University of Minnesota Twin Cities
2022-24 Graduate Courses

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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

University of Minnesota Twin Cities
3 Morrill Hall, 100 Church St. S.E., Minneapolis MN 55455

Academic Health Center Shared (AHS)

AHS 5100. HIV Drug Discovery. (3 cr. ; A-F only; Every Fall)
Basic virology, medicinal chemistry, pharmacology of HIV chemotherapy. General process of drug discovery, including target selection/validation, in vitro assay development, computer-aided inhibitor design strategies/drug-like properties. Major classes of FDA-approved anti-HIV drugs. Intellectual properties, FDA regulatory issues, successful antiviral discovery story. prereq: One year of organic chemistry, [CHEM 2301 and 2302] or equivalent, [one semester of biochemistry], [BIOC 3021 or equivalent]

Accounting (ACCT)

ACCT 5101. Intermediate Accounting I. (4 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Valuation, measurement, reporting issues related to selected assets/liabilities of firm. Theory underlying accounting issues. Applying accounting principles. prereq: Grade of B- or better in Acct 2050/Acct 2051 OR passed the Acct pretest (z.umn.edu/Acct5101pretest); CSOM Major, MGMT minor, mgmt grad student

ACCT 5102. Intermediate Accounting II. (; 4 cr. ; A-F or Audit; Every Fall & Spring)
Basic valuation problems encountered in financial reporting. Focuses on valuation of liabilities. Accounting for leases, pensions, and deferred taxes. Introduces consolidated financial statements. prereq: 5101[mgmt or grad mgmt student]

ACCT 5125W. Auditing Principles and Procedures. (WI; 4 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Concepts of auditing internal control/financial statements in accordance with generally accepted auditing/professional standards established by Public Company Oversight Board (PCAOB) and American Institute of Certified Public Accountants (AICPA). Writing Intensive course. prereq: [3101 or 5101 or 5100 or 6100], [acct major or grad mgmt student]

ACCT 5126. Internal Auditing. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Financial/operational auditing. Standards. Managing the function. prereq: 2050

ACCT 5135. Fundamentals of Federal Income Tax. (; 4 cr. ; A-F or Audit; Every Fall & Spring)
U.S. federal system of taxation. Concepts of gross income, deductions, credits. Analysis of structure of Internal Revenue Code, its provisions with respect to specific areas of law. Interrelationships between legislative, judicial, and administrative authority. Methods, tools, and techniques to conduct tax research. prereq: [2050 and or 2051] or MBA 6030], [mgmt or grad mgmt student]

ACCT 5141. Financial-Data Analytics. (2 cr. ; A-F only; Every Fall & Spring)
This is a 2-credit undergraduate-level financial reporting data analytics course for Carlson students. The main learning objective is to introduce students specializing in business (accounting, auditing, tax, finance, marketing, operations, etc.) to data analytics, providing them the necessary knowledge and tools needed to effectively use data analytics in their specialized domain. The goal is thus for students to be able to consume and use available data analytics technologies to complement existing technical skills, rather than to train "data analytics specialists" (although this class is a good jumping-off point for students who wish to pursue a career specializing in data analytics!). Prior coding experience is thus not required, although students should have completed business statistics (SCO 2550 or BA 2551 or equivalent statistics course). After a general overview of data analytics and machine learning, we will dive into the ETL (extract, transform, load) process, covering topics and showcasing applications such as data joins, variable types, formulas, and regular expressions. We will then explore data visualization tools (including pivot tables and dashboards) and conclude the term by modeling data to create business insights via predictions. Students will gain hands-on experience using state-of-the-art data analytics tools and will learn how to conduct basic SQL queries. Students will improve their quantitative and problem-solving skills and learn how to apply scientific research methods to answer questions, present solutions, and discuss limitations. An emphasis will be placed on financial reporting datasets/applications, although the methods and concepts covered are applicable to other business settings/ functions. Ultimately, students will enhance their analytical skills and achieve a deeper understanding of issues related to financial reporting specifically and business more generally. prereq: SCO 2550 or BA 2551 or equivalent statistics course and Acct 2050 or 2051

ACCT 5161. Financial Statement Analysis. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Interpretation/analysis of financial statements. Introduces basic techniques of financial statement analysis and applies them in different settings (e.g., in investment/credit decisions). prereq: [5101]

ACCT 5181. Consolidations and Advanced Reporting. (2 cr. ; A-F or Audit; Every Spring & Summer)
Theory underlying preparation of consolidated financial statements, as well as mechanical computations needed to prepare statements. prereq: 5101, 5102 recommended, or MBA 6031 (equiv. is also MBA 6030 before course number change in Fall 2022). MBA/Mgmt Sci MBA students must register A/F grade base.

ACCT 5201. Intermediate Management Accounting. (2 cr. ; A-F or Audit; Every Fall & Spring)
This course is an in-action course. The course explores the topic of management accounting in greater depth. The course expands introductory course material via special emphasis on decision making, problem solving skills and exploration of accounting's role within overall management. The course is an in-action class. We will have a project working on a business case from a firm as the final assessment for the course. prereq: 3001, acct or finance major

ACCT 5236. Introduction to Taxation of Business. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Introduction to the income tax laws governing the taxation of corporations, partnerships, limited liability companies, limited liability partnerships, and S corporations. Students will also increase their knowledge and skills related to tax research by writing research memorandums. prereq: 5135, acct major

ACCT 5311. International Accounting. (; 2 cr. ; A-F or Audit; Every Spring)
Causes/history of international differences in design of financial accounting/reporting systems, efforts to harmonize them into worldwide system. Role/impact of currency translation on financial statements. International Accounting Standards, conceptual framework. prereq: 5101; [5102 or concurrent registration is required (or allowed) in 5102] recommended

ACCT 5320. Financial Reporting Data Analytics. (; 2 cr. ; A-F only; Every Fall)
This is a core course for the students in the Master of Accounting program at Carlson School of Management. The main learning objective is to familiarize students with large-scale financial reporting and market information databases and to improve students' quantitative analytical and problem-solving skills in conjunction with these data. We will discuss financial reporting and corporate governance topics related to earnings management, fraud detection, audit quality, board structure, and SEC enforcement. Students will gain hands-on data analysis experience. Students will also learn how to apply scientific research methods to answer questions, present solutions, and discuss limitations. We will provide a brief overview of the concepts of probability distribution and statistical inference. Relying on the above tools, students enhance their analytical skills and ultimately achieve deeper understanding on issues related to financial reporting and capital markets.Topics vary.

ACCT 5420. MAcc directed study. (1-4 cr. ; Student Option; Every Fall, Spring & Summer)
Internship or directed study in Master of Accountancy degree program. prereq: MAcc student

ACCT 5900. Topics in Accounting. (; 1-4 cr. [max 12 cr.] ; A-F only; Periodic Fall & Spring)
Topics in Accounting which focus on specialized areas in ACCT that area currently relevant or have importance in the field

ACCT 6075. Managing the Global Corporate Tax Rate. (; 2 cr. ; A-F only; Periodic Summer)
Computation, disclosure, and analysis of worldwide provision for income taxes. Impact of new Administration?s tax policy. Comparative corporate income tax systems. Impact of International Financial Reporting Standards.

Short-term convergence of international/U.S. accounting standards. Case studies. prereq: MBA student

ACCT 6102. Financial Statement Analysis. (; 2 cr. [max 4 cr.] ; A-F only; Every Fall)
Firms communicate their results to various users through financial statements. By developing an understanding about how companies report their economic transactions, financial statement users can better understand the results of those transactions. Financial statements tell the story of a firm and are the basis upon which business decisions are made, so users need the ability to properly analyze the financial statements in order to make accurate decisions regarding the firm?s future. By the end of this course, students should be able to evaluate how a firm?s business strategy translates to the financial statements, recognize potential earnings management, decipher whether a firm?s profitability is sustainable or unsustainable, understand revenue recognition rules and the potential for manipulation, articulate the general accounting rules regarding operating activities for a firm, evaluate how investing and financing activities affect a firm?s health, and utilize financial forecasting to predict how a company will likely perform in the future. prereq: MBA 6031, MBA/Mgmt Sci MBA student

ACCT 6320. Current Topics in Accounting. (; 1-4 cr. ; A-F only; Periodic Fall & Spring)
Topics vary. prereq: MBA 6130, MBA student

ACCT 6601. Internal Control. (2 cr. [max 4 cr.] ; A-F only; Every Fall)
Internal control from management's perspective. Application of COSO Internal Control?Integrated Framework and Enterprise Risk Management?Integrated Framework. prereq: MAcc grad major

ACCT 6602. Securities and Exchange Commission (SEC) and Standard Setting. (2 cr. [max 4 cr.] ; A-F only; Every Fall)
Role/organization of Securities and Exchange Commission (SEC) and Public Company Accounting Oversight Board (PCAOB). Compliance with Securities Act of 1933, Securities and Exchange Act of 1934, and Sarbanes-Oxley Act of 2002. Setting/ convergence of international/U.S. accounting/ auditing standards.

ACCT 6603. Advanced Auditing. (2 cr. ; A-F only; Every Fall)
Auditing of derivatives, business combinations, fair value instruments, and other accounting topics. Evaluating the discipline of forensic accounting.

ACCT 6604. Advanced Management Accounting. (2 cr. ; A-F only; Every Fall)
Advanced Management Accounting will expose students to the application of management accounting from a strategic perspective. Students will deepen their knowledge and understanding of management accounting?s role in areas such as sustainability, environmental accounting, time-based accounting, including time-based activity-based costing, activity-based management, value chain analysis, business process re-engineering, benchmarking, target costing, product life cycle management, quantifying qualitative improvements and ?big data?. Via cases and discussion of current articles, students will explore the most current and challenging issues facing management accountants.

ACCT 6606. Financial Data Analytics. (2 cr. ; A-F only; Every Fall)
The main learning objective of this course is to familiarize students with large-scale financial reporting and capital market information databases and to improve students' quantitative analytical skills in conjunction with these data. We will discuss financial reporting, consumer finance, and corporate governance topics. Students will gain hands-on data analysis experience using Tableau, Excel, and R. Students will learn how to apply scientific research methods to answer questions, present solutions, and discuss limitations. We will provide a brief overview of the concepts of probability and statistical inference. Relying on the above tools and methodology, students enhance their analytical skills and ultimately achieve deeper understanding on issues related to financial reporting, auditing, and capital markets.

ACCT 8801. Topics in Empirical Research I. (; 2 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
Capital-markets stream of empirical research in accounting. Accounting earnings and stock prices, earnings-based security valuation (theoretical and empirical), estimation of earnings-based risk measures, market anomalies, and related topics from corporate finance. Econometric techniques in market-based empirical research/application to data analysis. prereq: Business admin PhD student or instr consent

ACCT 8802. Topics in Empirical Research II. (; 2 cr. ; Student Option; Every Fall & Spring)
Empirical capital markets research topics course. The course is designed to include current research topics in capital markets that are cutting-edge and topics in the instructor's area of expertise. Topics will vary with each offering.

ACCT 8803. Topics in Empirical Research III. (; 2 cr. ; A-F only; Every Fall & Spring)
The course is designed to include current research topics in Empirical Research that are cutting-edge and topics in the instructor's area of expertise. Topics will vary with each offering.

ACCT 8811. Topics in Information Economics I. (; 2 cr. [max 4 cr.] ; Student Option; Periodic Fall & Spring)
Asymmetric information, incentives, and contracts. Moral hazard, adverse selection, reputation, and signaling phenomena. Applications to accounting such as transfer pricing, budgeting, cost allocations, performance measurement, audit pricing. prereq: Business admin PhD student or instr consent

ACCT 8812. Topics in Information Economics II. (; 2 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
Information in capital markets; asset pricing with asymmetric information; economics of disclosure and information acquisition. prereq: Business admin PhD student or instr consent

ACCT 8813. Topics in Information Economics III. (2 cr. ; A-F only; Every Fall & Spring)
Asymmetric information, incentives, and contracts. Moral hazard, adverse selection, reputation, and signaling phenomena. Applications to accounting such as transfer pricing, budgeting, cost allocations, performance measurement, audit pricing.

ACCT 8821. Topics in Capital Markets I. (; 2 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
Auction markets; price formation in experimental asset markets; experimental studies of information transfer and capital market efficiency; experimental tests of strategic behavior, trust, and reciprocity.

ACCT 8822. Topics in Capital Markets II. (; 2 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
Heuristics and biases in information processing, auditor judgment, mental accounting, and decision aids.

ACCT 8823. Topics in Capital Markets III. (2 cr. ; A-F only; Periodic Fall & Spring)
PhD seminar course concentrating on current topics in Capital Markets.

ACCT 8831. Topics in Analytical Research I. (; 2 cr. ; Student Option; Every Fall & Spring)
The course is designed to include current analytical research topics that are cutting-edge and topics in the instructor's area of expertise. Topics will vary with each offering.

ACCT 8832. Analytical Research Topics II. (2 cr. ; Student Option; Every Fall & Spring)
The course is designed to include current analytical research topics that are cutting-edge and topics in the instructor's area of expertise. Topics will vary with each offering.

ACCT 8833. Topics in Analytical Research III. (2 cr. ; A-F only; Periodic Fall & Spring)
PhD seminar course focusing on current topics in Analytical Research

ACCT 8892. Readings in Accounting. (; 1-8 cr. [max 16 cr.] ; Student Option; Every Fall, Spring & Summer)
Readings appropriate to an individual student's program or objectives that are not available in regular courses. prereq: Business admin PhD student or instr consent

ACCT 8894. Research in Accounting. (; 1-8 cr. [max 16 cr.] ; Student Option; Every Fall, Spring & Summer)
Individual research on an approved topic appropriate to student's program and objectives. prereq: Business admin PhD student or instr consent

Addiction Studies (ADDS)

ADDS 5011. Foundations in Addiction Studies. (; 2 cr. ; A-F only; Every Fall & Spring)

Theoretical perspectives/concepts related to etiology of alcohol/drug dependency/abuse. Emphasizes bio-psycho-social models of addiction/disease: psychodynamics, social learning, contingency, family systems. Connection of theory to empirical research.

ADDS 5021. Introduction to Evidence Based Practices and the Helping Relationship. (3 cr. ; A-F only; Every Fall & Spring)
Initiating, conducting, and terminating a counseling relationship. Use of self in counseling process. Nature/process of helping. Evidence-based practices/theories. Reading, discussion, written exercises, role-play, observation, feedback, out-of-class practice.

ADDS 5031. Applied Psychopharmacology. (; 2 cr. ; A-F only; Every Spring & Summer)
This course provides a comprehensive survey of the basic concepts of psychopharmacology and psychiatric conditions for which psychoactive medication presents an appropriate intervention strategy. It is intended to be an introduction into the field and is designed to provide a working knowledge base to enable students to more competently address the experiences of their clients taking prescribed psychotropic medications.

ADDS 5041. Methods and Models I: Motivational Counseling. (2 cr. ; A-F only; Every Spring & Summer)
Concepts of motivational interviewing. Spirit of MI. Primary counseling skills. Working with resistance. Identifying/eliciting change talk. Transitioning into change, negotiating treatment plan. Strengths/shortcoming of MI.

ADDS 5051. Methods and Models II: Cognitive Behavioral Therapy. (2 cr. ; A-F only; Every Spring & Summer)
Components of cognitive model. Assessment, case formulation, automatic thoughts, core beliefs, cognitive restructuring, behavior change elements, therapeutic relationship. Learn, practice, master key concepts.

ADDS 5061. Foundations of Group Work. (3 cr. ; A-F only; Every Fall, Spring & Summer)
Designing/facilitating therapy groups. Intra-/inter-personal dynamics, leadership skills, developmental aspects, ethical issues. Application to therapy of chemically addicted individuals. Lectures, discussion, experiential exercises, small groups, readings.

ADDS 5071. Foundations of Co-occurring Disorders. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Understanding mentally ill/chemically abusive or dependent client. Intervention, advocacy, education, support for client/those part of his/her environment. Social, environmental, multicultural factors that contribute resources for these clients.

ADDS 5081. Multicultural Foundations of Behavioral Health. (3 cr. ; A-F only; Every Fall & Spring)
What is culture? How might culture, cultural practices, and history be significant in the use/abuse of substances? How is culture relevant to the attitudes/practices in the prevention/treatment of substance use/abuse? Multicultural counseling and cultural competence in addiction counseling. People as individuals. Clinician's own cultural worldview/other cultural worldviews.

ADDS 5091. Assessment and Treatment Planning I. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Core addictions counseling. Clinical assessment, case management, documentation treatment planning, ethical issues. Students begin process of securing internship.

ADDS 5121. Professional Seminar 1: Internship Prep. (; 1 cr. ; S-N only; Every Fall, Spring & Summer)
Prepares students for successful entry into field of substance use disorder counseling by focusing on facets that are critical to their professional development. Through discussions, experiential learning activities, guest lectures and site visits, students gain further understanding of the internship placement process and requirements, settings that fit their individual training and career goals, requirements for initial licensing and renewal, the testing process, models of professional development, the importance of professional advocacy and associations, self-care and requirements and benefits of clinical supervision. Professional ethics, including state rules, statutes, codes of conduct and regulations for practitioners and agencies are also addressed. Students will also develop their job search skills and apply them to secure a field placement for the internship seminar.

ADDS 5950. Special Topics. (; 1-4 cr. [max 12 cr.] ; A-F only; Every Fall, Spring & Summer)
Special topics in addiction studies. prereq: dept consent

ADDS 5993. Directed Study. (1-3 cr. [max 9 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed study. prereq: dept consent

ADDS 5996. Internship in Behavioral Health. (1 cr. [max 8 cr.] ; S-N only; Every Fall, Spring & Summer)
Internship provides Addiction Studies students with practical experience in settings where substance abuse and/or co-ocurring mental health treatment services are offered. The internship experience allows students to relate academic and theoretical learning to settings outside the classroom. General counseling skills, awareness and influence of self in the counseling process and competency in the 12 Core Functions are enhanced through clinical experience, on-site individual supervision and peer group supervision.

Adult Psychiatry (ADPY)

ADPY 5515. Neuropsychology: University Hospitals. (; 3-9 cr. ; O-N or Audit; Every Fall)

ADPY 7109. Adult Psychiatry: Duluth. (; 6 cr. ; H-N or Audit; Every Fall & Spring)
This externship in adult psychiatry provides a clinical exposure to the broad spectrum of psychiatric problems encountered in the general practice of psychiatry. The student has the opportunity to see and evaluate the various psychiatric syndromes from a hospital-based psychiatric unit. The program emphasizes an understanding of the psychodynamics, family interaction, sociologic issues, and general life stresses precipitating the psychiatric picture. Subsequent treatment possibilities also are stressed, and the student has an opportunity for participating in treatment efforts at the hospital. In addition, the student may attend seminars and staff activities at St. Luke's Hospital & Regional Trauma Center. Miller-Dwan Hospital, the Medical Center, and St. Mary's Hospital in Duluth also are used. Efforts are made to tailor this course to the wishes of the student when it is feasible. prereq: SPECIAL INSTRUCTIONS: Students must contact the UMD Department of Family Medicine, 10 University Drive, Duluth, MN 55812 [218-726-7916] at least one month prior to quarterly cancel/add deadline.

ADPY 7121. Descriptive Psychiatry. (; 2 cr. [max 4 cr.] ; H-N or Audit; Periodic Fall)
Psychiatric diagnoses encountered in physical-disabilities/psychosocial work settings. Clinical presentations of common diagnoses. General diagnostic criteria. Intervention alternatives. prereq: [OT or PT] student, instr consent

ADPY 7500. Psychiatry Clerkship. (; 4 cr. ; P-N only; Every Fall, Spring & Summer)
This course is a requirement for all third year medical students. Its goal is to prepare medical students to recognize, diagnose, and care for patients with psychiatric disorders encountered in most medical practices.

ADPY 7502. Elective Rotation In Addiction Medicine. (; 6 cr. ; H-N or Audit; Every Fall & Spring)
Elective rotations are offered in a variety of substance abuse treatment settings. Our program is innovative and flexible, using interventions from many schools. Each treatment plan is fully individualized, and may include 12-step approaches, Rational Recovery, social learning theory, and psychiatric care. Designed for students of any specialty. prereq: AdPy 7-500

ADPY 7503. Elective Experience in Research in Addiction Medicine. (; 3-6 cr. ; H-N or Audit; Every Fall & Spring)
A variety of clinical research projects offer the student excellent opportunities for developing research skills, as well as a deeper understanding of the addiction process. Ongoing projects include research on medical complications of alcoholism, treatment of alcohol and other drug dependence, brain imaging, neuropsychological testing and impairment, case management, and homelessness and alcohol/drugs. Other projects are available or possible and can be arranged. prereq: Approval of course director

ADPY 7505. Assessment and Treatment of Torture Victims. (; 2 cr. ; H-N or Audit; Every Fall, Spring & Summer)
How to assess/treat survivors of political torture. As part of an interdisciplinary team,

students have patient contact, participate in special projects. Two-week field experience. prereq: 7500, MED 7500, med sr

ADPY 7512. Acting Internship Psychiatry - Consultation/Liaison. (; 2-4 cr. ; H-N only; Every Fall, Spring & Summer)
The student is teamed with a resident and staff who supervise progressive participation in service activities. Case-directed teaching is complemented by seminars with assigned readings and service conferences.

ADPY 7514. Substance Abuse and Associated Psyciatric Disorders. (; 6 cr. ; H-N or Audit; Periodic Fall & Spring)
The student works with patients with substance use and/or abuse disorders. The student's involvement covers a spectrum of services including inpatient, intensive outpatient program, partial hospitalization, outpatient program, and outpatient follow-up. Supervision is conducted by Senior G-4 Resident and Staff. prereq: Approval of course director

ADPY 7530. Psychiatry Scholarly Work. (; 4 cr. [max 8 cr.] ; H-N only; Every Fall, Spring & Summer)
The student arranges a program with a faculty supervisor. Choosing the supervisor and the content of the course is the student's responsibility and must be approved by the faculty supervisor and course director.The student arranges a program with a faculty supervisor. Choosing the supervisor and the content of the course is the student's responsibility and must be approved by the faculty supervisor and Dr. Mackenzie.

ADPY 7535. Acting Internship Clinical Practice of Psychiatry. (2-4 cr. ; H-N only; Every Fall, Spring & Summer)
The various clinical experiences provide opportunities for diagnostic evaluation and treatment for a range of psychiatric disorders in adults and/or children, including bipolar and unipolar affective disorders, anxiety disorders, adjustment disorders, attentional disorders, personality disorders and some psychotic disorders.

ADPY 7640. Essentials of Interdisciplinary Health Care. (; 1 cr. ; H-N or Audit; Periodic Fall & Spring)
Knowledge/skills to work successfully in interdisciplinary health care. Web-based course.

ADPY 7910. Adult Psychiatry Medical Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Adult psychiatry medical residency.

ADPY 7911. Psychiatry PGY-1 at VA Medical Center. (; 8 cr. [max 24 cr.] ; H-N or Audit; Every Spring & Summer)
Introduction to wide variety of psychiatric topics. Lectures by invited speakers and by clinical/psychiatric faculty. prereq: PGY-1 psychiatry resident, dept consent

ADPY 7930. Adult Psychiatry Medical Fellowship. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Adult psychiatry medical fellowship.

ADPY 7952. Geriatric Psychiatry Fellowship VA Med Ctr. (; 8 cr. [max 24 cr.] ; H-N or Audit; Periodic Fall)
Fifth year fellowship in geriatric psychiatry at VA Medical Center. prereq: Psychiatric resident/fellow, dept consent

ADPY 7971. Consultation Liaison Psychiatric Fellowship. (; 8 cr. ; H-N or Audit; Every Spring & Summer)
Fifth year fellowship in consult-liaison psychiatry. prereq: C-L fellow/psychiatric resident, dept consent

ADPY 7972. Psychiatric Child Fellowship: Year I. (; 8 cr. [max 24 cr.] ; H-N or Audit; Every Fall, Spring & Summer)
First year of two-year fellowship in child/adolescent psychiatry, PGY-4 level. prereq: Psychiatric resident/fellow, dept consent

ADPY 7973. Chemical Dependency Fellowship. (; 8 cr. [max 24 cr.] ; H-N or Audit; Every Spring & Summer)
Fifth year fellowship in addiction psychiatry medicine. prereq: Psychiatric resident/fellow, dept consent

ADPY 7974. Eating Disorders Fellowship. (; 8 cr. [max 24 cr.] ; H-N or Audit; Every Spring & Summer)
Fifth year fellowship in psychiatry eating disorders at Fairview-University Medical Center. prereq: Psychiatric resident/fellow, dept consent

ADPY 7981. Psychiatric Child Fellowship: Year 2. (; 8 cr. [max 24 cr.] ; H-N or Audit; Every Spring & Summer)
Second year of two-year fellowship in child/adolescent psychiatry, PGY-5 level. prereq: Psychiatric resident/fellow, dept consent

ADPY 8205. Special Assignments. (; 1-16 cr. ; Student Option;)

ADPY 8206. Research. (; 1-16 cr. ; Student Option; Every Spring & Summer)

ADPY 8249. Clinical Neuropsychopharmacology. (; 1-15 cr. ; Student Option; Periodic Fall)
The course is designed for a two-day presentation, four hours one afternoon, followed by eight hours the next day, to include the following subject matter: introduction to neurotransmitter theory and mechanism of action of psychotropic drugs; evaluation of anxiety states and use of antianxiety agents; clinical picture of depression, use of antidepressants, and principles of drug combinations; schizophrenia diagnosis, use of antipsychotic drugs, antiparkinson medication, parkinson side effects of neuroleptics, and tardive dyskinesia; clinical evaluation of epilepsy and use of anticonvulsants; neurophysiology of sleep, prescription of hypnotics and sedatives, and significance of over-the-counter sleep aids; use of anorexiants, over-the-counter appetite suppressants, and opiate analgesics; geriatric psychopharmacology; classification of drug side effects and principles of drug interaction; abused drugs; and ethnopsychopharmacology. prereq: Resident status or 3rd- or 4th-yr med student or 8248 for grad students

ADPY 8970. Directed Studies. (; 1-24 cr. ; Student Option; Every Spring & Summer)

Aerospace Engineering and Mech (AEM)

AEM 5247. Hypersonic Aerodynamics. (3 cr. ; A-F or Audit; Spring Even Year)
Importance/properties of hypersonic flow. Hypersonic shock and expansion-wave relations. Local surface inclination methods. Approximate/exact methods for hypersonic inviscid flow fields. Viscous flow: boundary layers, aerodynamic heating, hypersonic viscous interactions, computational methods. Hypersonic propulsion and vehicle design. prereq: 4202 or equiv, CSE grad student

AEM 5253. Computational Fluid Mechanics. (3 cr. ; A-F or Audit; Every Fall)
Introductory concepts in finite difference and finite volume methods as applied to various ordinary/partial differential model equations in fluid mechanics. Fundamentals of spatial discretization and numerical integration. Numerical linear algebra. Introduction to engineering and scientific computing environment. Advanced topics may include finite element methods, spectral methods, grid generation, turbulence modeling. prereq: [4201 or equiv], [CSci 1113 or equiv], CSE grad student

AEM 5321. Modern Feedback Control. (; 3 cr. ; Student Option; Every Fall)
State space theory for multiple-input-multiple-output aerospace systems. Singular value decomposition technique, applications to performance/robustness. Linear quadratic gaussian and eigenstructure assignment design methods. Topics in H[infinity symbol]. Applications. prereq: 4321 or EE 4231 or ME 5281 or equiv

AEM 5333. Design-to-Flight: Small Uninhabited Aerial Vehicles. (3 cr. ; A-F only; Periodic Spring)
Designing, assembling, modeling, simulating, testing/flying of uninhabited aerial vehicles. Rapid prototyping software tools for vehicle modeling. Guidance, navigation, flight control, real-time implementations, hardware-in-the-loop simulations, flight tests. prereq: [[4202, concurrent registration is required (or allowed) in 4303W, 4601] or equiv], instr consent

AEM 5401. Intermediate Dynamics. (; 3 cr. ; A-F or Audit; Every Fall)
Three-dimensional Newtonian mechanics, kinematics of rigid bodies, dynamics of rigid bodies, generalized coordinates, holonomic constraints, Lagrange equations, applications. prereq: CSE upper div or grad, 2012, Math 2243

AEM 5451. Optimal Estimation. (; 3 cr. ; Student Option; Fall Even Year)
Basic probability theory. Batch/recursive least squares estimation. Filtering of linear/non-linear systems using Kalman and extended Kalman filters. Applications to sensor fusion, fault detection, and system identification. prereq: [[MATH 2243 or STAT 3021 or equiv], [4321 or EE 4231 or ME 5281 or equiv]] or instr consent

AEM 5501. Continuum Mechanics. (; 3 cr. ; Student Option; Every Fall)
Concepts common to all continuous media; elements of tensor analysis; motion, deformation, vorticity; material derivatives; mass, continuity equation; balance of linear, angular momentum; geometric characterization of stress; constitutive equations. prereq: CSE upper div or grad, 3031, Math 2243 or equiv or instr consent

AEM 5503. Theory of Elasticity. (; 3 cr. ; A-F or Audit; Every Spring)
Introduction to the theory of elasticity, with emphasis on linear elasticity. Linear and nonlinear strain measures, boundary-value problem for linear elasticity, plane problems in linear elasticity, three dimensional problems in linear elasticity. Topics from nonlinear elasticity, micromechanics, contact problems, fracture mechanics. prereq: 4501 or equiv, Math 2263 or equiv or instr consent

AEM 5581. Mechanics of Solids. (3 cr. ; Student Option; Fall Odd Year)
Continuum mechanics in one dimension: kinematics; mass, momentum/energy, constitutive theory. Wave propagation, heat conduction. Strings. Euler-Bernoulli theory. 3-D deformations/stress. Topics from fracture mechanics, structural stability, vibrations, thin films, layered media, smart materials, phase transformations, 3-D elastic wave propagation. Elasticity, viscoelasticity, plasticity. prereq: 3031 or equiv, [Math 2373 or equiv], [Math 2374 or equiv], [CSE grad student]

AEM 5651. Aeroelasticity. (; 3 cr. ; A-F or Audit; Every Fall)
Static aeroelastic phenomena, torsional divergence of a lifting surface, control surface reversal. Aeroelastic flutter, unsteady aerodynamics. Problems of gust response, buffeting. Design project. prereq: 4202, 4301, [grad student or CSE upper div]

AEM 8000. Seminar: Aerospace Engineering and Mechanics. (; 1 cr. [max 4 cr.] ; S-N or Audit; Every Fall & Spring)
To be determined prereq: DGS consent

AEM 8201. Fluid Mechanics I. (; 3 cr. ; Student Option; Every Fall)
Mathematical and physical principles governing the motion of fluids. Kinematic, dynamic, and thermodynamic properties of fluids; stress and deformation; equations of motion; analysis of rotational and irrotational inviscid incompressible flow; two-dimensional and three-dimensional potential flow. prereq: 4201 or equiv, Math 2263 or equiv

AEM 8202. Fluid Mechanics II. (; 3 cr. ; Student Option; Every Spring)
Analysis of incompressible viscous flow; creeping flows; boundary layer flow. prereq: 8201

AEM 8203. Fluid Mechanics III. (; 3 cr. ; Student Option; Every Fall)
Analysis of compressible flow and shock waves; method of characteristics for one-dimensional unsteady flow and for two-dimensional steady flow. prereq: 8202

AEM 8207. Hydrodynamic Stability. (; 3 cr. [max 4 cr.] ; Student Option; Periodic Fall)
Theory of hydrodynamic stability. Stability of shear flows, rotating flows, boundary layer, two fluid flows, fingering flows, Rayleigh-Taylor instability, Kelvin Helmholtz instability, capillary instability, convective/absolute stability. Methods of linear stability, normal modes, energy theory of stability, nonlinear perturbation, bifurcation theory, transition to turbulence. prereq: 8201

AEM 8211. Theory of Turbulence I. (; 3 cr. ; Student Option; Periodic Fall)
Reynolds equations, methods of averaging, elements of stability theory and vortex dynamics; description of large vortical structures in mixing layers and boundary layers; horseshoe vortices; flow visualization. prereq: 8202

AEM 8212. Theory of Turbulence II. (; 3 cr. ; Student Option; Periodic Fall)
Prandtl's mixing length theory applied to classical boundary layer, pipe, jet, and wake flows; prediction methods used at Stanford Conference; law of wall; law of wake; K-epsilon method. prereq: 8211

AEM 8213. Turbulent Shear Flows. (; 3 cr. ; A-F or Audit; Periodic Fall)
Equations of motion for turbulent flow. Isotropic/homogeneous turbulence. Free shear flows. Wall turbulence, elements of vortex dynamics. prereq: 8201, 8202

AEM 8221. Rheological Fluid Mechanics. (; 3 cr. ; Student Option; Periodic Fall)
Methods of solution for flows of simple fluids with general constitutive equations. Topics from viscometric flow, extensional flow, perturbations of the rest state with steady and unsteady flow, secondary flow. prereq: 8201 or 5501 or instr consent

AEM 8231. Molecular Gas Dynamics. (; 3 cr. ; Student Option; Periodic Fall)
Kinetic theory of gases, Boltzmann equation, Maxwell-Boltzmann distribution, collisions, transport properties. Introduction to quantum mechanics. Statistical thermodynamics, classical/quantum statistics. Partition functions and thermodynamic properties. Irreversible thermodynamics. prereq: [4201 or equiv], [4203 or equiv], [ME 3324 or equiv]

AEM 8232. Physical Gas Dynamics and Molecular Simulation. (3 cr. ; A-F or Audit; Periodic Spring)
Molecular description of gas dynamics. Kinetic theory, transport theory, quantum mechanics for internal energy partitions, statistical thermodynamics. Finite rate chemical kinetics. Emphasis on link to continuum fluid dynamics. Overview of numerical simulation techniques for the Boltzmann equation with emphasis on direct simulation Monte Carlo. prereq: AEM 8231

AEM 8233. Multi-phase Flows: Fundamentals, Measurement, and Modeling. (3 cr. ; A-F only; Spring Even Year)
Introduction to fluid flows with multiple interacting phases, with emphasis on cases in which a dispersed phase is carried by a continuous one. Droplet dynamics, bubbly flows and bubble-induced fluctuations, particle-turbulence interaction. Fundamentals of measurement techniques and modeling approaches. Elements of rheology for complex and active fluids.

AEM 8241. Perturbation Methods in Fluid Mechanics. (; 3 cr. ; Student Option; Periodic Fall)
Method of matched asymptotic expansions presented through simple examples and applied to viscous flows at high and low Reynolds numbers and other problems in fluid mechanics and applied mathematics. prereq: 8202 or instr consent

AEM 8251. Finite-Volume Methods in Computational Fluid Dynamics. (; 3 cr. ; Student Option; Periodic Spring)
Development of finite-volume computational methods for solution of compressible Navier-Stokes equations. Accuracy, consistency, and stability of numerical methods; high-resolution upwind shock-capturing schemes; treatment of boundary conditions; explicit and implicit formulations; considerations for high performance computers; recent developments and advanced topics. prereq: 4201 or 8201 or equiv, CSci 1107 or equiv

AEM 8253. Computational Methods in Fluid Mechanics. (; 3 cr. ; A-F or Audit; Periodic Fall)
Spatial discretization. Spectral methods. Temporal discretization. Nonlinear sources of error. Incompressible Navier-Stokes equations. Compressible Navier-Stokes equations. prereq: 4201

AEM 8261. Nonlinear Waves in Mechanics. (; 3 cr. ; Student Option; Periodic Fall)
Theory of kinematic, hyperbolic, and dispersive waves, with application to traffic flow, gas dynamics, and water waves. prereq: 5501 or instr consent

AEM 8271. Experimental Methods in Fluid Mechanics. (; 3 cr. ; Student Option; Periodic Fall)
Overview of computer organization, including external communications and A/D, D/A conversion. Measurement techniques, such as pressure measurements and hot-wire and laser Doppler anemometry. Signal processing and uncertainty; computer control of experiments. prereq: 4201, instr consent

AEM 8290. Topics in Fluid Mechanics. (; 1-4 cr. [max 8 cr.] ; Student Option; Every Fall, Spring & Summer)
Topics vary each semester within the field of Fluid Mechanics prereq: dept consent

AEM 8293. Directed Studies in Fluid Mechanics. (1-3 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
Topics of current interest. Individual projects with consent of faculty sponsor. prereq: dept consent

AEM 8295. Selected Topics in Fluid Mechanics. (; 1-4 cr. [max 8 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Includes individual student projects completed under guidance of a faculty sponsor. prereq: dept consent

AEM 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)

(No description) prereq: Master's student, adviser and DGS consent

AEM 8400. Seminar: Aerospace Systems. (; 1 cr. [max 4 cr.] ; S-N or Audit; Every Fall & Spring)
Developing program of research in aerospace Systems. Discussions of current research/ topics of interest. prereq: Aerosp Eng grad student

AEM 8411. Advanced Dynamics. (; 3 cr. ; A-F or Audit; Periodic Spring)
Advanced analytical mechanics and non-linear dynamical systems. Review of Lagrangian mechanics. Hamilton's equations of motion. Canonical transformations and Hamilton-Jacobi theory. Kane's equations. Analysis of differential equations and numerical methods. Phase plane, averaging, and perturbation methods. Stability/bifurcations of equilibria. prereq: 5401 or equiv

AEM 8415. Formal Methods for Dynamical Systems. (3 cr. ; Student Option; Every Fall)
Modern complex systems consist of physical elements and software which closely interact with each other. In the absence of software, a closed loop system can be rigorously designed via control theory. In the absence of dynamical models, complex specifications of software or hardware can be verified via formal methods. Over the last two decades, there has been a great interest in using formal methods to verify complex control systems. An essential thing in formal methods is specifying the desired complex requirement in a rigorous and compositional way. To this end, a suitable temporal logic is used to describe such specifications (which are more than classical stability or controllability). In this course, we will learn various temporal logics with different expressiveness, representations of these temporal logics, abstractions of dynamical systems, and algorithms that will synthesize controllers ensuring the satisfaction of the desired temporal logic specification.

AEM 8421. Robust Multivariable Control Design. (; 3 cr. ; Student Option; Periodic Spring)
Application of robust control theory to aerospace systems. Role of model uncertainty/ modeling errors in design process. Control analysis and synthesis, including H[sub2] and H[infinity symbol] optimal control design and structural singular value [Greek letter mu] techniques. prereq: 5321 or equiv

AEM 8423. Convex Optimization Methods in Control. (3 cr. ; A-F or Audit; Periodic Fall)
Practical aspects of convex optimization methods applied to solve design/analysis problems in control theory. prereq: 5321 or EE 5231 or equiv

AEM 8426. Optimization and System Sciences. (; 3 cr. ; A-F or Audit; Periodic Fall)
Review of probability concepts and random variables, nonlinear stochastic differential equations and their numerical solutions, Monte-Carlo simulations, Gauss-Markov process, stochastic dynamic programming, and optimal control of practical uncertain dynamic systems. prereq: 5321 or 5431, CSE grad student

AEM 8442. Aerospace Positioning, Navigation and Timing. (; 3 cr. ; Student Option; Periodic Fall)
Fundamental principles of navigation. Algorithms, performance analysis of navigational systems. Radio-navigation systems (DME,VOR,ILS). Satellite navigation ysstems (GPS,GLDNASS). Inertial navigation systems mechanization, error analysis. prereq: Exposure to [linear algebra, differential equations, probability, statistics]

AEM 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

AEM 8451. System Identification: Theory and Applications. (3 cr. ; A-F or Audit; Periodic Spring)
Modeling methods for dynamic systems using measurement data, or in combination with first principles, based on theory of systems/signals. Primary emphasis on linear systems for control system design/simulation applications. Examples from aerospace applications. prereq: 4321 or equiv

AEM 8453. Model Reduction and Approximation of Dynamical Systems. (3 cr. ; Student Option; Periodic Spring)
In this course, we will study analytical and data-driven methods for model reduction and approximation of dynamical systems. The focus will be on learning the relevant mathematics and tools for obtaining ?lean? low-dimensional representations of dynamical systems, which can be used to facilitate analysis and design. Roughly half of the course will be devoted to the problem of model reduction: i.e., given a mathematical description of a system, reduce the number of degrees of freedom required to faithfully represent that system. The other half of the course will be devoted to data-driven approximation of dynamical systems: i.e., given empirical data generated by a dynamical system, determine a mathematical representation for the underlying system dynamics. Although these two general problems are distinct, they are closely related and will be studied in parallel throughout the term.

AEM 8490. Topics in Aerospace Systems. (; 1-4 cr. [max 8 cr.] ; Student Option; Every Fall, Spring & Summer)
Topics vary each semester within the field of Aerospace Systems prereq: dept consent

AEM 8493. Directed Studies in Aerospace Systems. (1-3 cr. ; Student Option; Every Fall, Spring & Summer)
Topics of current interest. Individual projects with consent of faculty sponsor. prereq: dept consent

AEM 8495. Advanced Topics in Aerospace Systems. (; 1-4 cr. [max 32 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Individual student projects completed under guidance of a faculty sponsor. prereq: dept consent

AEM 8500. Research Seminar in Mechanics of Materials. (; 1 cr. [max 12 cr.] ; S-N or Audit; Every Fall & Spring)
Seminars given by students, faculty, and visitors on topics drawn from current research. prereq: instr consent

AEM 8511. Advanced Topics in Continuum Mechanics. (; 3 cr. [max 6 cr.] ; A-F or Audit; Periodic Fall & Spring)
Constitutive equations; invariance and thermodynamic restrictions. Nonlinear elasticity theory; exact solutions, minimization, stability. Non-Newtonian fluids; viscometric flows, viscometric functions, normal stress. Other topics may include reactive and/or nonreactive mixtures, nonlinear plasticity, and deformable electromagnetic continua. prereq: 5501 or instr consent

AEM 8521. Advanced Topics in Elasticity. (; 3 cr. ; A-F or Audit; Periodic Fall)
Contact stresses, finite deformations, and other topics. prereq: 5503

AEM 8523. Elastodynamics. (; 3 cr. ; A-F or Audit; Periodic Fall)
Waves and vibrations in rods, beams, and plates; dispersion; volume and surface waves; reflection; energy theorems; vibrations of bounded media and relation to technical theories; elements of nonlinear waves, inelastic waves, and stability of motion of elastic systems. prereq: 4581 or 5501 or instr consent

AEM 8525. Elastic Stability of Materials. (; 3 cr. ; A-F or Audit; Fall Even Year)
Stability/bifurcation problems. Poincare stability, Lyapunov stability, asymptotic stability. Lyapunov's general methods. Minimum potential energy criterion for elastic conservative systems. Numerical methods for continuation/branch switching. Material phase transformation, crystalline material stability, soft-phonon theory of phase transitions. Material instability problems in finite-strain elasticity. Stability of discrete/continuous structures. prereq: CSE grad student, familiarity with theory of linear algebra

AEM 8527. Pattern Formation and Bifurcation in Materials. (3 cr. ; A-F or Audit; Periodic Fall)
This course provides an in-depth discussion of bifurcation and stability problems and pattern formation in physics, chemistry, and mechanics (Fluids, Solids, Materials Science) with an emphasis on the application of symmetry theory to such problems. This theory applies to essentially all nonlinear equilibrium problems in science and engineering, but this class has a particular focus on structural mechanics and materials applications, including buckling of: beams, honeycombs, lattice structures, and phase transforming crystals. prereq: CSE grad student or instructor consent, familiarity with linear algebra.

AEM 8531. Fracture Mechanics. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Theories of mechanical breakdown. Kinetic rate theories and instability considerations; formation of equilibrium cracks and circular crack propagation under pulses; statistical aspects of strength and fracture of micromolecular systems; time and temperature dependency in fracture problems and instability

of compressed material systems. prereq: 5503 or instr consent

AEM 8533. Theory of Plasticity. (; 3 cr. ; Student Option; Periodic Fall)
Theory of permanent deformation of ductile metals; bi-linear material models, Drucker's three bar truss, and other examples; 3-D continuum formulation, yield surfaces, hardening rules, and material stability; slip line theory, Prandtl punch solution; single crystal plasticity. prereq: 5203 or instr consent

AEM 8541. Mechanics of Crystalline Solids. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Atomic theory of crystals and origins of stress in crystals. Relation between atomic and continuum description; phase transformations and analysis of microstructure; effects of shear stress, pressure, temperature, electromagnetic fields, and composition on transformation temperatures and microstructure; interfacial energy in solids. prereq: 5501 or instr consent

AEM 8551. Multiscale Methods for Bridging Length and Time Scales. (3 cr. ; A-F or Audit; Periodic Spring)
Classical/emerging techniques for bridging length/time scales. Nonlinear thermoelasticity, viscous fluids, and micromagnetics from macro/atomic viewpoints. Statistical mechanics, kinetic theory of gases, weak convergence methods, quasicontinuum, effective Hamiltonians, MD, new methods for bridging time scales. prereq: Basic knowledge of [continuum mechanics, atomic forces], familiarity with partial differential equations, grad student in [engineering or mathematics or physics]

AEM 8590. Topics in Mechanics and Materials. (; 1-4 cr. [max 8 cr.] ; Student Option; Every Fall, Spring & Summer)
Topics vary each semester within the field of Solid Mechanics and Materials prereq: dept consent

AEM 8593. Directed Studies in Solid Mechanics and Materials. (1-3 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
Topics of current interest. Individual projects with consent of faculty sponsor. prereq: dept consent

AEM 8595. Selected Topics in Mechanics and Materials. (; 1-4 cr. [max 8 cr.] ; Student Option; Every Fall, Spring & Summer)
Includes individual student projects completed under guidance of a faculty sponsor. prereq: dept consent

AEM 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
To be determined prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

AEM 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

AEM 8880. Plan B Project. (; 1-3 cr. ; Student Option; Every Fall, Spring & Summer)
Satisfies project requirement for Plan B Master's degree. May appear on M.S. program but does not count toward 20-credit minimum in the major field. Topic arranged by student and advisor; written report required. prereq: Grad aerospace engineering or mechanics major, dept consent

AEM 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

African Amer & African Studies (AFRO)

AFRO 5015. Food Sovereignty in Africa. (ENV,SOCS; 3 cr. ; A-F only; Every Spring)
Food Sovereignty in Africa critically evaluates how the physical environment and historical processes shaped agricultural productivity in Africa, as well as exploring the subsequent relationship the continent has had with the rest of the world. The course uses multi-disciplinary resources to examine historical factors that have contributed to contemporary food security issues, and discusses grassroots food movements that embrace the ethics and values of African societies in their efforts to achieve both food security and environmental sustainability. It also examines the interplay between food security, indigenous knowledge, and environmental sustainability by comparing various standpoints on African food production, scrutinizing the challenges the continent is facing and the unique perspectives it offers in terms of agricultural development in the globalized world. Finally, the course examines how agricultural systems in Africa are affected by the new global land rush. After taking the course, students will have better knowledge of emerging research directions on Africa and will be equipped with sufficient research and practical skills to pursue independent studies beyond the classroom.

AFRO 5016. Africa and African Diaspora Archaeology. (GP,HIS; 3 cr. ; Student Option; Every Fall)
Africa and African Diaspora Archaeology (AFRO/ ANTH 3016/5016) examines the evolution of human behavior in Africa and looks at subsequent social, cultural, and technological developments as shown in archaeological records including artifacts, ecofacts, rock art, and structures at archaeological sites. It also discusses methods used to identify archaeological records and how these records can be used to reconstruct past ways of life. Students will obtain hand-on-experience in identifying, classifying, and interpreting archaeological objects. The course covers Africa from around 2.6 million years ago to the recent past, focusing primarily on the last 10,000 years. It examines the development and spread of food production, pottery, metallurgy, trade, and African connections with the Atlantic world dating back to the fifteenth century.

AFRO 5101. Seminar: Introduction to Africa and the African Diaspora. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Comparative frameworks, related theories, and pivotal texts in study of Africa and African Diaspora.

AFRO 5103. World History and Africa. (3 cr. ; A-F or Audit; Fall Even Year)
Contributions of African American thinkers to making of African history/strategies to rework theoretical/analytical foundations of world history. Writings/intellectual networks of major thinkers whose historical/ethnographic works on Africa spanning nineteenth to twentieth century. prereq: Grad student or instr consent

AFRO 5120. Social and Intellectual Movements in the African Diaspora. (3 cr. ; A-F or Audit; Every Fall)
Political, cultural, historical linkages between Africans, African-Americans, African-Caribbean. Black socio-political movements/ radical intellectual trends in late 19th/20th centuries. Colonialism/racism. Protest organizations, radical movements in United States/Europe. prereq: Grad student or instr consent

AFRO 5181W. Blacks in American Theatre. (WI; 3 cr. ; Student Option; Periodic Spring)
Historical survey of significant events in the development of American Black theatrical tradition; essays, plays, playwrights, and theatres from early colonial references to Black Arts Movement.

AFRO 5182W. Contemporary Black Drama and Dramaturgies. (WI; 3 cr. ; Student Option; Every Spring)
This course is an exploration of the impact and evolution of Black Theatre in America, covering the period rising from the Black Arts Movement to the present. The exploration will entail an understanding of cultural and socio-political issues as they are reflected in key and significant plays written and produced from the late 1950's to the present. The plays and essays will be read against the background of significant cultural, social and literary movements - the Civil Rights Movement, Cold War politics, the Women's Movement, Gay Liberation, the Culture Wars, post-modernism, deconstruction, multiculturalism, afro-futurism, etc. as well as the evolution of identity nomenclature and racial classification from Colored to Negro to Black to African American. In addition to play analysis and criticism, students will garner a knowledge of significant Black cultural institutions and their impact on the ever-changing American theatre landscape.

AFRO 5191. Seminar: The African American Experience in South Africa. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Ideological, political, religious, and cultural ties that have informed African American and black South African relations from late 18th century to present.

AFRO 5406. Black Feminist Thought. (; 3 cr. ; Student Option; Periodic Spring)

Critically examine spatiality of African descendant women in Americas/larger black diaspora. Writings from black feminist/queer geographies, history, contemporary cultural criticism. Recent black feminist theorizing.

AFRO 5593. The African American Novel. (3 cr. ; Student Option; Every Spring)
Explore African American novelistic traditions. Plot patterns, character types, settings, symbols, themes, mythologies. Creative perspectives of authors themselves. Analytical frameworks from contemporary literary scholarship.

AFRO 5625. Women Writers of Africa and the African Diaspora. (; 3 cr. ; Student Option; Periodic Fall, Spring & Summer)
In Coming to America, a 1988 film which blends humor and romance with some fairly pertinent observations, an African prince travels to Queens, NY, in search of a bride who will be both an equal and valued partner in life? s great adventure. In the thirty years since, the African immigrant story has become an intrinsic component of the booming canon of contemporary American immigrant literature, which includes such names as Edwidge Danticat, Jhumpa Lahiri, Junot Diaz, Chang-rae Lee, Gary Shteyngart, and others. This literary phenomenon mirrors trends identified in surveys and other similar data gathering activities. According to a 2009 study of the Migration Policy Institute, for instance, more than 75% of the foreign born African population in the United States has arrived since 1990. For these newcomers, Africa is not an imagined ancestral ?motherland? impressed in collective memory. Nor is it a faraway continent of parental origin whose negative media portrayal at times foments a problematic identification. Africa is a lived space, a home left behind, the anchor of childhood memories and?all too frequently? a horizon that perpetually beckons. As for America, it is the idealized land of freedom, prosperity, and opportunity that sometimes gives more than it promised, but oftentimes disenchants. This course situates gender squarely within the interlocking contexts of dynamic, complex and ever-changing African and American landscapes. Over the course of the semester, we will read short stories, novellas, personal narratives and essays, interspersed with visual excerpts from selected films and other representations of immigration, migration and border crossing in contemporary African and American cultural landscapes.

AFRO 5627. Seminar: Harlem Renaissance. (3 cr. ; Student Option; Every Fall)
Review Harlem Renaissance from variety of perspectives. Literary, historical, cultural, political, international. Complex patterns of permeation/interdependency between worlds inside/outside of what W.E.B. Du Bois called "the Veil of Color." prereq: Grad student or instr consent

AFRO 5866. The Civil Rights and Black Power Movement, 1954-1984. (3 cr. ; A-F or Audit; Every Fall)
The "second reconstruction." Failure of Reconstruction, abdication of black civil rights in 19th century. Post-1945 assault on white supremacy via courts/state, grass-roots southern movement in 1950s/1960s. Black struggle in north and west, emphasis on Black Power by new organizations/ideologies/ leaders. Ascendancy of Reagan, conservative assault on movement.

AFRO 5910. Topics in African American and African Studies. (; 3 cr. [max 9 cr.] ; A-F only; Every Fall, Spring & Summer)
Topics vary by instructor.

AFRO 5932. The Production of Knowledge, Negotiating the Past, and the Writing of African Histories. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Recent scholarship on social history of Africa. Focuses on new literature on daily lives of ordinary people in their workplaces, communities, households. prereq: Grad student or instr consent

AFRO 5993. Directed Study. (; 1-3 cr. ; Student Option; Every Fall, Spring & Summer)
Guided individual reading/study for qualified seniors and graduate students. prereq: instr consent

AFRO 8202. Seminar: Intellectual History of Race. (; 3 cr. ; Student Option; Every Fall & Spring)
At its heart, the 8202 seminar is about dialogue, interrogating scholarship on race, intellectual history, and knowledge production. We will be in deep conversation with one another as we negotiate meaning around the intellectual history of race. Dialogue, indeed, is at the heart of this graduate seminar experience. Given the multidisciplinary composition of the students and content in 8202, we build together to form a learning whole in a remote format. Central to our work is excavating the 500 year legacy of race thought and making into the contemporary period.

AFRO 8554. Seminar: Gender, Race, Nation, and Policy--Perspectives from Within the African Diaspora. (; 3 cr. ; Student Option; Every Fall & Spring)
Interdisciplinary analysis of U.S. domestic and foreign policies as they affect Africans and peoples of African descent in the diaspora. Intersections of gender, race, nation, and class. prereq: instr consent

AFRO 8590. Contemporary Literary and Cultural Studies. (; 3 cr. ; A-F only; Periodic Fall & Spring)
Each term explores a topic of key intellectual and critical significance in African American and/or African literary and cultural studies.

AFRO 8802. Seminar: Orientalism. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Recent arguments related to Orientalism as a trend in modern literary and cultural criticism.

AFRO 8910. Topics in Studies of Africa and the African Diaspora. (; 3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Topics specified in Class Schedule.

AFRO 8993. Directed Study. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Guided indvidual reading/study for qualified seniors and graduate students

Ag Educ, Comm & Mktg (AECM)

AECM 5111W. Agricultural Education: Methods of Teaching. (WI; 4 cr. ; Student Option; Every Fall)
Use of teaching resources; principles of teaching and learning; problem-solving techniques, lesson plan construction for large group, small group and individual investigations; student management; and assessment.

AECM 5115. Foundations of Agricultural Education. (3 cr. ; A-F only; Every Fall)
This course explores historical and philosophical foundations and current structures of school-based agricultural education programs. Students will understand, value, and apply strategies to implement and manage the integrated program model of agricultural education.

AECM 5125W. Designing Curriculum & Instruction for Agricultural Education. (WI; 3 cr. ; Student Option; Every Spring)
This course provides students an opportunity to understand, observe, and experience the process of developing curriculum and instruction for school-based agricultural education. Through coursework and a part-time clinical field experience (minimum of 25 hours at an assigned placement) in a school setting (grades 5-12), students will engage in the development of middle and secondary school agricultural education curricula. Special consideration in planning will be given to identifying regional, state, and community needs as well as student interest and prior knowledge. Students will have the opportunity to determine a programmatic framework, outline a scope and sequence of courses within a school-based agricultural education program, develop course outlines and materials, and create units, sub-units, and daily lessons for a variety of content areas. Additionally, using the integrated program model, curricular and instructional opportunities related to experiential learning (Supervised Agricultural Experience ? SAE) and leadership development (FFA) will be addressed. prereq: Jr or Sr Ag Ed student, or Ag Ed MS IL student.

AECM 5135. Instructional Methodology for Agricultural Education. (3 cr. ; A-F only; Every Fall)
This course focuses on instructional methodology for use in school-based agricultural education. Students will understand and apply psychological principles of teaching and learning, practice a variety of instructional strategies, develop pedagogical content knowledge, and apply the integrated program model of agricultural education to classroom teaching. Prerequisites: Junior or senior Ag Ed student or Ag Ed MS IL student

AECM 5145. Agricultural Education Classroom & Program Leadership. (3 cr. ; A-F only; Every Fall)
This course examines models of classroom and program leadership within school-based agricultural education. Through coursework and a part-time clinical field experience

(minimum of 25 hours) in a school setting (grades 5-12), students will learn, observe, and experience the ways in which school-based agricultural education teachers create and maintain an effective classroom/lab environment, manage student behavior, communicate and engage with school district leaders, program stakeholders, and community members to ensure student success. (3 credits) Prereqs: Jr or Sr Ag Ed student or Ag Ed MS IL student

AECM 5155. Agricultural Education Teaching Seminar. (3 cr. ; A-F only; Every Spring)
This course emphasizes professionalism and the code of ethics for school-based agricultural educators. Students are prepared for the job search and teacher licensure application process. Students take this course concurrent with AECM 5698-Teaching Internship and apply professionalism and the integrated program model in their classroom, school, and community. Prereqs: Jr or Sr Ag Ed Student or Ag Ed MS IL student

AECM 5220. Special Topics in Agriculture Education and Extension. (; 1-3 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Content varies by offering.

AECM 5231. Agricultural Education Curriculum K-12. (; 2 cr. ; A-F or Audit; Periodic Fall)
Philosophy, organization, and administration of instruction in agricultural education programs at the elementary, middle, and high school levels.

AECM 5233. Advanced Procedures in Teaching Agricultural Education. (; 2 cr. ; A-F or Audit; Periodic Fall)
New developments in methodology; assessment of innovations and procedures; consideration of various levels of instruction.

AECM 5235. Experiential Learning in Agricultural Education. (; 3 cr. ; Student Option; Periodic Fall & Spring)
The organization and administration of agricultural experience programs for middle and secondary level students: career exploration, improvement projects, experiments, placement in production/business/community settings, entrepreneurship. Current state and national programs and resource material.

AECM 5280. Current Issues for the Beginning Agricultural Education Teacher. (; 1-3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Reflection, analysis on current problems and issues confronting beginning teachers of agricultural education. Issues in teaching methods, classroom and program management, discipline, curriculum, FFA and SAE development, school-to-work relationships.

AECM 5696. Teaching Internship. (; 2-10 cr. [max 20 cr.] ; A-F only; Every Spring)
Agricultural Education teaching experience in a school system that provides instruction to grades 5-12. prereq: Admission to initial licensure program

AECM 5993. Directed Study in Agricultural Education and Extension. (; 1-4 cr. [max 8 cr.] ; Student Option; Every Fall, Spring & Summer)
Topics may be chosen to permit study of areas within education or to supplement areas of inquiry not provided in the regular course structure.

AECM 5995. Integrating Paper--Master of Education: Agricultural and Extension Education. (; 1-5 cr. [max 10 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Students prepare paper dealing with issues in agricultural education applied to professional responsibilities. AFEE 5995 can be taken for 1-5 credits, and students can enroll for two semesters for a combined max total of 5 credits.

AECM 8090. Seminar: Agricultural Education and Extension. (; 1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Topics on various aspects of agricultural education. Prepare, present, and critique a report. prereq: AgEd grad student

AECM 8094. Research in Agricultural Education and Extension. (; 1-6 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Select problems, prepare bibliographies, analyze and interpret data, and prepare manuscripts on studies. prereq: AgEd student doing Plan B research, dept consent

Agronomy and Plant Genetics (AGRO)

AGRO 5021. Plant Breeding Principles. (; 3 cr. ; Student Option; Every Fall)
This course is intended for advanced undergraduate students and graduate students that are either: 1) not plant breeding majors who will benefit from a basic understanding of how genetics is applied to plant improvement; or 2) plant breeding majors lacking prior coursework in plant breeding. The objective of this course is to develop an understanding of the underlying principles, ideas, and concepts important to applying genetic principles to plant breeding, evaluating breeding methods, and enhancing genetic progress and efficiency.

AGRO 5121. Applied Experimental Design. (; 4 cr. ; Student Option; Every Spring)
Principles of sampling methodologies, experimental design, and statistical analyses. Methods/procedures in generating scientific hypotheses. Organizing, initiating, conducting, and analyzing scientific experiments using experimental designs and statistical procedures. prereq: Stat 5021 or equiv or instr consent

AGRO 5311. Research Methods in Crop Improvement and Production. (; 1 cr. ; S-N or Audit; Every Fall & Summer)
Demonstrations and discussions of techniques in crop improvement and/or production research. Presentations integrate biotechnology with traditional breeding methods; production sessions emphasize ecologically sound cropping systems. prereq: applied plant sciences grad

AGRO 5321. Ecology of Agricultural Systems. (; 3 cr. ; A-F or Audit; Every Spring)
Ecological approach to problems in agricultural systems. Formal methodologies of systems inquiry are developed/applied. prereq: [3xxx or above] course in [Agro or AnSc or Ent or Hort or PlPa or Soil] or instr consent

AGRO 5431. Applied Plant Genomics and Bioinformatics. (3 cr. ; Student Option; Every Spring)
Analysis, interpretation, visualization of large plant genomic datasets. Basic computer programming, applying large-scale genomics to answer basic/applied biological questions, understanding limitations of each application, presenting concise visual findings from large-scale datasets. prereq: Grad student or [undergrad with genetics course]

AGRO 5999. Special Topics: Workshop in Agronomy. (; 1-6 cr. ; Student Option; Every Fall, Spring & Summer)
Workshops on various topics in agronomy and plant genetics. Presenters/faculty may include guest lecturers/experts. Topics specified in class schedule.

AGRO 8005. Supervised Classroom or Extension Teaching Experience. (; 2 cr. ; S-N or Audit; Every Fall & Spring)
Classroom or extension teaching experience in one of the following departments: Agronomy and Plant Genetics; Biosystems and Agricultural Engineering; Horticultural Science; Plant Pathology; or Soil, Water, and Climate. Participation in discussions about effective teaching to strengthen skills and develop personal teaching philosophy. prereq: Grad SENG major, instr consent

AGRO 8023. Evolution of Crop Plants. (; 3 cr. ; A-F or Audit; Spring Even Year)
Origin, distribution, and evolution of cultivated plants; implication of the effects of evolutionary processes on crop breeding for needs of people today. prereq: 9 grad cr in ag or bio science

AGRO 8202. Breeding for Quantitative Traits in Plants. (; 3 cr. ; Student Option; Spring Even Year)
Principles and concepts of population and quantitative genetics/application in designing and implementing a plant breeding program/ theory, experimental approaches, and evidence that form the basis for these concepts and breeding strategies. prereq: [5201, STAT 5021] or instr consent

AGRO 8241. Chromosomal and Molecular Genetics of Plant Improvement. (; 3 cr. ; Student Option; Fall Even Year)
Mixture of classic/current info in molecular plant genetics, biotech, and genomics. Students devise experiments in breeding, genetics, genomics, physiology, cellular/molecular biology, and other areas. prereq: Introductory Genetics course

AGRO 8900. Advanced Discussions. (; 1-3 cr. [max 36 cr.] ; Student Option; Periodic Fall & Spring)
Special workshops or courses in applied plant sciences for graduate students only.

Akkadian (AKKA)

AKKA 5011. Elementary Akkadian I. (; 3 cr. ; Student Option; Periodic Fall)
Introduction to cuneiform script. Basics of Old Babylonian morphology and syntax. Written drills, readings from Hammurabi laws, foundation inscriptions, annals, religious and epic literature. prereq: Adv undergrads with instr consent or grads

AKKA 5012. Elementary Akkadian II. (; 3 cr. ; Student Option; Periodic Fall)
Continuation of 5011. Readings include The Gilgamesh Epic, The Descent of Ishtar, Mari Letters, Annals of Sennacherib and Essarhaddon, Sargon II. prereq: 5011

American Indian Studies (AMIN)

AMIN 5107. The Structure of Anishinaabemowin: The Ojibwe Language. (; 3 cr. ; A-F or Audit; Periodic Fall)
Analysis of Anishinaabemowin (Ojibwe language) structure in the context of an endangered Algonquian language. Examine writing systems, phonological (sound) features, morphology (word parts), and grammatical structures as documented historically and presently. The aim of the course is to provide students with an overview of the structure of Anishinaabemowin and introduce them to primary sources readings. Unlike language courses students may be familiar with from other departments, this course will not require memorization of extensive amounts of vocabulary ? our focus will be on understanding the structure of the language and acquiring an appreciation of the relevant linguistic issues and language revitalization issues.

AMIN 5141. American Indian Language Planning. (; 3 cr. ; A-F or Audit; Periodic Fall)
Planning for maintenance/revitalization of North American indigenous languages. Condition/status of languages. Documentation, cultivation, literacy, education. prereq: 3103 or 3123 or instr consent

AMIN 5202. Indigenous Peoples and Issues Before the United States Supreme Court. (3 cr. ; Student Option; Periodic Fall & Spring)
Seminar explores the role and the practice of the US Supreme Court as a policy-making institution when dealing with indigenous nations and their citizens. Analysis of theoretical, behavioral, political, and institutional perspectives. Student work includes reading and textual analysis, leading discussions, analytical research paper.

AMIN 5402. American Indians and the Cinema. (AH,DSJ; 3 cr. ; A-F or Audit; Every Spring & Summer)
Representations of American Indians in film, historically/contemporarily. What such representations assert about Native experience and cultural viability. What they reflect about particular relationships of power.

AMIN 5409. American Indian Women: Ethnographic and Ethnohistorical Perspectives. (DSJ,HIS; 3 cr. ; Student Option; Fall Even Year)
Comparative survey of ethnographic/ethnohistorical writings by/about American Indian women.

AMIN 5412. Comparative Indigenous Feminisms. (GP; 3 cr. ; Student Option No Audit; Periodic Fall & Spring)
The course will examine the relationship between Western feminism and indigenous feminism as well as the interconnections between women of color feminism and indigenous feminism. In addition to exploring how indigenous feminists have theorized from 'the flesh' of their embodied experience of colonialism, the course will also consider how indigenous women are articulating decolonization and the embodiment of autonomy through scholarship, cultural revitalization, and activism.

AMIN 5602. Archaeology and Native Americans. (DSJ; 3 cr. ; Student Option; Fall Even Year)
Historical, political, legal, and ethical dimensions of the relationship of American archaeology to American Indian people. Case studies of how representational narratives about Native people are created through archaeology; responses by Native communities; and the frameworks for collaborative and equitable archaeological practice. Professional ethics in archaeology/heritage studies in American contexts.

AMIN 5890. Readings in American Indian and Indigenous History. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Students in this course will read recently published scholarship in American Indian and Indigenous history that takes up pressing research questions, promises to push inquiry in new directions, and that theorizes important interventions in our thinking to understand where the field is situated and moving. Reflecting the instinctively interdisciplinary nature of American Indian and Indigenous history, readings will be drawn not just from the discipline of history but across other disciplines such as Anthropology, American Studies, Geography, Literature, Political Science, and Legal Studies. As well, readings will include scholarship that reaches out to embrace the Global Indigenous studies turn. prereq: Advanced undergrad with instr consent or grad student

AMIN 5920. Topics in American Indian Studies. (; 3 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
Various topics in American Indian studies, depending upon instructor/semester.

AMIN 5991. Graduate Level Directed Studies. (; 1-6 cr. [max 9 cr.] ; A-F or Audit; Every Spring)
Contact department for futher information. prereq: dept consent

AMIN 8301. Critical Indigenous Theory. (3 cr. ; A-F only; Every Fall)
This course covers the "critical turn" in American Indian and Native or Indigenous Studies as evident in the emergence of three overlapping threads or intellectual/political genealogies: critiques of Indigeneity (the claims and conditions of nativeness to specific places), Indigenous Feminist (which foregrounds the salience of gender in indigenous critiques of power structures), and Indigenous Queer, sometimes labeled "Two-Spirit" (which foregrounds sexuality). What are the analytical, political and cultural backgrounds and what are their purchases for theory, critique, and practice? For interrogating academic and non-academic (including Indigenous) forms of inquiry and knowledge production and being in the world?

AMIN 8910. Topics in American Indian and Indigenous Studies. (; 1-3 cr. [max 9 cr.] ; Student Option; Periodic Fall, Spring & Summer)
This is a topics shell

American Studies (AMST)

AMST 5412. Comparative Indigenous Feminisms. (GP; 3 cr. ; Student Option; Periodic Fall & Spring)
The course will examine the relationship between Western feminism and indigenous feminism as well as the interconnections between women of color feminism and indigenous feminism. In addition to exploring how indigenous feminists have theorized from 'the flesh' of their embodied experience of colonialism, the course will also consider how indigenous women are articulating decolonization and the embodiment of autonomy through scholarship, cultural revitalization, and activism.

AMST 5920. Topics in American Studies. (; 1-4 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Topics specified in Class Schedule.

AMST 8201. Historical Foundations of American Studies. (; 3 cr. ; Student Option; Every Fall)
Exposition of American studies as a field of inquiry, including its history, major theoretical framework, and interdisciplinary methodologies. prereq: grad AmSt major

AMST 8202. Theoretical Foundations and Current Practice in American Studies. (; 3 cr. ; Student Option; Every Spring)
Analysis of central theoretical work in the field and survey of key methodologies. prereq: grad AmSt major or instr consent or dept consent

AMST 8231. Cultural Fallout: The Cold War and Its Legacy, Readings. (; 3 cr. ; Student Option; Every Fall & Spring)
Culture of Cold War, its legacy. How it affected/reflected domestic politics, public policies, civic life, gender expectations, sexuality, class relations, racial justice, and civil rights. Impact of domestic anti-communism and of American cultural politics abroad.

AMST 8232. Cultural Fallout: The Cold War and Its Legacy, Research. (; 3 cr. ; Student Option; Every Fall & Spring)
Student produce a research paper on history/culture of Cold War era as it developed in

United States after World War II. Research projects build upon readings from 8231. prereq: 8231

AMST 8239. Gender, Race, Class, Ethnicity, and Sexuality in the United States: Readings. (; 3 cr. ; Student Option; Every Fall)
Social, cultural, and artistic modes of self-expression. Intellectual analysis of people in the United States identified as female or male or as members of groups defined by race, ethnicity, class, or sexual orientation.

AMST 8240. Gender, Race, Class, Ethnicity, and Sexuality in the United States: Topical Development. (; 3 cr. [max 9 cr.] ; Student Option; Every Spring)
Social, cultural, and artistic modes of self-expression and intellectual analysis of people in the United States identified as female or male and/or as members of group defined by race, ethnicity, class, or sexual orientation. prereq: instr consent

AMST 8249. Popular Culture and Politics in the 20th Century: Readings. (; 3 cr. ; Student Option; Periodic Fall)
Popular arts in their political/social context. Issues of race, gender, class, and nationalism.

AMST 8250. Popular Culture and Politics in the 20th Century: Research Strategies. (; 3 cr. ; Student Option; Periodic Fall)
Popular arts in their political/social context. Focuses on issues of race, gender, class, and nationalism. prereq: 8239 or instr consent

AMST 8259. Literature, History, and Culture: Research Strategies. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Interdisciplinary study of connections between literary expression and history, particularly as they articulate themes in American culture. prereq: instr consent

AMST 8260. Literature, History, and Culture: Topical Development. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Interdisciplinary study of connections between literary expression and history, particularly as they articulate themes in American culture. prereq: instr consent

AMST 8288. Working in the Global Economy: Readings. (; 3 cr. ; Student Option; Periodic Fall)
Debates about global economy's consequences for American culture/character. Effects of global capitalism on factory work, service sector, pink-collar, and factory work in multinational corporations and professional/managerial positions inside/outside U.S. borders. How work is lived through race, class, gender, and nation.

AMST 8289. Ethnographic Research Methods: Research Strategies in American Studies. (; 3 cr. ; Student Option; Periodic Spring)
Students conduct an empirical research project, write a final paper. Assumptions/practices of positivism, reflexive science, and feminist methodology. Issues surrounding politics/ethics of feminist research. Dilemmas in practice of fieldwork, oral histories, reading, and writing. prereq: 8288 or instr consent

AMST 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

AMST 8401. Practicum in American Studies. (; 3 cr. ; S-N or Audit; Periodic Fall & Spring)
Training in teaching undergraduate courses in American studies. prereq: instr consent

AMST 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

AMST 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
x prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

AMST 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

AMST 8801. Dissertation Seminar. (; 3 cr. ; S-N or Audit; Every Fall & Spring)
Conceptualizing the research problem for the dissertation and structuring the process of writing a chapter of it. prereq: AmSt doctoral student beginning dissertation work

AMST 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

AMST 8920. Topics in American Studies. (; 3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Topics specified in Class Schedule.

AMST 8970. Independent Study in American Studies. (; 1-9 cr. ; Student Option; Every Fall, Spring & Summer)
Independent study of interdisciplinary aspects of American civilization under guidance of faculty members of various departments. prereq: instr consent, dept consent

Anatomy (ANAT)

ANAT 5095. Advanced Problems in Anatomy. (; 1-6 cr. [max 12 cr.] ; A-F only; Every Fall, Spring & Summer)
Exceptional projects that do not easily fit within confines of other ANAT offerings. Examples include but not limited to individual teaching or research projects. prereq: one or more ANAT classes, instr consent

ANAT 5150. Human Gross Anatomy. (5 cr. ; A-F only; Every Fall)
Human cadaveric dissection based on traditional preparation, lab dissection, review sections, radiographic analysis, clinical correlations. Taught by regions. Extremities, torso, head/neck. Assessment by mid-semester/final written/practical examinations. prereq: instr consent, For Medical Students, or Graduate students enrolled in an appropriate graduate program as determined by instructor.

ANAT 5525. Anatomy and Physiology of the Pelvis and Urinary System. (; 1-2 cr. ; A-F only; Every Spring)
Two-day intensive course. Pelvis, perineum, and urinary system with cadaveric dissection. Structure/function of pelvic and urinary organs, including common dysfunction and pathophysiology. Laboratory dissections, including kidneys, ureters, urinary bladder, pelvic viscera and perineum (male or female), pelvic floor, vascular and nervous structures. Grand rounds section. prereq: One undergrad anatomy course, one undergrad physiology course, instr consent

ANAT 5999. Head and Neck Anatomy. (; 3 cr. ; A-F or Audit; Every Summer)
N/A prereq: instr consent

ANAT 6050. Dental Gross Anatomy. (; 5 cr. ; A-F or Audit; Every Fall)
Lab dissection-based course. Peer teaching, team-based learning. Extremities/torso. Head/neck. prereq: Dental student or instr consent

ANAT 6150. Human Gross Anatomy. (; 7 cr. ; A-F only; Every Fall)
Extremities/back, torso, head/neck. Lectures provide pre-lab presentation (dissection reviewed), review (at end of a unit), and clinical correlations. prereq: Grad student or instr consent

ANAT 6160. Human Embryology. (; 1 cr. ; A-F only; Every Fall)
Online course. Embryonic development/defects through most systems. Online lectures/forums. Two classroom review sessions, two assessments. prereq: Grad student, instr consent

ANAT 7600. Advanced Topics in Anatomy. (; 1-15 cr. ; P-N only; Every Fall, Spring & Summer)
Complete/detailed review of normal anatomy. prereq: instr consent

ANAT 7601. Advanced Clinical Gross Anatomy I. (; 2-8 cr. [max 16 cr.] ; P-N only; Every Fall & Summer)
Reviews gross anatomy of entire human body. Students perform regional dissections under guidance of anatomy faculty. Emphasizes clinical applications of gross anatomical structure/function. Teaching techniques in clinical anatomy. prereq: 6150 or instr consent

ANAT 7800. Integrated Preparation for Internship. (4 cr. ; H-N only; Every Spring)
Surgical anatomy through common surgical procedures. Simulated operating room environment. Operating room procedures, resource management, teamwork.

ANAT 7999. Head and Neck Anatomy. (; 3 cr. ; Student Option; Every Fall & Summer)
Head/neck anatomy. prereq: [Medical or dental] resident

Anesthesiology (ANES)

ANES 5587. Adv Clinical Physiology I for Nurse Anesthetists. (; 3 cr. ; A-F or Audit; Every Fall)
Cellular mechanisms underlying systems physiology. Cellular physiology, physiology of excitable tissues, renal physiology, cardiovascular physiology, hemostasis.

ANES 5588. Advanced Clinical Physiology II for Nurse Anesthetists. (; 3 cr. ; A-F or Audit; Every Spring)
Respiratory physiology, acid-base physiology, gastrointestinal physiology, metabolism, endocrinology, reproductive physiology, physiology of pregnancy/labor. prereq: Advanced Clinical Physiology I for Nurse Anesthetists

ANES 5686. Chemistry and Physics for Nurse Anesthetists. (; 3 cr. ; A-F or Audit; Every Summer)
Chemical equilibrium, organic chemistry, physics of fluids/gases, anesthetic applications. prereq: General chemistry or instr consent

ANES 7015. Directed Study, Anesthesia Topics/Project Course Development. (; 1-15 cr. ; H-N or Audit; Every Fall & Spring)

ANES 7181. Introduction to Anesthesiology. (; 2 cr. ; P-N only; Every Fall, Spring & Summer)
The student will receive supervised training in the operating suite at Fairview-University Medical Center (University Campus), assisting in the management of all types of surgical patients under the direction of the faculty and residents of the Department of Anesthesiology. The rotation is divided into one-week segments; each student may select sub-specialty areas on the basis of interest. The student will spend the majority of his/her time in the operating room because only under such controlled conditions can there be leisurely teaching of essential life-support skills. There is no night or weekend call.

ANES 7182. Anesthesiology Research. (; 2-8 cr. ; P-N only; Every Fall, Spring & Summer)
On- or off-campus learning experiences individually arranged between the student and a faculty member for credit in areas not covered by regular courses. May include clinical/basic science research, library research or special projects.

ANES 7184. Rural Externship in Clinical Anesthesiology. (; 0-3 cr. ; H-N only; Every Fall, Spring & Summer)
Students shadow surgical medical director in all aspects of patient care and administrative duties. Care of patients in OR. Clinic visits. ICU consult. Riding with paramedics. Meeting with CEO of hospital for strategic planning.

ANES 7185. Anesthesiology Advanced Elective. (4 cr. ; H-N only; Every Fall, Spring & Summer)
This 4-week advanced rotation is focused on the medical student who is interested in pursuing a career in anesthesiology and/or desires additional anesthesia experience in managing medically complex patients undergoing medium to high-risk surgery. Students will have the opportunity to care for the aging veteran population. There will be an emphasis on managing patients with multiple co-morbid conditions undergoing cardiac and vascular surgery. Additionally, medical students will learn more advanced concepts during cases that include ENT, thoracic, and abdominal surgery. The medical student will develop skills including placing peripheral intravenous catheters, endotracheal intubation, arterial lines, and central lines. The medical student will develop a greater understanding of perioperative cardiovascular physiology/hemodynamics and pulmonary physiology, ventilator management and interpretation of data from multiple simultaneous monitors. They will function at the level of a sub-intern and will be given advanced responsibilities consistent with their level of knowledge and skill.

ANES 7186. Clinical Practice in Anesthesia. (; 15 cr. ; H-N or Audit; Every Fall & Spring)

ANES 7187. Peroperative Clinic Rotation. (4 cr. ; H-N only; Every Fall, Spring & Summer)
This is a 4-week advanced elective that takes place in the Preoperative Anesthesia Clinic with the department of Anesthesiology faculty. The goal of this elective is for medical students to gain experience evaluating medically complex patients and optimizing them prior to their procedures. This elective is geared towards medical students planning to go into the primary care fields, surgery, or anesthesiology. Primary care physicians routinely perform the preoperative history and physical examinations for patients? procedures. They will gain a greater understanding of the anesthetic and procedural considerations that affect their patients. Medical students will work closely with the Preoperative Anesthesia Clinic faculty and anesthesiology residents. Initially, the medical student will shadow residents/faculty, then they will progress to see patients independently and present to staff pertinent history and physical, assessment, and plan of action. They will also assist in the coordination of the patient?s care which involves contacting primary care providers, surgical teams, and consultants. The medical student will have the opportunity to follow select medically complex patients from a patient-centered, longitudinal perspective including coordination of care; application of evidence based, best practice protocols and pathways; observation of the anesthetic care of the patient intraoperatively; observation of the recovery and rehabilitation of the patient post operatively; and finally return of the patient to his or her primary care physician. This is a unique, all encompassing view of a complex health care event not typically afforded trainees in traditional rotations. Over the course of 4 weeks, the medical student will have ten one-on-one didactic sessions in journal club format with faculty to cover topics related to the pre-operative assessment including evaluation of cardiovascular risk and testing, pulmonary testing, diabetes, and frailty.

ANES 7188. Pain Medicine Elective. (2 cr. ; P-N only; Every Fall, Spring & Summer)
Pain is a common ailment that physicians across a range of specialties manage. Therefore, accurately diagnosing and effectively managing pain is an important skillset to acquire. Medical students will gain a greater depth of understanding of the complex mechanisms that contribute to pain and appreciate the multidisciplinary approach to pain medicine. Medical students will spend their two weeks in both the outpatient and inpatient settings. In the chronic pain clinic they will evaluate patients with faculty, fellows, and residents, and observe and participate in interventional pain procedures. In the inpatient setting, they will observe and participate in regional anesthesia procedures prior to surgical procedures, evaluate hospitalized patients with chronic pain or complex pain management concerns and round on patients on the inpatient pain management service. Students can fulfill the anesthesiology prerequisite either by completing ANES 7181 or by doing at least 2 weeks of anesthesiology in SURG 7552.

ANES 7189. Acting Internship: Cardiovascular Intensive Care Unit. (4 cr. ; H-N only; Every Fall, Spring & Summer)
In the U.S., cardiovascular disease is the leading cause of mortality and many patients require surgical treatment for cardiovascular disease. Understanding the principles of diagnosis and management of complications in cardiac surgical patients is essential for students interested in pursuing a career in critical care regardless of avenue (surgery, emergency medicine, internal medicine, and anesthesiology). The goal of the Cardiovascular ICU (CVICU) clerkship is to give students the opportunity to develop basic skills in evaluation and treatment of patients requiring cardiac surgery including management of patients requiring mechanical circulatory support such as ventricular assist devices (VAD's) and extracorporeal membrane oxygenation (ECMO). Students can fulfill the anesthesiology prerequisite either by completing ANES 7181 or by doing at least 2 weeks of anesthesiology in SURG 7552.

ANES 7286. Directed Study Anesthesia Project: Clinical. (; 1-15 cr. ; H-N or Audit; Every Spring)

ANES 7910. Anesthesiology Medical Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Anesthesiology medical residency.

ANES 7930. Anesthesiology Medical Fellowship. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Anesthesiology medical fellowship.

ANES 8269. Research in Anesthesia. (; 1 cr. ; Student Option; Every Fall & Spring)

Animal Science (ANSC)

ANSC 5015. Animal Welfare Science and Ethics. (3 cr. ; A-F only; Every Fall)
This multidisciplinary course helps students develop an intellectual framework for understanding and interpreting issues involving

animal welfare and ethics of animal use in agriculture, science and society.

ANSC 5025. Gut Microbiome Systems. (3 cr. ; A-F or Audit; Every Fall)
This course is primarily focused on providing conceptual and methodological tools to understand how diet and the gut microbiome converge to impact the physiological landscape of animals and humans, considering diet, host and microbiome as one highly integrated system. To that end, the course relies on concepts of data analysis, gastrointestinal microbiology, the breadth of scientific literature produced up to date and hands on experiences to immerse attendants in the ever-growing microbiome field and open them to consider a microbiome lens to address different research questions in their respective fields. The course emphasizes three main conceptual areas: 1. Compositional and functional organization of microbial communities in the mammalian gut: From cells to functional communities. 2. Dietary drivers of the mammalian gut microbiome: Nutritional Ecology in the mammalian gut 3. Host-microbiome interactions: Physiological impact of the mammalian gut microbiome Rather than memorizing these concepts, the course emphasizes the need to apply them to real life issues in animal and human nutrition and health. As such, recognizing these conceptual areas in context, and using them for problem solving in their respective research areas is the ultimate goal of the course. Undergraduate level course in microbiology and physiology are suggested to enroll in this course. Also, previous completion of statistics courses and familiarity with the R statistical interface and command line are recommended.

ANSC 5035. Animal Welfare Judging and Assessment. (3 cr. ; A-F only; Every Fall)
Advanced application of animal welfare science toward the assessment of real-life scenarios in agriculture, companion, and exotic animals. Top students will compete on the UMN team at the Intercollegiate Animal Welfare Judging and Assessment Competition held in November each year.

ANSC 5091. Research Proposals: From Ideas to Strategic Plans. (3 cr. ; Student Option; Every Spring)
You have a great research idea, now what? How do you turn your idea into a proposal? It has been said paraphrasing Edison, that innovation is one percent inspiration, ninety-nice percent perspiration. In this course, we will start with and inspiring idea and sweat our way to develop a research proposal. The students will go through a step-by-step process that starts choosing and defining a research idea, then proceeding to do literature reviews and to the development of hypothesis, aims, objectives and a research strategy. The aim of this course is to provide students with tools to understand the structure of scientific reports and proposals, literature searches and basic data interpretation. The student will learn about different research approaches and how to achieve consistency in their research projects. We will guide students in how to begin and develop a written research proposal that will satisfy the requirements of their advisers, institution and funding organizations. prereq: There are no prerequisites, however, having taken ANSC 3011 Statistics for Animal Science is desirable.

ANSC 5099. Special Workshop in Animal Science. (; 1-6 cr. [max 12 cr.] ; Student Option; Every Spring)
Topics vary. See Class Schedule or department. Topics may use guest lectures/ experts. prereq: instr consent

ANSC 5200. Statistical Genetics and Genomics. (4 cr. ; Student Option; Fall Even Year)
Gene discovery. Genomic selection. Data analysis. Phenotypes/DNA markers. Parametric/non parametric linkage analysis. Mapping quantitative trait loci (QTL). Parentage testing. prereq: [Stat 3021 or equiv], [Biol 4003 or equiv]

ANSC 5555. Applied Livestock and Poultry Microbiology. (2 cr. ; A-F only; Spring Even Year)
This applied microbiology course is intended to provide theoretical basis and hands-on experience to students on major pathogenic bacteria colonizing livestock and domestic poultry. This course will provide skills to the students who seriously consider farm animal and poultry microbiology research and/or teaching in their careers. Pathogenic bacteria in livestock and poultry such as Listeria monocytogenes, Escherichia coli O157: H7, and Salmonella, fungal microorganisms (Aspergillus), and beneficial microorganisms such as Lactobacillus, will be discussed. In addition, the course will introduce feed testing methods (Bacteriological Analytical Manual (BAM) methodology), common antibacterials/ antibiotics used for decontamination and disinfection, and the emerging alternatives to antibiotics with a perspective on bacterial antibiotic resistance. In a flipped class room format, the students will gather necessary information provided by the instructor, listen to short lectures on the methods and mechanisms, participate in demonstrations, and apply it in a typical BSL2 laboratory set up under supervision. All students should undergo BSL2 training prior to enrollment. Online training counts to approximately 5-6 hours. Not more than 4 students will be allowed for each session due to BSL2 pathogenic microbiology space restriction, access to RAR facilities, and some non-conventional microbiological methods. Special health conditions, pregnancy, and immunocompromised situations must be consulted with the instructor prior to enrollment. The students must obtain clearance from ROHC for their tetanus vaccination status.

ANSC 5625. Nutritional Biochemistry. (; 3 cr. ; Student Option; Every Fall)
Overview of biochemical molecules and pathways important in nutritional events. prereq: BIOC 3021 or instr consent

ANSC 5626. Nutritional Physiology. (; 3 cr. ; A-F only; Every Spring)
Whole body macronutrient metabolism as it relates to etiology of metabolic diseases. Signaling between tissues to control homeostasis. How dysregulation of crosstalk can lead to metabolic diseases. How diet, exercise, or starvation impact metabolism. Regulation of food intake and energy expenditure. Designing/analyzing/interpreting research data.

ANSC 5702. Cell Physiology. (; 4 cr. ; A-F only; Every Fall)
Cell Physiology involves the study of control mechanisms involved in maintaining homeostasis with respect to a variety of parameters including regulation of pH, volume, nutrient content, intracellular electrolyte composition, membrane potential, receptor signaling and aspects of intercellular communication. The first half of this team-taught course is organized in a partially on-line format where students learn from on-line materials and then take an on-line quiz each week before meeting with the instructor to review key concepts in class. The second half of the course is presented in lecture format. Student evaluation is based on quiz scores, in-class exams and graded problem sets.

ANSC 8011. Applied Statistical Models and Analysis for Animal Science Professionals. (3 cr. ; A-F only; Every Spring)
This course is designed for graduate students in the applied agricultural, animal science, and related programs that require an understanding of applied statistical analysis and interpretation of research data. Students will learn central principles in sampling, experimental design, and statistical analysis. The course will have an intense focus on data analysis of research data with SAS software. By the end of the semester, students should be able to generate testable hypotheses, organize a work plan to collect research data, and analyze results using appropriate statistical procedures and SAS software. Prerequisites: STAT 3021 or 5021: Statistical Analysis or equivalent, or consent of instructors

ANSC 8111. Genetic Improvement of Animals. (; 3 cr. ; Student Option; Periodic Fall)
Application of population genetics to livestock breeding; selection index theory and practice; basis of relationships and covariances among relatives; and selection based on multiple sources of information. prereq: instr consent

ANSC 8121. Linear Model Methods. (; 3 cr. ; Student Option; Periodic Fall)
Techniques and statistical tools for analysis of data. Matrix manipulation, least-squares procedures, correction for environmental factors, estimation of components of variance, and standard errors of estimates. prereq: Stat 5021

ANSC 8134. Ethical Conduct of Animal Research. (; 3 cr. ; A-F or Audit; Every Fall)
Ethical considerations in use of animal subjects in agricultural, veterinary, and biomedical research. Federal, state, and University guidelines relating to proper conduct for acquisition/use of animals for laboratory, observational, epidemiological, and clinical research. Regulatory requirements, bases

for what is deemed proper conduct. Societal impact on scientific investigations utilizing animal subjects. prereq: Grad student or prof school student or instr consent

ANSC 8141. Mixed Model Methods for Genetic Analysis. (; 3 cr. [max 6 cr.] ; A-F or Audit; Fall Odd Year)
Theoretical foundation of genetic prediction, selection index theory, best linear unbiased prediction, multivariate mixed models, estimation of variance components using maximum/restricted maximum likelihood methods, genomic prediction/variance component estimation. prereq: 5200 or CMB 5200 or equiv

ANSC 8194. Research in Animal Genetics. (; 1-3 cr. ; Student Option; Every Fall, Spring & Summer)
Research in quantitative genetics, cytogenetics, molecular genetics, and other areas related to animal breeding. prereq: instr consent

ANSC 8211. Animal Growth and Development. (; 3 cr. ; Student Option; Every Spring)
Whole body growth of animals, bone, and adipose tissue; structure, function, differentiation, and development of tissues; mode of action of hormones, growth factors, and growth promoters. prereq: instr consent

ANSC 8294. Research in Muscle Chemistry and Physiology. (; 1-3 cr. ; Student Option; Every Fall, Spring & Summer)
Research in selected areas. prereq: instr consent

ANSC 8311. Animal Bioenergetics. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Integrated systems approach to energy metabolism of animals. Application of classical techniques of calorimetry and comparative slaughter. Development of systems for expressing energy content of feeds, and techniques for measuring whole body and organ metabolism of specific nutrients. prereq: instr consent; BIOC 4331 recommended

ANSC 8312. Protein Metabolism. (; 3 cr. ; A-F or Audit; Periodic Fall)
Basic and applied concepts of protein metabolism in farm animals. prereq: BioC 4331

ANSC 8320. Concepts and Developments in Nutritional Physiology. (; 3 cr. [max 6 cr.] ; A-F or Audit; Every Spring)
Review and critical evaluation of pertinent scientific literature. prereq: instr consent

ANSC 8330. Concepts and Developments in Animal Science. (; 1-2 cr. [max 8 cr.] ; A-F or Audit; Every Fall)
Review, critical evaluation of recent research reports. prereq: instr consent

ANSC 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

ANSC 8340. Concepts and Developments in Swine Nutrition. (; 2 cr. [max 4 cr.] ; A-F or Audit; Every Fall & Spring)
Review and critical evaluation of scientific literature. prereq: instr consent

ANSC 8344. Mechanisms of Hormone Action. (; 2 cr. ; Student Option; Fall Even Year)
Major signal transduction, apoptosis. Topics incorporate pharmacology, biochemistry, and cell biology of hormone action in relevant physiological systems. Lectures on basic principles. Specialized lectures. Discussion of primary literature. prereq: Course in biochemistry or cell biology or instr consent

ANSC 8394. Research in Animal Nutrition. (; 1-3 cr. ; Student Option; Every Fall, Spring & Summer)
Research in selected areas: topics and animal species determined by consultation. prereq: instr consent

ANSC 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

ANSC 8494. Research in Animal Physiology. (; 1-3 cr. ; Student Option; Every Fall, Spring & Summer)
Individual research under faculty direction. Topic determined by consultation: a specialized aspect of a thesis problem or an independent problem of mutual interest to graduate student and adviser. prereq: instr consent

ANSC 8510. Graduate Seminar. (; 1 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Students attend seminars and lead a seminar, giving oral presentation of scientific data. Public speaking skills. Preparing visuals for scientific presentations. Audience critiques of presentations. prereq: instr consent

ANSC 8520. Special Topics. (; 1-3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Various topics in Animal Science

ANSC 8594. Research in Animal Science. (; 1-3 cr. ; Student Option; Every Fall, Spring & Summer)
Research including experimental studies in disciplines associated with animal production and research, with emphasis on interdisciplinary studies. prereq: instr consent

ANSC 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

ANSC 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

ANSC 8990. Curricular Practical Training. (1 cr. [max 2 cr.] ; S-N only; Every Fall, Spring & Summer)
Industrial work assignment involving animal science. Review/approval by faculty member and director of graduate studies. Final report covering work assignment. prereq: AnSc grad student, dept consent

Anthropology (ANTH)

ANTH 5008. Advanced Flintknapping. (; 3 cr. ; A-F or Audit; Periodic Fall)
Hands-on training in techniques of advanced stone tool production, artifact reproduction, and lithic experimental design for academic/ artistic purposes. prereq: [3008 or 5269] or instr consent

ANTH 5009. Human Behavioral Biology. (; 3 cr. ; A-F or Audit; Every Spring)
In-depth introduction to, and critical review of, human behavioral biology, examining the approaches in anthropology and related fields. Classic texts/recent empirical studies of humans and other species. Theoretical underpinnings of this new discipline/how well theoretical predictions have been supported by subsequent research.

ANTH 5015W. Biology, Evolution, and Cultural Development of Language & Music. (SOCS,WI; 3 cr. ; Student Option; Every Spring)
Language is the most human form of behavior, and the investigation of the ways language and culture interact is one of the most important aspects of the study of human beings. The most fascinating problem in this study is how language itself may have evolved as the result of the interaction between biological and cultural development of the human species. In this course we will consider the development of the brain, the relationship between early hominins, including Neanderthals and Modern Humans, and such questions as the role of gossip and music in the development of language.

ANTH 5016. Africa and African Diaspora Archaeology. (GP,HIS; 3 cr. ; Student Option; Every Fall)
Africa and African Diaspora Archaeology (AFRO/ ANTH 3016/5016) examines the evolution of human behavior in Africa and looks at subsequent social, cultural, and technological developments as shown in archaeological records including artifacts, ecofacts, rock art, and structures at archaeological sites. It also discusses methods used to identify archaeological records and how these records can be used to reconstruct past ways of life. Students will obtain hand-on-experience in identifying, classifying, and interpreting archaeological objects. The course covers Africa from around 2.6 million years ago to the recent past, focusing primarily on the last 10,000 years. It examines the development and spread of food production, pottery, metallurgy, trade, and African connections with the Atlantic world dating back to the fifteenth century.

ANTH 5021W. Anthropology of the Middle East. (GP,WI,SOCS; 3 cr. ; Student Option; Fall Even Year)
Anthropological field methods of analyzing/ interpreting Middle Eastern cultures/societies.

ANTH 5027W. Archaeology of Prehistoric Europe. (HIS,WI; 3 cr. ; Student Option; Every Fall)
How archaeologists/historians analyze/interpret artifacts to develop knowledge about formation

of European society, from earliest evidence of human occupation to Roman Period. Interpreting archaeological evidence from specific sites to understand broad trends in human past.

ANTH 5028. Historical Archaeology. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
In this course, we will explore the theories and methods of historical archaeology ? such as material culture studies, landscape perspectives, archival, and oral historical interpretation - as a means of intervening in contemporary discussions of diversity in the United States. Historical archaeology can be a very effective means to challenge some of the standard American narratives about our diverse past. Our aim is to move beyond either a simplistic ethnic pluralism or the superficial ?melting pot? progressive history and instead grapple with the materiality of settler colonialism, white supremacy, and capitalism. In learning about this field, we will consider what has distinguished historical archaeology from American archaeology more broadly, and how those differences are parlayed into specific research strengths. This includes several themes: colonialism; the modern world and globalizing economies; intersectional identities (race and ethnicity, class, sex and gender, religion, age, ability/disability) and social movements; public memory and commemoration; landscapes and social space; citizenship and subjectivity. Although historical archaeology until recently has been restrictively defined as addressing the European-colonized New World, the discipline in the past twenty years has significantly broadened its scope and impact on the practice of archaeology as a whole. Throughout the course we will discuss these developments, and what directions archaeology may take in the future as a result. Course work includes both reading/discussion and learning methods through practical exercises, and handling of archaeological material.

ANTH 5037. Food Sovereignty in Africa. (ENV,SOCS; 3 cr. ; A-F only; Every Spring)
Food Sovereignty in Africa critically evaluates how the physical environment and historical processes shaped agricultural productivity in Africa, as well as exploring the subsequent relationship the continent has had with the rest of the world. The course uses multi-disciplinary resources to examine historical factors that have contributed to contemporary food security issues, and discusses grassroots food movements that embrace the ethics and values of African societies in their efforts to achieve both food security and environmental sustainability. It also examines the interplay between food security, indigenous knowledge, and environmental sustainability by comparing various standpoints on African food production, scrutinizing the challenges the continent is facing and the unique perspectives it offers in terms of agricultural development in the globalized world. Finally, the course examines how agricultural systems in Africa are affected by the new global land rush. After taking the course, students will have better knowledge of emerging research directions on Africa and will be equipped with sufficient research and practical skills to pursue independent studies beyond the classroom.

ANTH 5045W. Urban Anthropology. (WI; 3 cr. ; Student Option; Periodic Spring)
This class explores anthropological approaches to urban life. On one hand, the course examines the ontological nature of the city by looking into the relation between cities and their environment, and asking whether and how people differentiate "urban" and 'non-urban" spaces. It uncovers the social practices and behaviors that define urban life; urban-rural distinctions; the material and ecological processes that constitute cities; and popular representations of city and/or countryside. On the other hand, the course investigates the spatial and social divisions of the city, seeking to understand the historical struggles and ongoing processes that both draw together and differentiate the people of an urban environment. It studies how cities influence political decision-making, contributing to the uneven distribution of power and resources. It considers: industrialization; urban class conflict; gendered and racialized spaces; and suburbanization. Both of these approaches will also critically consider the city as a social object that we encounter and learn about through our engagement with kinds of media, such as novels and film. Hence, reading for the class will include literature from the social sciences and humanities, as well as critical works of fiction. Students will engage with these broader anthropological issues through an investigation of several global cities, especially Minneapolis-St. Paul, Chicago, Paris, Mexico City, Brasilia, and New Delhi. The class mixes lecture, discussion, and guided research. Lectures will introduce the history of urbanism and urban anthropology. Discussions will critically evaluate the readings, and offer insights and examples to better understand them. By participating in a guided research project, students will uncover hidden aspects of their own city, using ethnography or archaeology to shed light on the urban environment, social struggles over space, or other themes.

ANTH 5112. Reconstructing Hominin Behavior. (3 cr. ; A-F or Audit; Spring Even Year)
Major hypotheses regarding evolution of human behavior. Combine evidence from realm of biological anthropology as we consider link between bone biology/behavior. Archaeological record. Hypotheses about biocultural evolution regarding tool-use, hunting, scavenging, food sharing, grandmothers, cooking, long distance running. prereq: Previous coursework in Biological Anthropology or Archaeology

ANTH 5113. Primate Evolution. (3 cr. ; A-F only; Fall Odd Year)
Evolutionary history of primates. Particular focus on origin/diversification of apes/Old World monkeys. prereq: Anthropology major, junior or senior

ANTH 5121. Business Anthropology. (; 2 cr. ; Student Option; Every Spring)
Anthropological/ethnographic understandings/research techniques. prereq: MBA student

ANTH 5128. Anthropology of Education. (3 cr. ; Student Option; Spring Odd Year)
Cross-cultural perspectives in examining educational patterns. Implicit/explicit cultural assumptions. Methods/approaches to cross-cultural studies in education.

ANTH 5221. Anthropology of Material Culture. (; 3 cr. ; A-F or Audit; Periodic Fall)
The course examines material culture as a social creation, studied from multiple theoretical and methodological perspectives (e.g., social anthropology, archaeology, primatology, history of science). The course examines the changing role of material culture from prehistory to the future.

ANTH 5244. Interpreting Ancient Bone. (; 3 cr. [max 4 cr.] ; A-F or Audit; Periodic Fall & Spring)
To Interpret Ancient Bone we must sharpen observational skills, read about observations and analysis by previous workers, and learn to record and analyze complex information. The class combines seminar/discussion formats, in which we read literature about how to best accomplish this type of research, and laboratory time, to give students the opportunity to observe and record modifications to bones that form the basis of archaeological and forensic observations. Students analyze different kinds of tool marks on bone, weathering, carnivore modifications, eco-morphology, ages of death, bone tools, and bones from archaeological sites to infer the "life history" of a bone. We recommend you take the Human Skeleton or Zooarchaeology Laboratory before you take this class, but it is not absolutely required.

ANTH 5255. Archaeology of Ritual and Religion. (3 cr. ; Student Option; Fall Even Year)
The course discusses evidence for the origins of religion and its diverse roles in human societies over millennia. It focuses on how artifacts and architecture are essential to religious experience. It asks: What constitutes religion for different cultures? Why is religion at the heart of politics, social life, and cultural imagination?

ANTH 5269. Analysis of Stone Tool Technology. (4 cr. ; A-F or Audit; Fall Even Year)
The course offers practical lab experience in analyzing archaeological collections of stone tools to learn about human behavior in the past. Students gain experience needed to get a job in the cultural resource management industry.

ANTH 5327W. Inca, Aztec & Maya Civilizations. (HIS,WI; 3 cr. [max 6 cr.] ; A-F only; Periodic Fall)
This course is an intensive examination of the emergence, growth, and conquest of native civilizations in ancient America, focusing on the Maya, Aztec, and Inca states. Lectures and discussions examine the culture and history of these Native American civilizations, while also

introducing students to anthropological theories of the state, religion, aesthetics, and history.

ANTH 5401. The Human Fossil Record. (; 3 cr. ; A-F only; Fall Even Year)
Fossil evidence paleoanthropologists use to reconstruct human evolutionary history. Taxonomy, phylogeny, behavior, ecology, tool use, land use, and biogeography. Examination of fossil casts, readings from primary/secondary professional sources. prereq: 1001 or instr consent

ANTH 5402. Zooarchaeology Laboratory. (; 3 cr. ; A-F only; Every Fall)
How archaeologists reconstruct the past through the study of animal bones associated with artifacts at archaeological sites. Skeletal element (e.g., humerus, femur, tibia), and taxon (e.g., horse, antelope, sheep, bison, hyena) when confronted with bone. Comparative collection of bones from known taxa.

ANTH 5403. Quantitative Methods in Biological Anthropology. (4 cr. ; Student Option; Periodic Fall)
Quantitative methods used by biological anthropologists. Applying these methods to real anthropometric data. Lectures, complementary sessions in computer lab. prereq: Basic univariate statistics course or instr consent

ANTH 5405. Human Skeletal Analysis. (4 cr. ; Student Option; Every Spring)
Structure, design, and variability of modern human skeleton. Anatomy, functional morphology, development, evolutionary history. Bone histology/biology, excavation, preservation, taphonomy, pathology, forensic analyses. Differentiating between males/females, adults/sub-adults, and humans/non-humans. Quizzes, exams, research paper, project.

ANTH 5412. Comparative Indigenous Feminisms. (GP; 3 cr. ; Student Option No Audit; Periodic Fall & Spring)
The course will examine the relationship between Western feminism and indigenous feminism as well as the inter connections between women of color feminism and indigenous feminism. In addition to exploring how indigenous feminists have theorized from 'the flesh' of their embodied experience of colonialism, the course will also consider how indigenous women are articulating decolonization and the embodiment of autonomy through scholarship, cultural revitalization, and activism.

ANTH 5442. Archaeology of the British Isles. (; 3 cr. ; A-F only; Every Fall)
Have you ever wondered how archaeologists interpret the vast amount of archaeological evidence from the British Isles, one of the most studied and best documented parts of the world? And how do archaeologists and governmental agencies protect the heritage of Britain, from major monuments such as Stonehenge, Roman forts, and Shakespeare? s theaters, to the minor products of craft industries such as personal ornaments and coins? This course teaches you about the archaeology of the British Isles, in all of its aspects. You learn how archaeologists study the changing societies of Britain and Ireland, from the first settlers about a million years ago to modern times. You learn about the strategies that public institutions employ to preserve and protect archaeological sites, and about the place of archaeology in tourism in the British Isles and in the formation of identities among the diverse peoples of modern Britain.

ANTH 5448. Applied Heritage Management. (; 3 cr. ; A-F only; Every Spring)
Contexts of cultural heritage applicable to federal/state protection. Approaches to planning/management. Issues of heritage/stakeholder conflict.

ANTH 5450. Spatial Analysis in Anthropology: Research Design and Field Applications. (3 cr. ; Student Option No Audit; Spring Even Year)
This advanced undergraduate and graduate course introduces students to spatial analyses essential to anthropological ethnography, archaeology, and historical ecology. It builds on introductory courses at UMN, providing students an opportunity to learn anthropological applications of spatial analysis methods, including: research design, field mapping, database management, digital survey platforms, GIS analyses, and integration of quantitative and qualitative (ethnographic and historical) data. The structure of the course will follow the trajectory of a typical doctoral-level anthropological project, from pre-field data acquisition and preparation, to in-field data collection, post-field analysis, and presentation. Students who take this course will master skills that are crucial for successful anthropological spatial analysis in the field and laboratory.

ANTH 5501. Managing Museum Collections. (3 cr. ; A-F or Audit; Fall Even Year)
This course provides a hands-on and research experience in collections management utilizing artifact, archival, and digital collections. Museum collections, the objects or specimens they contain, the information associated with them, and their care and maintenance are a crucial part of both the sciences and the humanities. While seemingly disparate, many of the issues faced by those responsible for collections are quite similar: how to preserve and care for those collections, legal issues surrounding the materials they contain, how to organize and classify the items, how to facilitate discovery and access, and how to make the information contained in them available to the broadest audience possible. The course includes lectures by museum professionals, hands-on activities, and selected readings. Credit will not be granted if credit has been received for ANTH 3501.

ANTH 5601. Archaeology and Native Americans. (DSJ; 3 cr. ; Student Option; Fall Even Year)
Historical, political, legal, and ethical dimensions of the relationship of American archaeology to American Indian people. Case studies of how representational narratives about Native people are created through archaeology; responses by Native communities; and the frameworks for collaborative and equitable archaeological practice. Professional ethics in archaeology/heritage studies in American contexts.

ANTH 5980. Topics in Anthropology. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Topics specified in Class Schedule.

ANTH 8001. Ethnography, Theory, History. (; 3 cr. ; A-F or Audit; Every Fall)
Introduction to foundational concepts, methods, and ethnographic work. Emphasizes theories that have shaped 20th-century thinking in cultural anthropology. Connection of these theories to fieldwork and contemporary issues.

ANTH 8002. Ethnography: Contemporary Theory and Practice. (3 cr. ; A-F or Audit; Every Spring)
Concepts/perspectives in anthropology. Emphasizes American cultural anthropology. Rrecent work in semiotic, psychological, and feminist anthropology.

ANTH 8004. Foundations of Anthropological Archaeology. (; 3 cr. ; Student Option; Every Spring)
Theoretical foundations of anthropological archaeology in historical and contemporary perspective. prereq: 8001, 8002

ANTH 8005. Linguistic Anthropology. (; 3 cr. ; Student Option; Fall Even Year)
Introduction to literature of anthropological linguistics.

ANTH 8009. Prehistoric Pathways to World Civilizations. (3 cr. ; Student Option; Every Spring)
How did complex urban societies first develop? This course addresses this question in ten regions of the world including Maya Mesoamerica, Inca South America, Sumerian Near East, Shang Civilization in East Asia, and early Greece and Rome.

ANTH 8111. Evolutionary Morphology. (3 cr. ; Student Option; Periodic Fall)
Basic foundation of diverse anatomical adaptations of living/fossil primates. Principles of evolutionary theory. Stages of embryogenesis/fetal development. Morphological diversity. Evolutionary morphology. Body size, allometry, heterochrony. Primate evolution.

ANTH 8112. Reconstructing Hominin Behavior. (3 cr. ; A-F or Audit; Spring Even Year)
Consider major hypotheses regarding evolution of human behavior. Evidence/arguments used to support or reject hypotheses. Consider link between bone biology/behavior. Archaeological record for more holistic understanding of evidence.

ANTH 8113. Primate Evolution. (3 cr. ; A-F only; Fall Odd Year)
Evolutionary history of primates, with particular focus on origin/diversification of apes/Old World monkeys. prereq: Anthropology doctoral student

ANTH 8114. Biological Anthropology Graduate Program Seminar: Behavioral

Ecology of Primates. (3 cr. ; A-F or Audit; Fall Odd Year)
Course focuses on the behavioral ecology of primates, including humans, with a focus on how the evolution of social behaviors relates to ecology. The course serves as one of three Biological Anthropology Graduate Program Seminars, which provide training in the foundations of biological anthropology. For Biological Anthropology graduate students, the take-home exam for this course will stand as one of the three required Preliminary Papers. Students outside of Biological Anthropology are welcome to enroll pending permission of the instructor. prereq: Anthropology graduate student or instr consent.

ANTH 8120. Problems in Culture Change and Applied Anthropology. (; 3-6 cr. ; Student Option; Periodic Fall & Spring)
Comparative studies of change in cultural systems. Impact of global processes on local cultures. Roles of anthropology and anthropologists in policy, planning, implementation, and evaluation.

ANTH 8201. Humans and Nonhumans: Hybrids and Collectives. (; 3 cr. ; Student Option; Periodic Spring)
Social life as consisting of relationships not only among human beings, but also between humans and nonhumans: animals, plants, environments, technologies, etc. Focuses on figure of hybrid, its role in formations of collective life.

ANTH 8203. Research Methods in Social and Cultural Anthropology. (; 3 cr. ; Student Option; Every Fall)
Classic and current issues in research methodology, including positivist, interpretivist, feminist, and postmodernist frameworks. Methodology, in the broadest sense of the concept, is evaluated. Students conduct three research exercises and set up an ethnographic research project. prereq: Grad anth major or instr consent

ANTH 8205. Economic Anthropology. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Theoretical foundations of economic anthropology examined through critical readings of traditional, classical, and contemporary authors. Ethnographic puzzles of material life and issues of ecological degradation, development, market expansion, gender, and transglobal processes.

ANTH 8207. Political and Social Anthropology. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Western concepts of politics, power, authority, society, state, and law. Cross-cultural approaches to these concepts in historical perspective. Major theoretical frameworks and current problems and positions in social and political anthropology. Ethnographic classics and new directions.

ANTH 8213. Ecological Anthropology. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Seminar on method, theory, and key problems in ecological anthropology and human ecology. Examines approaches in light of human practices, interactions between culture and the environment, global environmental change, and our understanding of human dimensions of ecosystem-based management.

ANTH 8215. Anthropology of Gender. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Comparative, cross-cultural approach to gender. Focuses on various theories (e.g., feminist, postmodernist, psychoanalytic) of power, gender, authority, and femininity and masculinity. Gender ambiguity and issues of sexuality. prereq: Grad anth major or instr consent

ANTH 8219. Grant Writing. (; 2 cr. ; Student Option; Periodic Fall & Spring)
Students draft a research proposal in their area of interest. Seminar involves reading and evaluating proposals, learning about funding and process of submitting proposals, nuts of bolts of composing a proposal, and ethics of research in anthropology. prereq: Grad anth majors preparing to submit research grant proposals next academic yr

ANTH 8220. Field School. (; 6 cr. ; Student Option; Every Summer)
Advanced field excavation, survey, and research. Intensive training in excavation techniques, recordation, analysis, and interpretation of archaeological materials or prehistoric remains.

ANTH 8223. Anthropology of Place & Space. (3 cr. ; Student Option; Periodic Fall & Spring)
This course asks questions about the meaning of place, the relationship of space to place, the relationship of identity to place, and the relationship of place to environmental change in the event of industrial pollution, development projects, natural disasters and climate change. Theories of and ethnographic accounts of space and place in Cultural Anthropology and Geography will be discussed. In addition to foundational texts in the topic, we will also be reading contemporary accounts of nonwestern places.

ANTH 8230. Anthropological Research Design. (3 cr. [max 6 cr.] ; A-F or Audit; Periodic Fall & Spring)
Training seminar on research development, coordination, grant management, field/laboratory research management, fundraising. prereq: Anth grad student or instr consent

ANTH 8244. Interpreting Ancient Bone. (; 3 cr. [max 4 cr.] ; A-F or Audit; Periodic Fall & Spring)
To Interpret Ancient Bone we must sharpen observational skills, read about observations and analysis by previous workers, and learn to record and analyze complex information. The class combines seminar/discussion formats, in which we read literature about how to best accomplish this type of research, and laboratory time, to give students the opportunity to observe and record modifications to bones that form the basis of archaeological and forensic observations. Students analyze different kinds of tool marks on bone, weathering, carnivore modifications, eco-morphology, ages of death, bone tools, and bones from archaeological sites to infer the "life history" of a bone. We recommend you take the Human Skeleton or Zooarchaeology Laboratory before you take this class, but it is not absolutely required.

ANTH 8310. Topics: Biological Anthropology. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Seminar examines particular aspects of method and/or theory within the biological anthropology discipline. Topics vary according to student and faculty interests.

ANTH 8333. FTE: Masters. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

ANTH 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

ANTH 8510. Topics in Archaeology. (; 3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Seminar examines particular aspects of archaeological methods and/or theory. Topics vary according to student and faculty interests.

ANTH 8555. Master's Project Credits. (3 cr. ; S-N only; Every Fall, Spring & Summer)
Student may contact the department for more information.

ANTH 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

ANTH 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

ANTH 8810. Topics in Sociocultural Anthropology. (; 3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Seminar examines particular aspects of method and/or theory. Topics vary according to student and faculty interests.

ANTH 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

ANTH 8980. Anthropology Graduate Workshop. (; 1 cr. [max 3 cr.] ; Student Option; Periodic Fall & Spring)
Seminar examines aspects of the discipline that transcend traditional subfield boundaries.

ANTH 8990. Topics in Anthropology. (; 3 cr. [max 9 cr.] ; A-F only; Periodic Fall & Spring)

Seminar examines aspects of the discipline that transcend traditional subfield boundaries.

ANTH 8991. Independent Study. (; 1-18 cr. ; Student Option; Every Fall, Spring & Summer)
Under special circumstances and with instructor approval, qualified students may register for a listed course on a tutorial basis. prereq: instr consent

ANTH 8992. Directed Reading. (1-18 cr. [max 54 cr.] ; Student Option; Every Fall, Spring & Summer)
tbd prereq: instr consent

ANTH 8993. Directed Study. (; 1-18 cr. ; Student Option; Every Fall, Spring & Summer)
Directed Study prereq: instr consent

ANTH 8994. Directed Research. (; 1-18 cr. ; Student Option; Every Fall, Spring & Summer)
N/A prereq: instr consent

Apparel Studies (APST)

APST 5117. Retail Environments and Human Behavior. (; 3 cr. ; A-F or Audit; Every Fall)
Theory/research related to designed environment across retail channels. prereq: Grad student or instr consent

APST 5121. History of Fashion, 19th to 21st Century. (; 4 cr. ; A-F only; Every Spring)
Analysis/interpretation of primary data about 19th/20th centuries based on historical methods. Critique of cultural, social, economic, technological, political, and artistic data presented through lens of dress in film/literature.

APST 5123. Living in a Consumer Society. (; 3 cr. ; A-F only; Fall Odd Year)
Consumerism within U.S. society. Commodification of health care, education, and production of news. Commercialization of public space/culture. What drives consumer society. How meaning is manufactured. What the lived experiences are of consumers today. Postmodern market. Alternatives to consumer society. prereq: Sr or grad student

APST 5170. Topics in Apparel Studies. (; 1-4 cr. [max 16 cr.] ; A-F or Audit; Periodic Fall, Spring & Summer)
In-depth investigation of specific topic, announced in advance.

APST 5193. Directed Study in Apparel Studies. (; 1-4 cr. [max 8 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Independent study in apparel studies under tutorial guidance. prereq: instr consent

APST 5218. Fashion, Design, and the Global Industry. (; 3 cr. ; A-F only; Every Fall)
Relationship of fashion, dress, and culture to time, place, and design. Focuses on fashion centers, fashion industry, and globalization. Chinese fashion industry as case study.

APST 5224. Functional Clothing Design. (4 cr. ; A-F only; Every Spring)
This class uses an engineering design process to analyze and meet the functional needs of specific user groups. We will be designing clothing that protects users from environmental conditions, and that facilitates and/or expands body function and movement. Physical principles of clothing and human anatomy are explored. A theoretical understanding of human anatomy and movement is applied through advanced patterning techniques for a variety of body types, work environments, and activities. Class projects are often conducted with an outside partner. Project work focuses on developing skills in collecting, synthesizing (in written and visual form) and using evidence to inform the design of a solution to a user-centered problem. Written documentation, developmental prototypes, and final design solutions are produced and evaluated.

APST 8170. Topics in Apparel Studies. (; 1-3 cr. [max 6 cr.] ; A-F or Audit; Every Fall & Spring)
In-depth investigation of a topic announced in advance. prereq: Varies with topic

APST 8180. Professional Seminar. (; 1-2 cr. [max 4 cr.] ; A-F or Audit; Every Fall & Spring)
Professional development issues/trends.

APST 8192. Readings in Apparel Studies. (; 1-3 cr. [max 8 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Independent study/review of books/periodicals under tutorial guidance. prereq: instr consent

APST 8193. Directed Study. (; 1-3 cr. [max 8 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Directed study in apparel studies. prereq: instr consent

APST 8222. Plan B Master's Project. (; 3 cr. ; S-N or Audit; Every Fall & Spring)
Plan B master's project. prereq: DHA master's student, instr consent

APST 8268. Behavioral Aspects of Dress. (; 3 cr. ; A-F or Audit; Fall Odd Year)
Research and social science theories as applied to appearance/dress as manifestations of human behavior.

APST 8271. Retailing: Strategic Perspectives. (; 3 cr. ; A-F or Audit; Fall Even Year)
Selected topics in the field of retailing. Students extend their thinking regarding consumer behavior to strategic retail management.

APST 8272. Digital Consumers: Theories in Retail and Consumer Studies. (3 cr. ; A-F or Audit; Spring Odd Year)
Reviews range of critical theories in retail/consumer studies to explore issues in multi-channel retailing environments. Exposure to breadth of topics in multi-channel retailing. Practical research experience. prereq: DES 8102 or equivalent quantitative methods class

Applied Economics (APEC)

APEC 5031. Methods of Economic Data Analysis. (; 3 cr. ; Student Option; Every Fall)
Statistical and econometrics techniques for applied economists. Theory and application of multivariate regression model using data sets from published economic studies. Emphasis on use of statistical techniques to understand market behavior. prereq: APEC 3001, Math 1142 or Math 1272, Stat 3001 or Sco 2550 or grad student or instructor consent

APEC 5032. Economic Data Analysis for Managerial and Policy Decisions. (; 3 cr. ; Student Option; Every Spring)
Statistical and econometric methods for the analysis of large data sets to support managerial and policy decisions. Methods for organizing, accessing, and ensuring the quality of data. Estimation techniques include panel data methods, limited dependent variable models, and time series analysis. Clarity of reporting and design of procedures for maintaining and updating data estimates. prereq: 5031 or instr consent

APEC 5151. Applied Microeconomics: Firm and Household. (; 3 cr. ; Student Option; Every Fall)
Quantitative techniques for analysis of economic problems of firms and households. Links between quantitative tools and economic analysis Regression analysis, mathematical programming, and present value analysis. prereq: (APEC 3001, Math 1142 or Math 1272, and Stat 3011 or Sco 2550) or equiv or grad student or instr consent

APEC 5321. Regional Economic Analysis. (; 3 cr. ; Student Option; Every Spring)
Development patterns. Role of resources, transportation, and institutional constraints. Migration, investments in growth and change. Economic information in investment and location decisions. Economic development policies and tools. Economic impact analysis. prereq: 3006 or ECON 3102 or instr consent

APEC 5411. Commodity Marketing. (3 cr. ; Student Option; Every Fall)
Economic concepts related to marketing agricultural commodities. Conditions of competitive markets, historical perspectives on market institutions/policy, structural characteristics of markets, policies/regulations affecting agricultural marketing of livestock, crop, and dairy products. prereq: graduate student and 1101 or Econ 1101

APEC 5451. Food Marketing Economics. (; 3 cr. ; A-F or Audit; Every Fall)
Economics of food marketing in the United States. Food consumption trends. Consumer food behavior, expenditure, data collection. Consumer utility models, demand forecasting. Food distribution system. Changes in supply chain, industry structure that serves retail food outlets. Individual/group projects.

APEC 5481. Futures and Options Markets. (; 3 cr. ; Student Option; Every Spring)
Economic concepts related to futures/options trading. Hedging, speculation.

APEC 5511. Labor Economics. (; 3 cr. ; Student Option; Periodic Fall)
Theoretical foundations of labor markets. Intertemporal/household labor supply. Demand for labor, efficiency wages. Human capital theory, unemployment, migration decisions. Analysis of econometric research applied to

labor policy issues such as minimum wage, tax policy, social insurance, education. prereq: [[3001 or Econ 3101 or PA 5021], [PA 5032 or equiv]] or instr consent

APEC 5711. Agricultural and Environmental Policy. (; 3 cr. ; Student Option; Periodic Spring)
This is a topics course which changes from year to year. This year we will consider the relationship between famines and armed conflict. The general supposition (conventional wisdom) is that famines are the result of the forces of nature ? floods, droughts, and earthquakes. In fact, the evidence supports the argument that famines result from the actions of man to do harm to others. We will consider a variety of cases including the Irish Famine of the 19th Century, the hunger after the conclusion of World War II, and the Bengal Famine of 1948. prereq: 3001 or Econ 3101

APEC 5721. Economics of Science and Technology Policy. (; 3 cr. ; Student Option; Every Fall)
This course covers the economic effects of science and technology policies, such as intellectual property rights. The course considers the effects of policies on: (1) the economic growth and development levels of countries; (2) the international technology transfers that occur between countries through trade, foreign direct investment, and licensing arrangements; and (3) differences in the economic welfare of developed and developing countries. prereq: APEC 3001 or ECON 3101 or instr consent

APEC 5731. Economic Growth and International Development. (; 3 cr. ; Student Option; Periodic Spring)
Economics of research and development. Technical change, productivity growth. Impact of technology on institutions. Science and technology policy. prereq: 3002 or [Econ 3101, Stat 3022]; Econ 4211 recommended

APEC 5751. Global Trade and Policy. (; 3 cr. ; Student Option; Fall Even Year)
Trade policies of import/export nations, gains from trade, trade negotiations/agreements. Free trade and common market areas. Exchange rate impacts. Primary commodities and market instability. Current trade issues. prereq: 3001 or Econ 3101 or PA 5021

APEC 5821. Business Economics and Strategy. (3 cr. ; Student Option; Every Spring)
Strategic management for production, processing, wholesaling, retailing, and service. Strategy formulation, implementation, and control. Business plans. Case study analysis. prereq: graduate student and 3002, [3501 or FINA 3001], and [ACCT 3001 or MGMT 3001 or MKTG 3001]

APEC 5831. Food and Agribusiness Marketplace. (; 2-3 cr. ; A-F or Audit; Every Spring)
This is a graduate student survey course of the industrial organization and current policy issues in the food and agribusiness marketplace. It represents a collaboration between the College of Food, Agricultural, and Natural Resource Sciences and the Carlson School of Management. The course uses short readings and speakers. A comprehensive look at all of the sectors in the food and agribusiness value chain is described. Topics include food policies (Farm Bills, food stamps, food labeling, and similar topics); environmental policies (water, invasive species, agriculture production and similar topics); and industrial organization issues (marketing and production contracts, overview of firm strategic orientation, distribution and similar topics). Readings, guest speakers, and presentations are used. prereq: graduate student

APEC 5832. The Business of Food Systems. (1 cr. ; Student Option; Every Fall)
This is a graduate survey course to introduce students to the Minnesota food industry through its regulatory process, research and development, and industry structure. It is an integrated week long course that includes field study tours of Minnesota agriculture and food economy coupled with classroom instruction. Each year the course will focus on two Minnesota industries such as dairy, beef, soybean, corn, potatoes, and other agricultural and food industries. The course has been developed through a collaboration with College of Veterinary Medicine, School of Public Health, and College of Food, Agricultural, and Natural Resource Sciences.

APEC 5841. Agricultural and Consumer Cooperatives and Mutuals. (3 cr. ; Student Option; Every Fall)
Introduction to the cooperative and mutual form of business. Each class begins with a speaker, usually a producer member or manager, from a cooperative or mutual including coffee, cocoa, farm supply, dairy, and other types of cooperatives. About 25% of the speakers are from global cooperatives. Students will choose a cooperative or mutual at the beginning of the semester and most homework assignments will be applied to your cooperative including a final digital media project. The course has one live lecture and one asynchronous lecture each week.

APEC 5990. Special Topics in Applied Economics. (; 1-4 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Special topics courses - focus on areas not covered in regularly offered courses. prereqs: graduate student or instructor consent

APEC 5991. Independent Study in Applied Economics. (1-4 cr. [max 32 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent study and supervised reading/ research on subjects/problems not covered in regularly offered courses. prereq: instr consent

APEC 8001. Applied Microeconomic Analysis of Consumer Choice and Consumer Demand. (; 2 cr. ; A-F or Audit; Every Fall)
Consumer behavior/demand. Introduction to welfare analysis. General equilibrium analysis in pure exchange economy. Part of four-course sequence (APEC 8001-8004). prereq: [[5151 or ECON 3101 or ECON 5151 or intermediate microeconomic theory], [[MATH 2243, MATH 2263] or equiv]] or instr consent

APEC 8002. Applied Microeconomic Analysis of Production and Choice Under Uncertainty. (; 2 cr. ; A-F or Audit; Every Fall)
Production, competitive markets, and choice under uncertainty. Technology and production, cost minimization and profit maximization, production duality, efficiency and technical change, general equilibrium of production. Part of four-course sequence (APEC 8001-8004). prereq: [[8001 or ECON 8001 or ECON 8101], [[MATH 2243, MATH 2263] or equiv]] or instr consent

APEC 8003. Applied Microeconomic Analysis of Game Theory and Information. (; 2 cr. ; A-F or Audit; Every Spring)
Strategic competition, game theory, and information. Non-cooperative games, static games of complete and imperfect information, dynamic games of complete/incomplete information, application of incomplete information. Part of four-course sequence (APEC 8001-8004). prereq: [[8002 or ECON 8002 or ECON 8102], [[MATH 2243, MATH 2263] or equiv]] or instr consent

APEC 8004. Applied Microeconomic Analysis of Social Choice and Welfare. (; 2 cr. ; A-F or Audit; Every Spring)
Welfare economics/measurement, externalities and social choice. Welfare theorems in general equilibrium, externalities and public goods, social choice, social welfare, and welfare change measurement. Part of four-course sequence (APEC 8001-8004). prereq: [[8003 or ECON 8003 or ECON 8103], [[MATH 2243, MATH 2263] or equiv]] or instr consent

APEC 8202. Mathematical Optimization in Applied Economics. (; 3 cr. ; Student Option; Every Fall)
Economic foundations and applications of mathematical and dynamic programming and optimal control. Mathematical optimization concepts; structures and economic interpretations of various models of the firm, consumer, household, sector, and economy. Model building and solution techniques. prereq: [5151, Econ 5151] or equiv or instr consent

APEC 8203. Applied Welfare Economics and Public Policy. (; 3 cr. ; Student Option; Every Spring)
Basic concepts underlying measurement of welfare change, problems of market failure and externalities, social welfare functions, and distribution within and across generations. Application of concepts, based on case studies of the environment, returns to research, technical change, and agricultural policy. prereq: calculus, intermediate econ theory

APEC 8206. Dynamic Optimization: Applications in Economics and Management. (; 3 cr. ; Student Option; Every Spring)
Formulation and solution of dynamic optimization problems using optimal control theory and dynamic programming. Analytical and numerical solution methods to solve deterministic and stochastic problems for

various economic applications. prereq: 5151 or equiv or instr consent

APEC 8211. Econometric Analysis I. (; 2 cr. ; Student Option; Every Fall)
Asymptotic theory, theory and application of linear models. Reproducibility of econometric research will be emphasized. prereq: ApEc 5031 or equiv OR Ph.D. student OR instr consent

APEC 8212. Econometric Analysis II. (; 2 cr. ; Student Option; Every Fall)
Correlated errors, linear probability models, instrumental variables, and panel data. Resampling and randomization inference. prereq: 8211 or equiv or instr consent

APEC 8213. Econometric Analysis III. (2 cr. ; Student Option; Every Spring)
Theory of M-estimation, generalized method of moments, and maximum likelihood. Quantile regression, discrete choice models, and quasi-maximum likelihood in the linear exponential family. Censoring and selection bias. prereqs: ApEc 5031 or equiv OR Ph.D. student OR instr consent

APEC 8214. Econometric Analysis IV. (2 cr. ; A-F or Audit; Every Spring)
Principles and methods of causal inference. Rubin potential outcomes framework, treatment effect concepts, matching, instrumental variables, and regression discontinuity designs. prereqs: ApEc 5031 or equiv OR Ph.D. student OR instr consent

APEC 8221. Programming for Econometrics. (2 cr. ; Student Option; Fall Even Year)
Applications of computer programming in econometrics. Introduction to and best practices in programming, including writing functions, organizing and commenting code, vectorization and other performance tips. Programmatic acquisition of novel economic datasets through Application Programming Interfaces (APIs), web scraping, and databases. Efficient cleaning and merging of datasets. Finally, a survey of common computational challenges in econometric estimation and potential solutions. prereq: APEC 5031 or equivalent

APEC 8222. Big Data Methods in Economics. (2 cr. ; Student Option; Fall Even Year)
Challenges, techniques, and opportunities presented by data that has one or more of the following characteristics: large, unstructured, high frequency, variable quality. The course will consist of three parts: 1) computational tools for applying standard econometric techniques on large datasets, 2) extracting summary information from unstructured data (e.g. images, text) for use in econometric analysis, 3) application of statistical learning techniques (e.g. classifiers, regression trees, machine learning) and the role of such techniques in causal inference. prereq: APEC 5031 or equivalent; APEC 8221 or equivalent programming experience.

APEC 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

APEC 8341. Applied Public Finance. (; 3 cr. ; A-F or Audit; Periodic Spring)
Current economic research on government tax and expenditure policy. Apply tools of applied economics to public finance issues. Tax policy, taxation and household decisions (including labor supply and saving), taxation and the firm (including the cost of capital), and fundamental tax reform. Alternative demand models for public goods, public choice theory, and fiscal federalism. prereq: 8001-8004 or ECON 8001-8004 or ECON 8101-8104

APEC 8401. Agricultural Markets and Policy. (2 cr. ; A-F or Audit; Periodic Spring)
Seven-week course. Designed for students pursuing the field of food and agricultural economics to acquire a foundational understanding of markets for food and farm commodities and skills to conduct analyses of market supply and demand and efforts of policy changes. prereq: APEC 8001 & 8002 or ECON 8101 & 8102, or concurrent registration

APEC 8402. Information and Behavioral Economics. (2 cr. ; A-F or Audit; Spring Even Year)
This course examines new theories of consumer behavior that combines economists' and psychologists' modeling of human behavior. Questions about whether human behavior is consistent with standard economic models will be posed and alternative explanatory models will be offered by incorporating psychological phenomena. The influence of information on consumer choice over time and under uncertainty will also be studied from a theoretical and empirical perspective. Topics include expected and unexpected utility theory, bounded rationality, prospect theory, choice over time, and rational addiction with applications to empirical work. prereq: APEC 8001 - 8004 or ECON 8101 - 8104, APEC 8401, APEC 8211-8212

APEC 8403. Applied Consumer Theory. (; 3 cr. ; A-F only; Spring Odd Year)
The objective of this course is to provide students with the theoretical and methodological foundations to perform analyses of demand and competition in food and agricultural markets. Some of the specific topics include specification and estimation of demand systems such as welfare analysis, analysis of competition, market power and public policy (e.g., a tax policy) in both homogeneous and differentiated product markets, analysis of cost pass-through, and merger analysis. prereqs: APEC 8001 - 8004 or ECON 8001 - 8004 or ECON 8101 - 8104, APEC 8211, APEC 8212, or instructor consent.

APEC 8404. Applied Production Theory. (; 3 cr. ; A-F or Audit; Spring Odd Year)
Aspects of production theory. Axiomatic representations of multi-output technologies. Input, output, and directional distance functions. Cost, revenue, and profit functions and duality. Input/output separability. Jointness/non-jointness in production. Index numbers, measures of efficiency/productivity. prereq: APEC 8001 and 8002 or equiv or instr consent

APEC 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

APEC 8501. Labor Economics I. (2 cr. ; A-F or Audit; Periodic Fall)
Theoretical and empirical studies of compensating differentials, discrimination, personnel economics, and gross flows. prereq: 8003 or equiv or concurrent registration is required (or allowed) in 8003, 8211, 5032 or equiv

APEC 8502. Labor Economics II. (; 2 cr. ; A-F or Audit; Periodic Fall)
Topics in applied microeconomics related to labor supply and human capital. Household decisions and resulting outcomes in labor market. Household labor supply. Estimation of labor supply and earnings functions. Theory of human capital, wage structure and determination, and impacts of tax and transfer policies.

APEC 8601. Natural Resource Economics. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Economic analysis of resource use and management. Capital theory, dynamic resource allocation. Applications to renewable and nonrenewable resources. Empirical studies, policy issues. prereq: [5151, 8202, 8206 [ECON 5151 or equiv]] or instr consent

APEC 8602. Economics of the Environment. (; 3 cr. ; Student Option; Every Fall)
Economic analysis of environmental management, emphasizing environmental policy. Application of microeconomic theory to problems of market failure, market-based pollution control policies, contingent valuation, hedonic models, option value, and other topics. prereq: 8004 or ECON 8004 or ECON 8104 or equiv or instr consent

APEC 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Doctoral Pre-Thesis Credits prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

APEC 8701. Trade and Development I. (; 2 cr. ; Student Option; Fall Odd Year)
This course will analyze international trade and economic policies that affect trade. The course will consider the determinants of trade, the welfare effects of trade, and the implications of trade liberalization or protectionism. The course will use contemporary economic theory and econometric methods of analysis; and will provide an economic foundation for analyzing issues on the frontier of the academic literature and policy debate.

APEC 8702. Trade and Development II. (; 2 cr. ; Student Option; Every Fall)
This course will focus on the applied microeonomics of international development. The course will focus on empirically testing the various theories developed to account

for persistent economic underdevelopment and poverty. We will start from key ideas and methods in empirical development economics, then cover household models (both unitary and otherwise), intrahousehold models, market formation and market participation, land markets, technology adoption, risk and insurance, and other topics related to development microeconomics, all from an empirical perspective. : prereq: First-year PhD level microeconomics and econometrics

APEC 8703. Trade and Development III. (; 2 cr. [max 3 cr.] ; Student Option; Periodic Spring)
Topics in the microeconomic analysis of development covered include: education (both the determinants of educational outcomes and the impact of those outcomes on several economic outcomes), poverty, inequality, demography (population, fertility and gender issues), and the impact of international aid.

APEC 8704. Trade and Development IV. (2 cr. ; Student Option; Every Spring)
This course will focus on the applied microeconomics of international development. It will empirically analyze various market failures in developing countries, their role in driving persistent poverty, and interventions to address them. The course will focus specifically on the functioning of financial, labor, and healthcare markets, as well as the influence of social networks and economic decisions and outcomes.

APEC 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

APEC 8793. Master's Paper: Plan B Project. (; 1-6 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Students work under guidance of adviser to complete their Plan B Paper project. prereq: Agri/ApEc MS student or ApEc MS student

APEC 8803. Marketing Economics. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Review of market structure, conduct, and performance. Market interdependency over space/time. Product forms. Issues pertaining to market failures/interventions. prereq: [Econ 8001, Econ 8002] or [Econ 8101, Econ 8102] or instr consent

APEC 8804. Managerial Economics. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Analysis of managerial decisions by organizations/individual entrepreneurs. Application of dynamic programming to investment/resource allocation decisions. Economics of business organization, including boundaries of the firm, mechanisms for vertical coordination. Economic implications of alternative ownership structures. prereq: [8001, 8002, 8003, 8004] or [Econ 8101, Econ 8102, Econ 8103, Econ 8104] or instr consent; majors must register on A-F basis.

APEC 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Doctoral thesis credit. prereq: ApEc PhD student; max 18 cr per semester or summer; 24 cr required

APEC 8901. Graduate Seminar: MS & PhD. (; 1 cr. ; S-N or Audit; Every Fall)
Attendance and active participation in applied economics research seminars. Effective research methods. Research topics and observe professional methods of research presentations.

APEC 8902. Graduate Research Development Seminar. (1 cr. ; S-N or Audit; Every Fall & Spring)
Faculty, students, outside speakers present research ideas/results, which participants critique. Topics vary according to interests of speakers. prereq: ApEc MS student or ApEc PhD student

APEC 8903. PhD Qualifying Paper Seminar I. (1 cr. ; S-N only; Every Fall)
Support for writing second year Qualifying Paper. Purpose of paper is to provide guided opportunity for doctoral students to complete substantial research paper. prereq: 8001-8004 or Econ 8001-8004 or Econ 8101-8104

APEC 8904. PhD Qualifying Paper Seminar II. (1 cr. ; S-N only; Every Spring)
Provides support to doctoral students writing second year Qualifying Paper. Purpose of paper is to provide guided opportunity for students to complete substantial research paper. prereq: APEC 8903

APEC 8990. Special Topics in Applied Economics. (; 1-4 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Special topics courses - focus on areas not covered in regularly offered courses. prereqs: graduate student or instructor consent

APEC 8991. Independent Study in Applied Economics. (1-4 cr. [max 24 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent study and supervised reading/ research on subjects/problems not covered in regularly offered courses. prereq: instr consent

Applied Plant Sciences (APSC)

APSC 8123. Research Ethics in the Plant and Environmental Sciences. (; 0.5 cr. ; S-N or Audit; Every Spring)
Ethics training to graduate students enrolled in plant/environmental graduate research programs and fulfill requirement for training in responsible conduct of research. Course meets during first seven weeks of spring semester.

APSC 8201. Advanced Plant Breeding. (3 cr. ; A-F or Audit; Spring Odd Year)
This course covers the principles underlying the application of genetics and statistics to cultivar development; evaluation of breeding methods; and methods to enhance genetic progress and efficiency through the application of statistical genetics, genomics, and molecular markers. In terms of format, this course is combination of lecture, discussion, and computer lab, varying according to the topic. An emphasis will be placed on classical and current literature to teach concepts, as well as hands-on experience with data analysis. Introductory courses in plant breeding/genetics and statistics. Knowledge of population and quantitative genetics would be useful but not required.

APSC 8270. Graduate Seminar. (2 cr. [max 4 cr.] ; A-F or Audit; Every Fall & Spring)
Examine qualities of effective scientific presentations. Develop skills in presenting scientific information effectively. Practice public speaking skills. Presenting scientific information to the general public. Organize a seminar series. prereq: Grad major in Applied Plant Sciences or instructor consent

APSC 8280. Current Topics in Applied Plant Sciences. (; 1-3 cr. [max 4 cr.] ; S-N or Audit; Periodic Fall & Spring)
This variable-credit course is a forum for learning and discussing contemporary topics in applied plant sciences. The topics covered differ according to the instructor and term that the class is taught.

APSC 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

APSC 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

APSC 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

APSC 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

APSC 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Applied Professional Studies (APS)

APS 5101. Ecological Design for Horticulture. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Polyculture and Ecological Design is the design science of assembling plants into ecologically balanced systems. Natural polycultures are self-supporting plant communities in forests, wetlands, and prairies. Investigate ecological functions and services that are important components for sustainable

horticultural design. Learn to apply the ecological landscape design language and technique while using the permaculture design process to create ecologically functional plant communities. Crucial discussions will assess the solutions in horticultural design for adapting to accelerated climate disruption, and follow natures momentum as a guide to sustainable production systems. Lab sessions will demonstrate, and you will develop, the skills and foresight needed to assess, research, concept, design, and present polycultures in a sequential and professional process.

APS 5102. Garden Design: Theory and Application. (; 2 cr. ; A-F or Audit; Periodic Spring)
This course provides an overview of the garden design process, the analysis and conceptual design of the landscape, exploration of the design characteristics of plants, sustainable design and a descriptive journey into several historical garden styles. You will be introduced to a variety of topics, including the design process, basic design principles, and the basic concepts of graphic communication in garden design. A working knowledge of design process and principles is critical to quality design. This course is intended to strengthen student awareness and knowledge of design rather than fully develop the skills necessary to draw, develop and implement garden designs. This course is different from fact-based horticulture science courses. Although you will be held responsible for learning a broad range of principles and processes in this course, there are typically no absolute right answers relative to design assessment and critique. What is more important is that you gain the ability to articulate and assess design character and quality and give evidence of your thought process.

APS 5103. Integration of Sustainable Agriculture Concepts. (3 cr. ; A-F only; Every Fall)
Biodiversity, ecological balance, nutrient cycling, soil quality. Organic practices of tillage, fertility management, weed control, insect control. Specific practices compared with conventional/integrated pest management. Economic analysis of both organic/conventional practices. prereq: AGRO 1101 or AGRO 1103 or BIOL 1001 or BIOL 1009 or HORT 1001 or HORT 6011 or instr consent, [sr or grad student admitted to MPS in horticulture] Because of the 5xxx level, undergraduates need permission numbers to register. Students can obtain permissions by writing to: reefx001@umn.edu

APS 5104. Conservation at Botanic Gardens. (1 cr. ; A-F or Audit; Periodic Fall)
In this class, students will explore conservation strategies of botanic gardens using the Plant Conservation Program at the University of Minnesota Landscape Arboretum as a model. Discussions will center around scientific and non-scientific strategies, as well as limitations and strengths of the botanic garden system in regards to rare plant conservation. There are many different conservation programs around the continent and world, all of them working on different species and attacking conservation issues with different toolsets, goals, and even philosophies. Some of these gardens interact with each other and combine resources, but some do not. Some gardens work at very large scales of conservation and some work at much smaller, local scales. During this course, there will be opportunities to interact with conservation programs at other botanic gardens.

APS 5950. Topics in APS. (; 1-3 cr. [max 18 cr.] ; A-F only; Periodic Fall, Spring & Summer)
Topics in APS

APS 5993. Directed Studies. (; 1-6 cr. ; Student Option; Every Fall, Spring & Summer)
Directed Studies prereq: dept consent

APS 6011. Presentations in the Biological Sciences. (2 cr. ; A-F only; Every Summer)
Course introduces students to the diverse ways in which biologists communicate in their professional lives. In this course students will choose an article from the primary literature and practice presenting the information to a range of audiences through a variety of techniques including soundbites, interviews, conference talks, conference posters, TED talks, podcasts, and internet videos.

APS 6950. Topics in Professional Studies. (; 1-3 cr. [max 24 cr.] ; A-F or Audit; Periodic Fall, Spring & Summer)
Topics in professional studies. prereq: dept consent

Applied Sciences Leadership (ASCL)

ASCL 6001. Perspectives in Integrated Applied Sciences. (; 3 cr. ; A-F only; Every Fall)
This course serves as an introductory anchor for students in the Master of Professional Studies in Applied Sciences Leadership. This course will introduce the applied sciences leadership framework and how it relates to the disciplinary focus areas in the program. The course will improve science-based communication skills, introduce applied research techniques, and sharpen critical thinking skills through exploration of current scientific inquiry.

ASCL 6002. Applied Sciences Leadership Capstone. (; 3 cr. ; A-F only; Every Spring)
This course serves as the capstone course for students in the Master of Professional Studies in Applied Sciences Leadership. This course will synthesize the disciplinary and applied sciences leadership coursework taken by students during their graduate career and will facilitate completion of an individualized, applied capstone project based on their applied science focus area. The course further develops scientific communication skills and sharpens critical thinking through investigating a scientific question. This culminating experience provides students with an opportunity to engage in creative problem-solving that addresses pressing real-world needs.

ASCL 6212. Regulatory Affairs for Food Product Development and Market Entry. (; 3 cr. ; A-F only; Every Spring)
This course equips participants with the regulatory affairs knowledge and critical analysis skills necessary to navigate the regulatory environment for food product innovation, formulation, and market entry. Participants will also gain insight into the way regulation and the underlying food laws are affected by scientific developments and changing societal values and concerns.

ASCL 6213. Regulatory Affairs for Food Production and Distribution. (; 3 cr. ; A-F only; Every Fall)
This course equips participants with the regulatory affairs knowledge and critical analysis skills necessary to navigate and apply the regulatory requirements for safe food production and distribution. Participants will also gain insight into the way regulation and the underlying food laws are affected by scientific developments and changing societal values and concerns.

ASCL 6214. Regulatory Affairs for Food Claims and Labeling. (; 3 cr. ; A-F only; Every Spring)
This course equips participants with the regulatory affairs knowledge and critical analysis skills necessary to navigate the regulatory affairs for food claims and labeling. Participants will also gain insight into the way regulation and the underlying food laws are affected by scientific developments and changing societal values and concerns.

ASCL 6215. Landmark Food Cases Shifting Regulatory Policy. (; 3 cr. ; A-F only; Every Spring)
This course will explore landmark food events that resulted in changes in food laws, regulations, policies, and approaches. A case study approach will be used to analyze how these learnings may be applied in future food innovation, safety, and marketing programs. Course participants will use the historical cases to identify future conditions indicative of an emerging incident that may rise to the level of a landmark case.

ASCL 6312. Finance for Non-financial Managers. (; 3 cr. ; A-F or Audit; Every Fall)
This course explores organizational finance from the lens of a non-financial manager, helping students gain an applied understanding of financial and accounting concepts and the role finance plays in the economic viability of a business. Students will learn to construct financial statements and use these tools to strategically determine the overall business financial health. Students will forecast possibilities for future growth in relation to costs associated with operational expenses and the cost of capital. Students will review basic economic frameworks and complete case studies focusing on the connection of global economic influences to company and industry financial indicators. Specific topics include financial analysis; planning, forecasting, and budgeting; cash flow, and strategic financing.

ASCL 6313. Data for Decision Making. (; 3 cr. ; A-F or Audit; Every Spring)

This course aims to provide knowledge and equip students with techniques to transform data into information that decision makers can use in order to make decisions. Students will learn the importance of source and quality of the data, input from and impact on stakeholders, and how social, community, and political or governmental dynamics come into play in the decision-making process. By the end of this course, students will understand and be able to apply decision-making data collection, analysis, synthesis, and presentation skills to incorporate an abundant and wide-variety of data in order to make an informed decision. This course will have didactic and application components where students will be able to apply the skills and knowledge learned.

ASCL 6314. Leading Projects and Teams. (; 3 cr. ; A-F or Audit; Every Spring)
This course provides students the background and skills needed to enhance teamwork, make informed business decisions, or resolve productivity issues effectively. This course will focus on the principles techniques, and tools used to plan, control, monitor, and review projects to meet organizational monetary and time constraints. Through case studies and practical application, students will practice project management skills along with setting team priorities, performance objectives, and the team decision making process.

ASCL 6315. Legal and Ethical Business Issues for Science Professionals. (; 3 cr. ; A-F only; Every Spring)
Legal and/or ethical non-compliance can have significant negative impacts for any company and its employees, including (i) negative impact on a company?s stock price and value, (ii) whether the desired/needed talent wants to work for a company, (iii) whether customers want to buy products or services from a company and (iv) whether suppliers want to sell products or services to a company. In this course you will (i) learn how to identify potential legal and/or ethical dilemmas before they become scandals, (ii) confirm your personal values and learn your ethical type and understand how they impact your assessment of ethical and legal dilemmas, (iii) learn how to identify the most appropriate stakeholders and their perspectives to evaluate and resolve legal and ethical dilemma,(iv) learn how to to identify conflicts of interests and other red flags, (v) learn to identify personal and general cognitive biases that impact your/others evaluation of potential legal and ethical dilemmas, (vi) develop a personalized methodology to evaluate, resolve, and accept accountability for resolving legal and/or ethical dilemmas in the real world, and (vii) learn the importance and value of crisis management and crisis communication plans when dealing with legal or ethical noncompliance.

ASCL 6316. Transformational Leadership in an Intercultural World. (; 3 cr. ; A-F only; Every Fall)
This course will explore and transform personal leadership styles to succeed in a dynamic cross-cultural environment. Today? s organizations are being impacted by fast tracking global trends that are shaping the very concept of leadership. Course material will review the fundamental tenets of leadership, provide nuance to self-leadership and organizational leadership, and address major global trends that require different sets of leadership skills. In addition, it will address these leadership concepts and skills within a cross-cultural context including exploration of intercultural competencies and strategies required to practice inclusive and diverse leadership.

Arabic (ARAB)

ARAB 5040. Readings in Arabic Texts. (; 2-4 cr. [max 9 cr.] ; A-F only; Every Fall)
Post-advanced study of extensive, complex original Arabic texts and development of students' Arabic discussion and writing skills in the realms of literature, academia, media and/or business. All primary and secondary readings, assignments, in-class analysis and discussion are done fully in Arabic. Topics specified in Class Schedule.

ARAB 5041. Classical and Modern Arabic Prose. (3 cr. ; A-F only; Periodic Fall & Spring)
In this class, students read extensive, complex, original Arabic texts and develop their academic discussion and writing skills in Arabic. The course covers a substantial number of Arabic literary texts of different genres and time periods: excerpts of the Prophet's biography, classical treatises and travel writing, stories from the "1001 Nights," 20th-century short stories, and short novels. To contextualize the literary texts, students read secondary texts also composed in Arabic and engage with Arabic audiovisual materials (video clips, TV interviews, songs) in class and at home. In-class analysis and discussion of the texts is conducted exclusively in Arabic. prereq: ARAB 5102 or the equivalent thereof as established by a placement test

ARAB 5101. Advanced Arabic I. (4 cr. ; Student Option No Audit; Every Fall)
Advanced readings in classical/modern Arabic. Compositions based on texts. prereq: Grade B- or higher in 3102 or instr consent

ARAB 5102. Advanced Arabic II. (4 cr. ; Student Option No Audit; Every Spring)
Readings of Arabic texts. Writing compositions based on texts. Continuation of 5101.

ARAB 5993. Directed Studies. (; 1-5 cr. [max 20 cr.] ; Student Option; Every Fall & Spring)
Students enrolling in this directed study/ research course will complete the University's common Directed Study/Research contract with the faculty mentor/evaluator. The Faculty member will ensure academic standards are upheld, including: -The work proposed is at the appropriate level for the course, academic in nature, and the student will be involved intellectually in the project. -The project scope is reasonable for one semester and the number of credits specified (42 hours of work per credit). -The faculty mentor is qualified to serve in this role. -Assessment of student learning and grading criteria are clear and appropriate. -The student will be working in a respectful, inclusive environment.

Architecture (ARCH)

ARCH 5001. Architectural Design Studies: Representation & Design. (1 cr. ; A-F only; Every Summer)
During this six week, summer intensive course, students will focus on basic issues of visual thinking and conceptual representation in architecture. This sequence of complementary exercises introduces issues and ways of working intended to complement educational backgrounds from other, non-architectural, disciplines. To do that we have designed the exercises to juxtapose different ways of perceiving and understanding constructed environments. While exploring these architectural ways of thinking, the exercises will also help to acknowledge preconceptions that may hinder one's ability to explore conceptual decisions.

ARCH 5110. Architecture as Catalyst. (1 cr. [max 3 cr.] ; S-N only; Every Spring)
Topical workshops on design methods, theories, or emerging practices. prereq: M.Arch

ARCH 5212. Undergraduate Architecture Studio 05: Advanced Design. (6 cr. ; A-F only; Every Fall)
Advanced design studio to engage students in range of critical subjects to be determined by respective instructors. Intended to challenge students with independent/experimental approach to design that builds on prior knowledge, develop working methodologies/ design ethics. prereq: C- or better in 3281, 3282, 4283, 4284

ARCH 5250. Advanced Topics in Design. (; 1-6 cr. [max 24 cr.] ; A-F only; Every Fall, Spring & Summer)
Advanced topics in architectural design.

ARCH 5301. Conceptual Drawing. (; 3 cr. ; A-F only; Every Spring)
Drawing as way of analyzing, exploring, and generating design ideas. Projection systems, diagramming, mapping. Different modes of visual perception. Nonverbal structures. prereq: MArch major or instr consent

ARCH 5313. Visual Communication Techniques in Architecture. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Delineation, presentation, and design techniques. Various visual media and methods of investigation. prereq: M Arch major or instr consent

ARCH 5321. Architecture in Watercolor. (; 3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Watercolor as a tool in design process. Foundation principles, techniques, medium, tools, materials. Color relationships, mixing, composition, applications to design. prereq: M Arch grad student or instr consent

ARCH 5350. Topics in Architectural Representation. (; 1-4 cr. [max 16 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Selected topics in architectural representation.

ARCH 5391. Design and Representation with BIM. (3 cr. ; A-F or Audit; Every Fall)
In this course, students will be introduced to the concept of Building Information Modeling (BIM) through the use of Autodesk Revit, one, one of the BIM software tools most commonly used in architectural practice today. Students will engage in a series of design exercises that will require both learning and applying Revit in the context of real world architectural scenarios. In addition to learning Autodesk Revit as a design tool, we will examine the use of BIM technology within the architectural industry through a series of case study examples. Also, presenters will share firsthand accounts of CAD and BIM Software being implemented in architectural practice.

ARCH 5392. Facade Design & Construction. (3 cr. ; A-F or Audit; Every Fall)
This course explains and explores contemporary facade design by introducing students to key technical principles that will empower them to be more thoughtful and informed facade designers. We will take an in-depth look at four fundamental facade materials ? stone, clay, metal, and glass ? followed by exploration and development in a 3D environment of the students' choice.

ARCH 5410. Topics in Architectural History. (; 3 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
Advanced study in architectural history. Readings, research, seminar reports.

ARCH 5411. Principles of Design Theory. (; 3 cr. ; A-F or Audit; Every Spring)
Principles of design and their instrumentation. How and why architecture theory is generated. Types and significance of formal analysis. Theoretical positions and modes of criticism. prereq: M Arch major or instr consent

ARCH 5412. Architecture: A Global and Cultural History. (3 cr. ; A-F only; Every Fall)
This course examines the history of architecture from a global perspective, addressing a variety of traditions and geographical locations, and following their interconnections and exchanges.

ARCH 5413. Modern and Contemporary Global Architecture. (3 cr. ; A-F only; Every Spring)
This course is a global history of modern and contemporary architecture, tailored to graduate students in the M.Arch. program. The course examines the architectural production of the 20th and 21st centuries through the focused study of buildings, urban plans, unbuilt designs, manifestos, and other visual and textual documents. Students will be called upon to reflect on issues of design, planning, programming, technology, and representation, connecting this course to their architectural training and future professional practice.
At the same time, the course will offer a critical and multidisciplinary perspective, presenting architecture in the context of culture, politics, economics, ideology, and other historical developments. The premise of this course is the fundamental role of history for contemporary and future architectural practice. The course assignments, readings, and activities aim to spur a productive dialogue between critical reflection and historical knowledge with an eye towards creative action.

ARCH 5421. Architecture and Interpertation: The Cave and the Light. (; 3 cr. ; A-F only; Periodic Spring)
Historical/hermeneutical investigation of iconography of grotto. Intertwined themes of descent into earth and ascent to light, from earliest strata of human culture to present day. prereq: [3411, 3412] or instr consent

ARCH 5423. Gothic Architecture. (; 3 cr. ; A-F or Audit; Spring Odd Year)
History of architecture and urban design in Western Europe, from 1150 to 1400. prereq: MS Arch or M Arch major or instr consent

ARCH 5424. Renaissance Architecture. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
History of architecture and urban design in Italy, from 1400 to 1600. Emphasizes major figures (Brunelleschi, Alberti, Bramante, Palladio) and evolution of major cities (Rome, Florence, Venice). prereq: MS Arch or M Arch major or instr consent

ARCH 5425. Baroque Architecture. (; 3 cr. ; A-F or Audit; Fall Odd Year)
Architecture and urban design in Italy, from 1600 to 1750. Emphasizes major figures (Bernini, Borromini, Cortona, Guarini) and evolution of major cities (Rome, Turin). prereq: MS Arch or M Arch major or instr consent

ARCH 5431. Eighteenth-Century Architecture and the Enlightenment. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Architecture, urban planning, and garden design in Europe and America from 1650 to 1850.

ARCH 5432. Modern Architecture. (; 3 cr. ; A-F or Audit; Periodic Fall)
Architecture and urban design in Europe and the United States, from early 19th century to World War II. prereq: MS Arch or M Arch major or instr consent

ARCH 5434. Contemporary Architecture. (; 3 cr. ; A-F or Audit; Every Fall)
Developments, theories, movements, and trends in architecture and urban design, from World War II to present. prereq: MS Arch or M Arch major or instr consent

ARCH 5435. History of American Architecture. (3 cr. ; A-F or Audit; Periodic Fall)
Through lectures, readings, discussion, and research, we will analyze buildings and spaces?architect designed and ?vernacular?? in the context of social, political, economic, technological, and ecological change. As we address these issues, we will examine the ways design and daily life, performed locally, interacted with national and global systems and flows; and the role the built environment has played in advancing structures and concepts of class, gender, race, ethnicity, and power. Students will gain a broad familiarity with the history of American buildings and landscapes, develop critical frameworks for analysis, and enhance their understanding of the environments they interact with every day?as designers, citizens, consumers, and professionals.

ARCH 5441. Minnesota: Architecture and Landscapes. (; 3 cr. ; A-F only; Every Spring)
History of major architectural monuments, urban phenomena, and landscape forms of Minnesota. Interrelationships between architecture, geography, and people. prereq: [3411, 3412] recommended

ARCH 5450. Topics in Architectural Theory. (; 1-3 cr. [max 9 cr.] ; A-F or Audit; Periodic Fall & Spring)
Selected topics in architectural theory and criticism.

ARCH 5451. Architecture: Defining the Discipline. (; 4 cr. ; A-F only; Periodic Fall & Spring)
Paradigms through which architecture has defined itself. Implications for its practice, product, and architecture in general. Lecture, discussion, design exercises. prereq: M Arch major

ARCH 5452. Architecture: Design, Form, Order, and Meaning. (; 4 cr. ; A-F or Audit; Every Fall & Spring)
Architecture and the issue of meaning. Explores fundamental and constituent elements of architectural form and order; their inherent tectonic, phenomenal, experiential, and symbolic characteristics; their potential and implications for the creation and structure of meaningful human places. prereq: M Arch major or instr consent

ARCH 5516. Technology Two: Luminous and Thermal Design. (; 6 cr. ; A-F only; Every Spring)
Concepts/principles of daylighting, thermal, energy, and systems integration. Architectural/ technological implications of lighting and thermal design. Ecological thinking in support of sustainable design decision making. prereq: M Arch

ARCH 5518. Environmental Technology: Integrative Ecological Design for Responsive Architecture. (3 cr. ; A-F only; Every Fall)
This course introduces the ecological design concepts and principles of daylighting, thermal, energy, and building systems integration. The course will provide students with an understanding of the primary architectural and technological implications of lighting and thermal to inform design and ecological thinking and to support sustainable design decision-making.

ARCH 5521. Material Investigation: Concrete. (; 4 cr. ; A-F only; Every Spring)
Design projects identify common problems/ improvements, investigate alternatives, and develop solutions where concrete is primary building material. prereq: MArch or MS

ARCH 5527. Material Investigations: Stone and Water. (; 4 cr. ; A-F only; Every Spring)
Design projects identify common problems/ improvements, investigate alternatives, and

develop solutions where wood is primary building material. prereq: M.Arch or M.S.

ARCH 5539. Daylighting and Architecture Design. (; 3 cr. [max 4 cr.] ; A-F only; Every Spring)
This 15-week seminar will explore approaches to daylighting and architectural design that weave together diverse layers of ecological, physiological, and psychological issues to enhance our understanding and relationship of light in place and time. We will explore how the formal, aesthetic, atmospheric, and experiential aspects of daylighting also support and foster more sustainable and regenerative approaches to architectural design. The goal of the seminar is to familiarize students with daylighting from an ecological perspective in order to use both creatively in the design process.

ARCH 5550. Topics in Technology. (; 1-4 cr. [max 12 cr.] ; A-F only; Every Fall, Spring & Summer)
Selected topics in architecture technology, e.g., construction, environmental management, energy performance, lighting, materials.

ARCH 5561. Tech 1, Structures for Building. (3 cr. ; A-F or Audit; Every Fall)
Role of structure in architectural design. Common systems found throughout history. Review systems to identify parameters that influence structural decisions. prereq: M Arch major or instr consent

ARCH 5562. Tech 2, Intro to Building Technology. (3 cr. ; A-F only; Every Fall)
Origin/development of architectural idea. Designs as direct means of representing our underlying intentions. prereq: M.Arch or instr consent

ARCH 5563. Tech 3: Advanced Building Technology Integrated Building Systems. (3 cr. ; A-F only; Every Fall)
Logic of integrating building systems. Improving understanding of/thinking critically about integration principles, theories, practice, application. Identifying/working through problems the project architect must address. prereq: M.Arch or instr consent

ARCH 5564. Tech 4: Building Structural Systems. (3 cr. ; A-F only; Every Fall)
Main concepts related to building structures. Basic knowledge of flow of forces. Review of rules for sizing structures. Calculations to understand systems behavior. Knowledge/tools to design buildings considering structure within design process. prereq: M.Arch or instr consent

ARCH 5609. Development and Implementation of Research. (3 cr. ; A-F only; Every Fall)
Bridge gaps among architectural research, design, practice. Forum for students to independently develop research topics/ implement research methods related to architectural scholarship/practice, aided by classmates, instructor, guest lecturers. prereq: instr consent

ARCH 5611. Design in the Digital Age. (; 3 cr. ; A-F or Audit; Every Spring)
Introduction to design, design process. Developing/understanding ways of seeing, thinking, and acting as a designer. Changes in design being wrought by digital technology. Team design project. prereq: Grad student or upper level undergrad student

ARCH 5621. Professional Practice in Architecture. (; 3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Legal, ethical, business, and practical requirements of architectural practice. Contemporary and historical models of contract formation, business principles, accounting, project management, design services, and marketing. prereq: M Arch major or instr consent

ARCH 5630. Practicum: Advanced Issues in Practice. (3 cr. [max 6 cr.] ; Student Option No Audit; Every Fall & Spring)
Advanced architectural practice topics not normally covered in curricula are examined/ evaluated as foundation for licensure/ARE 4.0 testing processes. prereq: M.S. Architecture or M.Arch

ARCH 5650. Topics in Architectural Practice. (; 1-4 cr. [max 16 cr.] ; Student Option; Every Fall, Spring & Summer)
Topics in architectural practice, methods of design production, marketing, operation, and relationships among clients, architecture, and society. prereq: 5621, Arch major or 5621, M Arch major or instr consent

ARCH 5651. Building Stories. (; 3 cr. [max 12 cr.] ; A-F only; Every Spring)
Professional practice education by means of case study analysis.

ARCH 5670. Topics in Historic Preservation. (; 1-3 cr. [max 12 cr.] ; Student Option; Periodic Fall)
Selected topics in the theory, philosophy, research, and methods of architectural historic preservation.

ARCH 5671. Historic Preservation. (3 cr. ; Student Option; Every Fall)
Philosophy, theory, origins of historic preservation. Historic archaeology/research, descriptive analysis, documentation of historic buildings. Government's role in historic preservation, preservation standards/ guidelines, preservation/building codes, preservation advocacy.

ARCH 5672. Historic Building Conservation. (; 3 cr. ; Student Option; Every Spring)
Historic building materials, systems, and methods of conservation. Discussion of structural systems, building repair and pathology, introduction of new environmental systems in historic buildings, and conservation of historic interiors. Research on historic building materials and techniques using primary and secondary resources and on documentation of a specific historic site through large-format photography and measured drawings. prereq: 3412, 5671 or instr consent

ARCH 5673. Historic Property Research and Documentation. (3 cr. ; Student Option; Every Spring)
Philosophy, theory, methods of historic building research. Descriptive analysis of buildings, building documentation, historical archaeology, architectural taxonomy. prereq: [3412, 3641, 4671, 5671, 4672 or 5672] or instr consent

ARCH 5674. World Heritage Conservation. (; 3 cr. ; A-F only; Periodic Fall)
Investigations of World Heritage conservation and nomination for the preservation of historic buildings and sites and their management for public use. Case studies link current practices, methods, and solutions with expert preservationists, site conservationists and local communities in the development and design of preservation strategies. prereq: MS in Arch-HP concentration or M.ARCH or MLA or instr consent

ARCH 5676. Economics of Heritage Preservation. (; 3 cr. ; A-F only; Periodic Fall)
Theory and practice of heritage preservation-based community redevelopment/economics. Financial aspects of real estate development. Case studies of recent historic rehabilitation projects throughout Minnesota. Financial feasibility and compliance with design guidelines/regulatory aspects. Financial incentives in other states/how new policies in Minnesota might positively influence preservation activity.

ARCH 5686. Research Practices Final Project: Research into Practice. (4 cr. ; A-F only; Every Fall)
The course is the first of a three-??course final project sequence required as the capstone experience for MS-??RP students. The course provides a forum for understanding the current state of research in the design and building industry and its trajectories and trends. Student projects will apply this knowledge to a regionally based commercial or non-?????profit practices in the building industry, assessing the firm???s research capacity, mapping its potential in context of innovative precedents and suggesting future growth. prereq: MS-RP student

ARCH 5687. Research Practices Final Project: Practice into Research. (4 cr. ; S-N only; Every Fall)
Course is the second of a three-??course final project sequence required as the capstone experience for MS-??RP students. Building upon the previous semester understanding the state of research in the building industry, this course develops a single case study project in comparative context of contemporary practice. The work of individual students adds to a collective knowledge base on project best practices and development of industry-????? wide metrics and standards. Course meets concurrently with ARCH 5688 Representation of Case Studies. prereq: Arch 5686

ARCH 5688. Research Practices Final Project: Representation of Case Studies. (1 cr. ; A-F only; Every Fall)
The course is the third of a three-??course final project sequence required as the capstone experience for MS-??RP students. This course meets concurrently to ARCH 5687 Practice into Research. Information graphics are essential to understanding and explaining critical issues in a case study. The format of information can be

designed to emphasize comparisons between projects or to highlight unique characteristics of individual projects. This course will explore a variety of strategies commonly used in case study documentation and ask the student to apply one method to present the case developed in ARCH 5687. prereq: Arch 5686

ARCH 5689. Advanced Inclusive Professional Practice. (3 cr. ; A-F only; Every Fall)
Advanced inclusive professional practice class focuses on new and emerging issues in architectural practice including: Lean design, research practices, collaborative intercultural competence. Student projects include creation of interactive material and diagrams.

ARCH 5711. Theory and Principles of Urban Design. (; 3 cr. ; A-F or Audit; Every Spring)
Seminar. Debate on dominant theories/ paradigms informing city design from renaissance to 21th century. Critical issues central to current debates. prereq: M Arch major or LA grad major or grad student or instr consent

ARCH 5721. Case Studies in Urban Design. (; 3 cr. ; A-F or Audit; Every Spring)
Reading seminar. Evolution of contemporary city. Dynamics that created contemporary urban spatial patterns. Planning/design theories that have guided public interventions in built environment. Thematic texts, classroom discussions. prereq: Grad student or instr consent

ARCH 5731. Territorial City. (; 3 cr. ; A-F only; Every Fall)
Seminar. Students research, define, and test conditions within which the territory and contemporary city coexist. Site for research is Twin Cities metropolitan area. Readings, discussions, field trips, collaborative development of urban proposals.

ARCH 5750. Topics in Urban Design. (; 1-4 cr. [max 16 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Special topics in theory/practice of urban design.

ARCH 5756. Public Interest Design: Principles and Practices. (3 cr. ; A-F or Audit; Every Spring)
As the allied fields of design evolve in response to an increasing number of global challenges?inequity, social and political turmoil, disruptive climate-change, accelerating population growth?the question of how designers will address the needs of the most vulnerable among us is fundamental. Public Interest Design (PID), an emerging area of specialization within the design professions, specifically considers the concerns of the vast majority of the world's inhabitants who are historically under-resourced and ill-equipped to respond to the "Grand Challenges" facing humankind. With this mind, this introductory survey course has two aims: First, to critically examine the range of environmental, economic, social, and ethical issues that underpins work with under-resourced domestic and international communities?including how these concerns can be collectively addressed to become more resilient; and second, to investigate organizational models that seek to broaden the traditional scope of the allied design fields as disciplines and professions by advocating a humanitarian basis for practice.

ARCH 5993. Directed Study. (; 1-4 cr. [max 8 cr.] ; A-F or Audit; Every Fall & Spring)
Guided individual reading or study. prereq: instr consent

ARCH 8101. Subjects and Methods in Architecture. (; 2 cr. ; S-N or Audit; Periodic Fall & Spring)
The discipline of architecture. prereq: Grad Arch major or instr consent

ARCH 8250. Advanced Topics in Design. (; 1-6 cr. ; S-N or Audit; Periodic Spring & Summer)
Design studio. prereq: Admitted to 3+ track for MArch prog or instr consent

ARCH 8251. Graduate Architectural Design I. (; 9 cr. ; A-F or Audit; Every Fall)
Design projects focus on fundamental issues of space/form/ light/materiality in relation to human habitation. Design as a process of exploration/inquiry. Modes/media of representation, their critical impact. prereq: MArch or instr consent

ARCH 8252. Graduate Architectural Design II. (; 6 cr. ; A-F or Audit; Every Spring)
Fundamental architectural problems involving design as a creative inquiry. Individual and collaborative effort. prereq: 8251, grad Arch major or instr consent

ARCH 8253. Graduate Architectural Design III. (; 6 cr. ; A-F or Audit; Every Fall)
Issues of design process, representation, programming, technology, and urban relations. prereq: [8251, MArch] or instr consent

ARCH 8254. Technical Applications in Design. (; 3 cr. [max 6 cr.] ; A-F or Audit; Every Fall)
Design potential inherent in technical development process of design project. Testing concepts, developing details, integrating building systems. Structural bay enclosure, cost considerations, regulatory compliance. Building-information modeling, analog/digital representations in architecture document production. prereq: [8253, MArch major] or dept consent

ARCH 8255. Graduate Architectural Design V. (; 6 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
Fundamental architectural problems involving design as a creative inquiry. Individual/ collaborative effort. prereq: [8254, grad Arch major] or instr consent

ARCH 8295. Directed Graduate Architectural Design. (; 6 cr. ; A-F or Audit; Every Spring)
N/A prereq: 8251, grad Arch major or instr consent

ARCH 8299. Master's Final Project. (; 10 cr. ; S-N only; Every Spring)
Final studio project for Plan C master's. Measures knowledge of architecture and ability to conduct research for design proposal, communicate in visual/written representations. Proposal, graphic presentation of project. prereq: Plan C, MArch

ARCH 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

ARCH 8350. Advanced Topics in Representation. (; 1-3 cr. ; A-F or Audit; Periodic Fall & Spring)
Theory and practice of visual representation in architecture. prereq: Grad Arch major or instr consent

ARCH 8450. Topics in Theory. (; 1-3 cr. ; A-F or Audit; Every Fall & Spring)
Topics vary prereq: 5411, grad Arch major or instr consent

ARCH 8494. Directed Research in Architectural History. (; 1-3 cr. ; A-F or Audit; Every Spring)
tbd prereq: Grad Arch major or instr consent

ARCH 8550. Topics in Technology. (; 1-3 cr. ; A-F or Audit; Every Fall & Spring)
Special topics in theory/practice of architecture technologies. prereq: Grad arch major or instr consent

ARCH 8561. Sustainable Design Theory and Practice. (; 3 cr. ; A-F only; Every Fall)
History, theory, and ethics of sustainable design processes/practices. Emphasizes approaches to sustainable architecture. Regional/global ecological issues, design strategies, methods of assessment. Primary architectural/technological implications of sustainable design theory/practice that inform design thinking/research. Sustainable design issues. Research projects, case studies, fieldwork. prereq: [5513, [grad MS or MArch]] or instr consent

ARCH 8563. Energy and Indoor Environmental Quality Issues in Sustainable Design. (; 3 cr. ; A-F or Audit; Every Spring)
Energy/IEQ aspects of sustainable design related to global environmental issues. Energy/ IEQ strategies, methods, and tools as applied to sustainable building design. Research projects, case studies. prereq: [5513, [grad MS or MArch]] or instr consent

ARCH 8565. Materials Performance in Sustainable Building. (; 3 cr. ; A-F only; Every Fall)
Building-material properties, resource conservation, fabrication/construction processes in production of high performance sustainable building designs. Application of assessment/evaluation tools (LCA, BEES, Athena or LEED) for IEQ, waste reduction and management with an emphasis on experimental/analytic methods. Aesthetic/technical solutions that integrate design selection processes, construction methods, commissioning processes, and facility management, maintenance, and decommissioning. prereq: [5512, grad MS or March]] or instr consent

ARCH 8567. Site and Water Issues in Sustainable Design. (; 3 cr. ; A-F only; Every Spring)
Site, water and site/building integration aspects of sustainable design. Ecological principles, site analysis. Water/site/building integration strategies, methods, and tools integrated with sustainable design issues such as energy, indoor environmental quality, and materials. Research projects, case studies, measurement methods. prereq: [5512, [grad MS or MArch student]] or instr consent

ARCH 8650. Topics in Architectural Practice. (; 1-3 cr. ; A-F or Audit; Periodic Fall)
N/A prereq: Grad Arch major or instr consent

ARCH 8750. Topics in Urban Design. (; 1-3 cr. ; A-F or Audit; Periodic Fall)
N/A prereq: Grad Arch major or instr consent

ARCH 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only

Art (ARTS)

ARTS 5105. Advanced Dimensional Painting. (; 4 cr. ; Student Option; Every Spring)
Illusionary space applied to sculptural forms. Practical applications of spatial/painterly concepts. Emphasizes critical/visual judgment. Development of cohesive body of work reflecting interaction of two/three dimensions. prereq: 3105 or instr consent

ARTS 5110. Advanced Drawing. (; 4 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
This studio course provides students the opportunity to investigate individual ideas and work on self-guided projects within a communal learning environment. Students will be encouraged to develop and execute their ideas with skillfulness and clarity. Through a consideration of diverse materials and practices, students will develop a proficiency in the language of contemporary drawing or painting. This course is designed to assist students in making connections between their own work and larger global themes and issues. Group and individual critiques, field trips, reviewing the work of other artists and readings will supplement studio work. Students are expected to spend time working on their projects outside of scheduled class time. prereq: Art major and ARTS 3110

ARTS 5120. Advanced Painting. (; 4 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
This studio course provides students the opportunity to investigate individual ideas and work on self-guided projects within a communal learning environment. Students will be encouraged to develop and execute their ideas with skillfulness and clarity. Through a consideration of diverse materials and practices, students will develop a proficiency in the language of contemporary painting. This course is designed to assist students make connections between their own work and larger global themes and issues. Group and individual critiques, field trips, reviewing the work of other artists and readings will supplement studio work. Students are expected to spend time working on their paintings outside of scheduled class time. prereq: ARTS 3120 and ARTS major

ARTS 5140. Advanced Printmaking. (; 4 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
In-depth research of personal imagery using a broad range of historical and contemporary applications. Development of imagery using color, photo-mechanical, digital processes. Cross-media approaches. Prereq: ARTS 3130

ARTS 5230. Advanced Art + Sound. (; 4 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Sound art practice/theory. Emphasizes individual creative projects using sound as primary material. History of experimental sound art from early 20th century to present. Critiques, readings, writing, public presentations. prereq: ARTS major and 3605 or 3230

ARTS 5250. Art + Performance. (; 4 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Studio practice in performance art and installation; investigation of historical and contemporary methods and concepts of interdisciplinary expression. Development of personal imagery. Prereq: ARTS major

ARTS 5260. Art + Interdisciplinary Collaborations. (; 3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Interdisciplinary, collaborative artist teams explore modes of creative expression at intersections of the arts. Students collaborate to co-author/produce works of art for pubic presentation. Emphazes integration of media arts with visual art, music, dance, and theater to produce interdisciplinary/collaborative art. prereq: Upper-division undergraduate or graduate student in art, creative writing, dance, music or theater.

ARTS 5401W. BFA Seminar Capstone 1: Concepts and Practices in Art. (WI; 3 cr. ; Student Option; Every Fall & Spring)
Various ideologies, cultural strategies that influence practice/interpretation of art. Emphasizes diversity of viewpoints. Application of issues in developing final BFA exhibition.

ARTS 5404. BA Capstone and Exhibition. (3 cr. ; S-N only; Every Fall & Spring)
The BA Captstone and Exhibition will focus on building professional skills, developing a strong studio practice, and preparing for an exhibition in Regis Center Public Spaces.

ARTS 5407. BFA Capstone 2: Critique and Exhibition. (; 4 cr. ; A-F only; Every Spring)
This critique-based seminar will provide a structured critical forum for the discussion of your work, help you to verbally articulate and defend your work and prepare you in the presentation of your work. This is a self-motivated and self-directed class. It is expected that you will produce a substantial amount of work to show in this course. Your work is self-directed Artwork created from assignments (in other classes) will not be critiqued. Each artist will have two one-hour critiques of their work over the course of the semester. Critiques may include members from the arts community such as local artists, MIA, Midway Contemporary Art, Walker Art Center, The Soap Factory and Franklin Artworks. Grades are based on critique participation, attendance and your artist presentation. This class culminates in the BFA Exhibition in the Nash Gallery. Throughout the semester, we will meet with Nash Gallery staff to develop this final show.

ARTS 5490. Workshop in Art. (; 1-4 cr. [max 48 cr.] ; Student Option; Every Fall, Spring & Summer)
Selected topics and intensive studio activity. Topics vary yearly.

ARTS 5610. New Media: Making Art Interactive. (; 4 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Conceptual/aesthetic development with digital, interactive art. Experimental approaches to interactive technologies. Projects with responsive/tangible media. Theory/history of new media. prereq: 3601 or instr consent

ARTS 5710. Advanced Photography and Moving Image Projects. (; 4 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
Design/implementation of individual advanced projects. Demonstrations, lectures, critique. Reading, writing, discussion of related articles/ exhibitions. prereq: previously completed a 3XXX course in Photography or Moving Images and Art major

ARTS 5750. Advanced Narrative Digital Filmmaking. (; 4 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Narrative forms of video. Documentary, live action, memoir, experimental forms. Digital video production and editing. Personal aesthetic and conceptual directions. Theory, critical readings about historical and contemporary works in video. prereq: 3750

ARTS 5760. Experimental Film and Video. (; 4 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Experimental approaches in producing digital video within a contemporary art context. Using digital media technologies in installation, performance, and interactive video art. Emphasizes expanding personal artistic development. Theoretical issues, critical/ historical readings/writings in media arts. prereq: ArtS major, ArtS 1704

ARTS 5770. Animation. (; 4 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Creating ideas visually with 2- and 3-dimensional animation technologies. Vector- and layer-based raster animation. Modeling objects and spaces, creating textures, lighting, movement, sound track. prereq: Art major

ARTS 5780. Advanced Super 8 and 16 MM Filmmaking. (4 cr. [max 8 cr.] ; A-F or Audit; Every Fall & Spring)
This course will explore the medium of Super 8 filmmaking in the tradition of the

experimental and avant ?garde. We will focus on the physicality of the film stock, the basic mechanics of the camera and projector, and how these elements translate into a visual language and aesthetic. Students will learn how to shoot, process, edit, splice, project, and transfer their own super 8 films. This course will balance the technical, conceptual, and historical aspects of small gauge or amateur analog filmmaking, and address what it means to work in this medium at the beginning of the 21st century. The course will include presentations, readings, and discussions on contemporary and historical artists in the medium, as well as outside film screenings and lectures. Classroom visits by artists will also provide an informed context for the primary course objective. Prereq: Art major

ARTS 5810. Advanced Ceramics. (; 4 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
Critical discourse of aesthetics. History of, contemporary issues in clay and criticism. Independent, advanced projects. prereq: ARTS major and ARTS 3820 or ARTS 3830

ARTS 5850. Advanced Foundry and Metal Sculpture. (4 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Metal casting of sculpture in bronze, iron, aluminum, other metals. Studio practice, investigation of historical/contemporary methods and concepts. Development of personal sculptural imagery. prereq: Art major

ARTS 5860. Advanced Sculpture. (; 4 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
This advanced Sculpture course is a self-motivated and self-directed studio class to help you develop and maintain a personal studio practice. The structure of this studio course provides space for in-depth research, idea development, individual exploration, experimentation, play and critical feedback. Prereq: ARTS major and ARTS 3860

ARTS 5890. 3D Modeling and Digital Fabrication. (4 cr. [max 12 cr.] ; Student Option; Every Spring)
In this class, students will learn the basic skills of 3D computer modeling and digital fabrication to generate objects using the Department of Art's 3D Printers, 3-axis CNC Router, and Laser Cutter. Instruction includes computer modeling in Adobe Illustrator and Rhino, transfer of files, and object fabrication. Prereq: ARTS major

ARTS 5990. Independent Study in Art. (1-4 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Independent study project designed by student in consultation with instructor. prereq: Major, completed regular course with instructor, instr consent

ARTS 8100. Practice and Critique: Drawing and Painting. (3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Creative practice/critique. Colloquium emphasizing individual goals/directions. Aesthetics, history, theory, contemporary issues in practices/criticism. prereq: Art MFA student

ARTS 8300. Practice and Critique: Sculpture. (3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Creative practice/critique. Colloquium emphasizing individual goals/directions. Aesthetics, history, theory, contemporary issues in practices/criticism.

ARTS 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

ARTS 8401. Studio and Pedagogy: Philosophy and Practice. (; 3 cr. [max 6 cr.] ; Student Option; Every Spring)
Orientation to establishing studio practice, introduction of department and community resources, and preparation for teaching. Studio visits and critiques; development of teaching strategies. Required of drawing and painting students.

ARTS 8402. Theoretical Constructions in Contemporary Art. (; 3 cr. ; Student Option; Every Fall & Spring)
Structure for examining and understanding current critical practice. Evaluation and questions about assumptions of theory in context of current artistic production.

ARTS 8403. MFA Professional Practices and Teaching Pedagogy. (3 cr. ; A-F only; Every Spring)
This course is intended to provide a context for developing a career as an artist and explore how to create a sustainable artistic practice. This course will also explore issues in contemporary arts education through multiple approaches and best practices in teaching pedagogy. A primary goal of the course is to provide the Department of Art graduate instructors with an opportunity develop teaching skills before entering the classroom, access to UMN teaching resources and important information regarding expectations of University of Minnesota instructors and courses. Through visiting artist presentations, as well as those by professionals in arts administration, non-profits, established and non-traditional galleries, curators, critics, and recent art graduates, we will also examine the rich ecology of the arts in the Twin Cities community. We will also explore how to navigate the arts terrain successfully as an artist.

ARTS 8404. MFA Thesis Research + Writing. (3 cr. ; A-F only; Every Fall)
This workshop aims to facilitate the writing process of the MFA Thesis Supporting Paper for third-year graduate students. In accordance with the MFA advisory manual, students are challenged to articulate their creative investigations and processes as well as philosophical and critical perspectives developed throughout their course of study. By the time third-year reviews take place in December, students are expected to have a full-length draft of their text (15 pages, double-spaced, 12-point type) that names relevant reference points of the work, historical and contemporary art influences, a bibliography, and completes the requirements laid out in the MFA Advising Manual.

ARTS 8410. MFA Critique Seminar. (3 cr. [max 12 cr.] ; A-F only; Every Fall & Spring)
Taken for three semesters during the first and second year of the program, the MFA Critique Seminar provides candidates with an intellectual community and critical forum in which they may test, temper, and enlarge the ideas that underlie their artistic goals. The seminar will meet weekly to critique, in rotation, the work-in-progress of all candidates. The cross-disciplinary nature of the conversation is meant to foster the widest possible dialogue among artists, encourage divergent thinking and discourage the easy acceptance of received notions. The seminar will also include, critiques, and discussions with visiting artists, curators, etc.

ARTS 8420. MFA Studio. (; 1-6 cr. [max 12 cr.] ; A-F only; Every Fall & Spring)
This graduate level directed study offers students the opportunity to work with individual faculty. Students arrange regular meetings and develop a proposal for the semester, which is approved by the instructor. Prior to registration, the student must contact the faculty member with whom they hope to work.

ARTS 8450. MFA Creative Thesis. (1-9 cr. [max 18 cr.] ; A-F only; Every Fall & Spring)
Research/studio work in preparation for thesis exhibition. Third year students are required to complete 18 cr. of this course in their final year. Prior to registration, the student must contact the faculty member with whom they hope to work.

ARTS 8490. Workshop in Art. (; 1-4 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Selected topics/intensive studio activity. Topics vary yearly.

ARTS 8500. Practice and Critique: Printmaking. (3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Creative practice/critique. Colloquium emphasizing individual goals/directions. Aesthetics, history, theory, contemporary issues in practices/criticism.

ARTS 8600. Practice and Critique: Experimental and Media Arts. (3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Creative practice/critique. Colloquium emphasizing individual goals/directions. Aesthetics, history, theory, contemporary issues in practices/criticism.

ARTS 8700. Practice and Critique:Photography. (3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Creative practice/critique. Colloquium emphasizing individual goals/directions. Aesthetics, history, theory, contemporary issues in practices/criticism.

ARTS 8800. Practice and Critique: Ceramics. (3 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
Creative practice/critique. Colloquium emphasizing individual goals/directions.

Aesthetics, history, theory, contemporary issues in practices/criticism.

ARTS 8990. MFA Creative Thesis. (1-9 cr. [max 18 cr.] ; A-F only; Every Fall & Spring)
Research/studio work in preparation for thesis exhibition.

Art History (ARTH)

ARTH 5252. History of Early Christian Art in Context. (; 3 cr. [max 4 cr.] ; Student Option; Periodic Spring)
This course will introduce graduate and advanced undergraduate students to Christian visual art from its evident beginnings (ca. 200) to the dawn of the early Middle Ages, attending to its transformation under imperial patronage. Working with both objects and texts, core themes include the continuity between Christian and pagan art of Late Antiquity, the influence of imperial ceremonies and style, the emergence of sacred icons, the development of Passion iconography, the influence of Islam, and the divergent styles, motifs, and theological perspectives on the validity and role of images from the Byzantine East to the early Medieval West.

ARTH 5302. The Image Multiplied: Prints in Early Modern Europe. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
The technology of mechanically reproducing complex visual images on paper, a development of fifteenth-century Europe, transformed the early modern world no less than the emergence of digital media has transformed our own. Techniques of woodcut, engraving and etching quickly became important media for innovation within the fine arts. At the same time, they became equally important as sources for devotional imagery, for disseminating copies of other artworks, for the expansion of knowledge through scientific illustration, and for the effective broadcasting of political and religious messages during centuries of extraordinary political and religious upheaval. In this course we will investigate the cultural history of printed images in Europe from the time of their emergence in the fifteenth century through the mid-eighteenth century. Through lectures and class discussion, you will develop a familiarity with the technical aspects of printmaking and apply that understanding to the historical interpretation of specific works. The course will not be an exhaustive survey of printmakers and printmaking styles during the early modern era but will instead approach the early modern print through the changing cultural circumstances of its production and reception. While we will consider the work of many lesser-known (and anonymous) artists, we will concentrate on the work of major printmakers such as Mantegna, D?rer, Goltzius, Rembrandt, Callot, Hogarth, and Piranesi. The course will include visits to local collections.

ARTH 5313. Spanish Baroque Masters: Tradition and Experimentation in Golden Age Spain. (HIS; 3 cr. ; Student Option; Periodic Fall & Spring)
This seminar focuses on some of the major masters of Spanish Baroque art, including Francisco de Zurbar?n, Diego Vel?zquez, Jusepe de Ribera, Bartolom? Esteban Murillo, and Juan S?nchez Cot?n. We will explore their works from a variety of perspectives in an effort to understand the unique character and contributions of the art of the Spanish Golden Age.

ARTH 5315. The Age of Curiosity: Art, Science & Technology in Europe, 1400-1800. (AH,TS; 3 cr. ; Student Option; Periodic Fall & Spring)
Diverse ways in which making of art and scientific knowledge intersected in early modern Europe. Connections between scientific curiosity and visual arts in major artists (e.g., da Vinci, Durer, Vermeer, Rembrandt). Artfulness of scientific imagery/ diagrams, geographical maps, cabinets of curiosities, and new visual technologies, such as the telescope and microscope.

ARTH 5335. Baroque Rome: Art and Politics in the Papal Capital. (; 3 cr. ; Student Option; Fall Even Year)
Center of baroque culture--Rome--as city of spectacle and pageantry. Urban development. Major works in painting, sculpture, and architecture. Ecclesiastical/private patrons who transformed Rome into one of the world's great capitals.

ARTH 5336. Transformations in 17th Century Art: Caravaggio, Velazquez, and Bernini. (3 cr. ; Student Option; Periodic Fall & Spring)
This course offers an in-depth examination of three of the most innovative masters of early modern European art, the painters Michelangelo Merisi da Caravaggio and Diego Vel?zquez, and the sculptor and architect Gianlorenzo Bernini. Through selected readings, slide presentations and discussions, we will explore the lives and works of these artists, paying particular attention to the ways they created an entirely new relationship between the work of art and the viewer and ushered in a radically new way of conceiving visual imagery.

ARTH 5411. Gender and Sexuality in Art Since 1863. (; 3 cr. ; Student Option; Periodic Fall & Spring)
In 1863, ?douard Manet painted a scandalous nude titled Olympia, which was met with outrage by critics when it was exhibited at the Paris Salon in 1865. The painting has been the subject of extensive discussion ever since among critics, curators, and art historians who examine not only its modernist style and formal qualities, but also the class, racial, and sexual identities of the two figures it depicts. This course surveys the role gender and sexuality have played in the historical development of western art from Manet?s Olympia to the present, and the role that art has played in both reinforcing and challenging dominant theories of gender identity. It considers modernism and postmodernism not only as products of the rise of industrial and post-industrial capitalism, urbanization, colonialism, and globalization, etc., but also as tangled up with the establishment of gender and sexuality as powerful ideas that bring into being the very categories they name. Students gain knowledge not only about the historical development of art throughout this period, but also about diverse strategies for scholarly research that is informed by theories of gender and sexuality, and art historical models for reading bodies, gestures, texts, and works of art. They complete guided or independent research papers, prepare an in-class presentation on a work of art in a local museum, and complete a structured literature review through which they learn to read and critically evaluate art historical scholarship.

ARTH 5413. Alternative Media: Video, Performance, Digital Art. (; 3 cr. ; A-F or Audit; Periodic Fall)
One rather old and rigid concept in the history of art and aesthetics is that artistic media, each with its distinct qualities, are most successful when they remain separate. The best painting, according to this view, is one that explores its own properties of flatness, abstraction, and color. What became known in the first half of the 20th century as the philosophy of ?medium specific purity? was radically challenged in the 1960s when the differences between painting and sculpture were intentionally blurred and when new media (performance, body art, happenings, video art, installations and digital art) were introduced. This course seeks to understand how alternative media were developed not through the invention of new technologies nor in isolation, but through revolutionary modes of thinking about time and space, human and non-human life, machines, archives, cyborgs, and interactivity (some of which date back to the 18th and 19th centuries). Through assigned readings and discussions as well as structured essay assignments, the class provides students with extensive practice in the critical analysis of theoretical texts and ample experience synthesizing diverse intellectual ideas and arguments in written form. More broadly, through a creative ?timeline? assignment, the course seeks to teach students to think inventively about new media and their histories, to learn strategies for looking at, evaluating, and thinking about works of new media art. It also provides instruction in research techniques and resources in contemporary art, as well as on writing in art history.

ARTH 5417. Twentieth Century Theory and Criticism. (; 3 cr. ; Student Option; Periodic Fall)
Since the 19th century, artists, critics, and historians have deployed philosophical and theoretical ideas to think self-reflexively about the meaning of art. What counts as a work of art and who qualifies as an artist? What is the role of the viewer and how should works of art be interpreted? Are they passive reflections of their historical milieu or do they play an active role in forming cultural values? In the 1920s, the surrealists were reading Karl Marx and Sigmund Freud to answer these questions. Artists of the Harlem Renaissance studied the sociological essays of W.E.B. Dubois and Zora Neale Hurston. Conceptualist artists in the 1960s read books on semiotics; performance artists studied

phenomenology reading the work of Maurice Merleau-Ponty. Feminist artists in the 1970s read up on psychoanalysis and feminist philosophy. Following in their footsteps, this is primarily a readings course designed to familiarize students with important theoretical ideas applied to the visual arts of the 20th century. The course focuses on significant trends in that century?s art theory, historical methodology, and criticism. It examines key philosophical ideas of modernism and postmodernism including formalism, semiotics, poststructuralism, feminism, Marxism, psychoanalysis, deconstruction, critical race and queer theory. Because the course is organized chronologically as well as thematically and follows the lives and writings of key figures, it is also intended to help students trace intellectual histories as they develop over the century. In addition, it seeks to foster students? critical reading skills, discipline-specific writing skills, and to help them consider the historical implications of art theory for the production and reception of works of art today.

ARTH 5422. Off the Wall: History of Graphic Arts in Europe and America in the Modern Age. (; 3 cr. [max 4 cr.] ; Student Option; Periodic Fall & Spring)
History/theory of creation of lithography, social caricature (e.g., Daumier, Gavarni), revival of etching (e.g., Goya, mid-century practitioners, Whistler), and color lithography (e.g., Toulouse-Lautrec, Vuillard, Bonnard). Media changes of 20th century. Revolutionary nature of new media.

ARTH 5431. Art and Activism: French Painting 1789 to 1870. (3 cr. ; Student Option; Periodic Fall)
This course surveys art major movements, institutions, and debates in France and its expanding overseas empire from the late eighteenth to the late nineteenth centuries, paying particular attention to the intersection of art and politics. Artists and movements we will consider include some of the most well-researched and revered in art history: neo-classicism-David and Ingres; Romanticism-Corot, Gericault, Delacroix; landscape and peasant?painting-the Barbizon group; Realism-Courbet; and Impressionism-Manet, Pissarro, Morisot, and Degas. Major themes to be addressed in the course include, but are not limited to, the following: artists? challenge to established institutions and exhibition practices; their participation in, and responses to, revolutionary political movements; the artist as worker; censorship and exile; visions of empire and abolition; the New Woman; and, finally, contemporary artists? appropriations of nineteenth-century French art to advance their own artistic/political agendas in the present.

ARTH 5466. Contemporary Art. (; 3 cr. ; Student Option; Periodic Spring)
The art of today as it is practiced around the globe takes a bewildering variety of forms? from traditional painting and sculpture to AI, interactive digital media, film projections, bio art (involving human, plant, and animal blood, tissue and DNA), participatory and community engaged projects, and environmental interventions. It addresses urgent social and political themes including globalization, institutionalized racism, climate crisis, big data, and mechanized vision. Just as today? s citizens should inform themselves about contemporary politics and current events, so is it crucial that we understand the art of our own time. In this course students gain an understanding of art?s development since the late 20th century and key ideas that are central to interpreting the art of this period. The course begins with a review of important movements, significant artists, and influential theories and issues. It then takes up and studies specific themes through the reading and analysis of theoretical texts. Students are asked to read, participate in class discussions, complete guided or independent research papers, prepare an in-class presentation on one of the course themes, and complete a book review for a textbook on contemporary art history. Each of these assignments is designed to impart specific historical knowledge about the period of the contemporary, to provide students with opportunities to practice critical reading and synthetic writing, and to offer them a chance to inspect their own positions regarding key debates.

ARTH 5565. American Art in the Gilded Age. (; 3 cr. ; Student Option; Periodic Fall & Spring)
In 1873, Mark Twain coined the phrase ? Gilded Age? to describe an era in which public displays of national prosperity and optimism barely covered over the deeper realities of racial violence, labor inequities, and strident political divisions in the barely reunited republic, still recovering from a bloody Civil War. This class will examine the social and cultural history of the United States from 1865-1910, by following the visual record of paintings, sculpture, photographs, architecture, and landscape and furniture design. We will look closely at works by artists including Winslow Homer, Abbott Thayer, Cecilia Beaux, Henry Ossawa Tanner, Jacob Riis, Gertrude K?sebier, Thomas Nast, Bernhard Gillam, Frederick Law Olmsted, McKim, Mead & White, and Candace Wheeler. We will consider the role of creatively made images and objects as both a tool of the elite and the weapon of the critic. And we will actively investigate the kinds of questions art historians ask about this era, so as to ask new questions and produce new scholarship that might productively address the concerns of our own. Open to interested students from all majors, this course culminates in an independent research project suitable for development as a senior capstone project.

ARTH 5575. Boom to Bust: American Art from the Roaring Twenties to the Great Depression. (; 3 cr. ; Student Option; Periodic Fall & Spring)
American art/culture from 1917 to 1940. Boom of post-WWI affluence, bust of stock market crash, Midwestern Dust Bowl. How tumultuous times influenced painting, sculpture, photography, and industrial design.

ARTH 5655. African-American Cinema. (AH,DSJ; 3 cr. ; Student Option; Periodic Fall)
African American cinematic achievements, from silent films of Oscar Micheaux through contemporary Hollywood and independent films. Class screenings, critical readings.

ARTH 5765. Early Chinese Art. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Art/material culture of early China from Neolithic age (ca. 10000-2000 BCE) to early imperial period (221 BCE-906 CE).

ARTH 5766. Chinese Painting. (3 cr. ; Student Option; Periodic Fall & Spring)
Major works from the late bronze age to the modern era that illustrate the development of Chinese landscape painting and associated literary traditions.

ARTH 5769. Connoisseurship and Curatorial Practice in Early Chinese Art. (; 3 cr. ; Student Option; Periodic Fall & Spring)
This course provides students an immersive experience in the study of early Chinese art and material culture from the Neolithic age (ca. 8000?ca. 2000 BCE) to the early imperial period (221 BCE-220 CE). Geographical coverage uses today's China as a point of departure, but its scope also extends to the rest of the world. This course will explore artifacts in a variety of media, including ceramic, jade, metal, lacquer, silk, painting and writing, as well as ephemeral arts. Students are expected to think each artwork as the embodiment of the complex socio-cultural history of the period, in which they were produced. Guided by the instructor, students will have a selective examination of representative works of art from MIA (the Minneapolis Institute of Art), where they are supposed to be engaged in comprehensive object study, consultation and investigation with the curators, and develop essential curatorial skills of working with artworks. Based on two or more selected artworks, students are expected to finish a short research paper that is throughly studied and potentially publishable.

ARTH 5774. The Body in Indian Art. (3 cr. ; Student Option; Periodic Fall & Spring)
This course explores the concept of embodiment and the nature of representation, from images of gods to human portraits, in Hindu, Jain, Buddhist, Muslim, and courtly contexts. We consider diverse media from ancient to modern periods, including painting, sculpture, photography, architecture, inscriptions, and literature. This course explores the concept of embodiment in the diverse artistic traditions of South Asia. We will consider how ideas of representation of an individual have been understood and expressed differently across the history of South Asian art and religions. The course will consider the embodied representation of deities and semidivine figures along with those of ?real? people; we will consider, given the ontologies of such representations in their religious and cultural contexts. Representation of an individual ? a portrait ? is a foundational subject in the canon of art history. What does the very idea of a portrait mean so far outside the canon of (Western) art history? As we survey the diverse traditions and media of images of the body, we will be attentive to

questions such as, Does media make meaning for these types of images? Can a ?portrait? be textual? Is verisimilitude essential to the depiction of a person? In what ways are practices of depiction informed by other modes of image-making, such as images of religious devotion, and traditions of representation encountered through trade or gift? We will consider diverse media from Ancient India to the modern period, including painting, stone and metal sculpture, photography, architecture, inscriptions, and even a Sanskrit play.

ARTH 5777. The Diversity of Traditions: Indian Empires after 1200. (; 3 cr. ; Student Option; Periodic Fall & Spring)
This class considers the development of Indian and Pakistani art and architecture from the introduction of Islam as a major political power at the end of the 12th century to the colonial empires of the 18th century. We will study how South Asia?s diverse ethnic and religious communities interacted, observing how visual and material cultures reflect differences, adaptations, and shared aesthetic practices within this diversity of traditions. Students in this class will have mastered a body of knowledge about Indian art and probed multiple modes of inquiry. We will explore how Muslim rulers brought new traditions yet maintained many older ones making, for example, the first mosque in India that combines Muslim and Indic visual idioms. We will study the developments leading to magnificent structures, such as the Taj Mahal, asking why such a structure could be built when Islam discourages monumental mausolea. In what ways the schools of painting that are the products of both Muslim and Hindu rulers different and similar? The course will also consider artistic production in the important Hindu kingdoms that ruled India concurrently with the great Muslim powers. In the 18th century, colonialist forces enter the subcontinent, resulting in significant innovative artistic trends. Among questions we will ask is how did these kingdoms influence one another? Throughout we will probe which forms and ideas seem to be inherently Indian, asking which ones transcend dynastic, geographic and religious differences and which forms and ideas are consistent throughout these periods of political and ideological change. To do all this we must constantly consider how South Asia? s diverse ethnic and religious communities interact.

ARTH 5778. Traditions of South Asian Painting: Past to Present. (3 cr. ; Student Option; Periodic Fall & Spring)
This course surveys the rich diversity of painted media in India, Pakistan, Sri Lanka, and Nepal, from 5th-century murals to contemporary canvases that travel the world. We will locate the works in their physical, ritual, and intellectual contexts. We will explore how the familiar categories with which we describe painting, such as Landscape, Portraiture, Narrative, and even Modern, might be productively reassessed in light of South Asian aesthetic traditions by locating the works in their physical, ritual, and intellectual contexts. The course culminates in the contested spaces of contemporary art, where questions of politics, identity, and intention come to the fore. Although mainly focusing on the painting traditions of India, the course will include painting from Pakistan, the Himalayas, Sri Lanka, and the South Asian diaspora. The humanities sharpen our ability to develop critical questions and to judge why and how one answer or interpretation may be stronger than another. Humanistic thinking is developed in dialogue; it emerges between individuals in conversation with each other and with their objects of study. This course asks you to boldly bring your curiosity, convictions, and blind-spots to our collective conversation, close reading, and individual writing. The course consists of two weekly meetings, and one or two trips to nearby museums or galleries.

ARTH 5781. Age of Empire: The Mughals, Safavids, and Ottomans. (; 3 cr. ; Student Option;)
Artistic developments under the three most powerful Islamic empires of the 16th through 19th centuries: Ottomans of Turkey; Safavids of Iran; Mughals of India. Roles of religion and state will be considered to understand their artistic production.

ARTH 5787. Visual Cultures in Contact: Cross-Cultural Interaction in the Ancient and Early Medieval Worlds. (3 cr. ; Student Option; Fall Even Year)
Evaluate critical perspectives from variety of interdisciplinary conversations. Framework for studying cross-cultural interaction among ancient visual cultures that integrates practical, cognitive, object oriented approaches. Cross-continental movement/selective appropriation of objects/motifs.

ARTH 5930. Junior-Senior Seminar. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Major art-historical theme, artist, period, or genre. Topics specified in Class Schedule. prereq: [Jr or sr] ArtH major, instr consent

ARTH 5950. Topics: Art History. (; 3 cr. [max 9 cr.] ; Student Option; Every Fall, Spring & Summer)
Topics specified in Class Schedule.

ARTH 5993. Directed Study. (; 1-4 cr. [max 12 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
TBD prereq: instr consent

ARTH 5994. Directed Research. (; 1-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)
tbd prereq: instr consent

ARTH 8001. Art Historiography: Theory and Methods. (; 3 cr. ; A-F only; Periodic Fall & Spring)
Key texts, from Renaissance to present, from western/non-western fields, relating to history/ criticism of both art and visual culture. Focuses on recent critical theory, its re-examination of assumptions underlying the discipline.

ARTH 8120. Computer Applications in Art History and Archaeology. (; 3 cr. ; Student Option; Every Fall & Spring)
Seminar. Potential of digital technology as applied to art history/archaeology. Computer technologies as affecting methodologies of art history/archaeology. Way in which art history/archaeology can contribute to emerging computer applications.

ARTH 8190. Seminar: Issues in Ancient Art and Archaeology. (; 3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Selected topics, with special attention to current scholarly disputes. Topics specified in Class Schedule. prereq: instr consent

ARTH 8200. Seminar: Medieval Art. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Focus on a major art historical theme, artist, period, or genre.

ARTH 8320. Seminar: Issues in Early Modern Visual Culture. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Issues in visual culture of Europe and the Americas, 1500-1750. Topics vary, may include representation of body, collectors/ collecting, impact of Reformation, image/book, art/discovery, early modern vision/visuality.

ARTH 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

ARTH 8340. Seminar: Baroque Art. (; 3 cr. [max 12 cr.] ; Student Option; Every Spring)
Topics vary. prereq: instr consent

ARTH 8400. Seminar: Issues in 19th-Century Art. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Typical seminars have included symbolism, role of the academy and the avant-garde, surrealism in art and theory, and Franco-American relationships at the turn of the 20th century. prereq: instr consent

ARTH 8440. Seminar: Contemporary Art. (; 3 cr. [max 12 cr.] ; A-F or Audit; Every Spring)
Identity politics in contemporary art. Theories of performance/performativity. Nationalism/ sexuality in art since 1980s. Discourses of death in postmodernism. Body at turn of 21st century. prereq: instr consent

ARTH 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

ARTH 8500. Issues in Latin American Art. (; 3 cr. [max 12 cr.] ; Student Option; Every Spring)
Topics vary.

ARTH 8520. Seminar: American Art and Material Culture. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Topics in American art, popular art, and material culture, emphasizing methods and techniques of inquiry: creation and use of archives, oral history, sources for pictorial evidence, and current approaches to interpreting traditional and non-traditional data. prereq: instr consent

ARTH 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

ARTH 8710. Seminar: Islamic Art. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Focus depends on current research interests of the professor and needs and interests of graduate students in Islamic and Asian art history. prereq: instr consent

ARTH 8720. Seminar:East Asian Art. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Research focuses on closely defined topic, such as a short period of Chinese art, a restricted subject, or role of a single artist. A substantive research paper is required and participation in the seminar dialogue is expected. prereq: instr consent

ARTH 8770. Seminar: Art of India. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Selected problems and issues in history of South Asian art. Topic varies by offering. prereq: 3 cr art history, instr consent

ARTH 8783. Art, Diplomacy, and Empire. (3 cr. ; A-F only; Periodic Fall & Spring)
This course examines the mobility and agency of objects and people in diplomatic practice. An emerging body of scholarship within Renaissance and early modern studies explores the exchange and global circulation of objects and their role in cultural encounters. The possibilities offered by this 'material turn' highlight the potential of objects to enable cultural contact, conversion, and exchange across traditional political and cultural boundaries. At the same time, recent innovative and interdisciplinary approaches to exchange highlight cultural aspects of the diplomatic encounter. As a result, the roles of diplomats, interpreters, merchants as well as various types of objects and services continue to be interpreted in new ways. This course will introduce students to canonical texts associated with gift-exchange and reciprocity, and will explore their relevance to the disciplines of history and art history particularly with regard to imperial encounters and exchanges.

ARTH 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

ARTH 8920. Seminar: Film History and Criticism. (; 3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Selected topics in film history and theory, including specific directors, genres, movements, periods, and critical issues (e.g., violence). prereq: instr consent

ARTH 8950. Seminar: Issues in the History of Art. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Theoretical or topical issues. Topics vary. prereq: 3 cr art history, instr consent

ARTH 8970. Directed Studies. (; 1-3 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
tbd prereq: instr consent

Arts and Cultural Leadership (ACL)

ACL 5100. Topics in Arts and Cultural Leadership. (; 1-4 cr. [max 24 cr.] ; A-F or Audit; Periodic Fall, Spring & Summer)
Topics in Arts and Cultural Leadership.

ACL 5211. Trends and Impacts in Arts and Cultural Leadership and Management. (3 cr. [max 6 cr.] ; A-F or Audit; Every Fall)
Through discussion and analysis, research and peer presentation projects, this seminar will investigate and question the theoretical nuances from which nonprofit arts and cultural organizations are built and the practical influences that affect them daily. Leadership in the cultural sector is evolving rapidly; textbook strategies are being re- evaluated and organizations are re-inventing themselves in creative ways in response to current social and economic conditions. Emphasis is placed on current events, immediate and long- term trends and research into what is happening now. Topics include the role of arts and cultural organizations within the community; past, current and future concepts in organizational structures; and the application of traditional and integrated relationship-based strategies.

ACL 5221. Creative Entrepreneurship and Resource Development. (3 cr. ; A-F or Audit; Every Spring)
An entrepreneurial approach to developing resources (including financial, human, and partnership) for arts and culture based enterprises whether using a nonprofit, for-profit or social enterprise business model. The course will investigate and discuss the complexities and nuances of how to determine the appropriate business model and develop both earned and philanthropic income. Students focus on framing and articulating the relevance of the enterprise as well as understanding the perspectives of audiences, customers, funders and donors. The course also explores the role of communications strategies in support of fundraising, and the importance of leadership in acquiring resources to sustain and grow successful organizations. Students develop both a broad understanding of resources as well as detailed strategies for supporting work in arts and culture based enterprises.

ACL 5231. Ethical Dilemmas and Legal Issues for Cultural Leaders. (3 cr. ; A-F or Audit; Every Spring)
This course explores topics in ethics, law and leadership. Through interactive sessions, readings, presentations, discussions, papers and guest speakers, student-leaders will develop knowledge, tools and resources for assessment of ethical and legal issues within arts and cultural contexts. The course will engage student-leaders with an overview of relevant topics and a foundation for further exploration of self selected topics. Student-leaders will learn to spot issues and identify when to seek legal guidance, and assess considerations relevant to critical problem solving and informed decision-making.

ACL 5241. Financial Management for Arts Nonprofits, Community Organizations, and Artists. (3 cr. ; A-F or Audit; Spring Even Year)
This course introduces students to concepts and applications of financial management and leadership practices with a specific focus on nonprofit arts and cultural organizations. The goal of the course is to develop both theoretical and practical understanding of the central responsibilities of financial management and leadership to equip students to use financial information, identify business models, and employ a financial lens for planning and decisions. Focus will be on the fundamentals of budgeting and accounting, interpretation of financial statements, data, and procedures for operational forecasts, as well as the fiduciary responsibilities of nonprofit boards. This course is designed for individuals working within arts nonprofits or community organizations, considering a career in the arts, or interested in learning more about nonprofit financial management principles. Individuals interested in financial sustainability as individual artists or cultural leaders will also benefit from this foundation in financial best practices. The goal of the course is to develop both theoretical and practical understanding of the central responsibilities of solid financial management to benefit arts, cultural, and/or community organizations and the sector as a whole. Students will have the opportunity to apply what is learned to a case study organization.

ACL 5251. Courageous Imagination in Action: Art and Culture as Forces and Resources of Change. (3 cr. ; A-F or Audit; Every Fall)
This class is for anyone passionate about the unique capacities embedded in arts and cultural work, concerned about the cascade of challenges facing humanity, and determined to lead with and through the powerful resources of the arts and culture. Fundamental changes in organizations, programs, and resources are needed to meet the complex challenges of our times. A key emphasis of the course is development of a personal mission and purpose by each student as a leader in working with existing organizations and systems and leading changes essential for a sustainable, humane, creative, and thriving future. The course is designed to challenge and support students as they choose a direction and purpose they wish to address ? contacts, examples, resources, local, regional, national, websites, people, and examples will be provided. The course examines existing organizations and systems, those in transformation and the opportunity, need and challenge in creating new forms. Students meet key people in different sectors and stages of change. This is a highly interactive course, with

simulations, imaginative work and a variety of visitors, site visits, and explorations of ideas and beliefs that may be challenging. These may include connections with Minnesota State legislature, regional arts councils, City of Minneapolis and/or St Paul, large and small arts and culture organizations in the area. National networks including USDAC, Americans for the Arts, Climate Generation, The Wounded Warrior Project, and others. Students will prepare a presentation that links their personal purpose and mission with the work they seek and the differences they hope to make and support.

ACL 5251. Courageous Imagination in Action: Art and Culture as Forces and Resources of Change. (3 cr. ; A-F only; Every Fall)
This class is for anyone passionate about the unique capacities embedded in arts and cultural work, concerned about the cascade of challenges facing humanity, and determined to lead with and through the powerful resources of the arts and culture. Fundamental changes in organizations, programs, and resources are needed to meet the complex challenges of our times. A key emphasis of the course is development of a personal mission and purpose by each student as a leader in working with existing organizations and systems and leading changes essential for a sustainable, humane, creative, and thriving future. The course is designed to challenge and support students as they choose a direction and purpose they wish to address ? contacts, examples, resources, local, regional, national, websites, people, and examples will be provided. The course examines existing organizations and systems, those in transformation and the opportunity, need and challenge in creating new forms. Students meet key people in different sectors and stages of change. This is a highly interactive course, with simulations, imaginative work and a variety of visitors, site visits, and explorations of ideas and beliefs that may be challenging. These may include connections with Minnesota State legislature, regional arts councils, City of Minneapolis and/or St Paul, large and small arts and culture organizations in the area. National networks including USDAC, Americans for the Arts, Climate Generation, The Wounded Warrior Project, and others. Students will prepare a presentation that links their personal purpose and mission with the work they seek and the differences they hope to make and support.

ACL 5261. Culture, Place and Equitable Communities: Ways of Living Together in the 21st Century. (3 cr. ; A-F or Audit; Periodic Summer)
The rise of the creative economy, creative cities, the creative class, and creative placemaking are generally considered unique to the 21st century. Are these new phenomena or just new brand identities for the historic role of cities as centers of cultural production and exchange? As contemporary phenomena, they have also been linked to a rise in social and economic inequities. Creativity, culture, and the role of artists are of increasing significance in the ways cities and communities are planned, form, and function. What roles can artists, activists, cultural leaders, urban planners, and other civic leaders play with regard to making cities more equitable and culturally vibrant? This course explores the evolving relationships of arts, culture, and the creative sector with city planning, development, and democractic practices. Students will hear directly from community leaders and undertake their own community change projects.

ACL 5950. Special Topics. (; 1-4 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall, Spring & Summer)
Special topics. prereq: dept consent

ACL 5993. Directed Studies. (; 1-4 cr. [max 15 cr.] ; A-F only; Every Fall, Spring & Summer)
Guided individual reading or study for qualified graduate students. prereq: Grad student, dept consent

ACL 6001. A Multiplicity of Ways: Epistemologies In the 21st Century. (; 1 cr. ; A-F or Audit; Every Fall)
There are many different ways to experience and understand the world. Creative, culturally based forms of expression serve to expand on those ways. However, colonial practices, alive in academic, arts, and cultural environments globally, homogenize ways of knowing, understanding, and evaluating the world around us. These epistemologies are grounded in collecting data, building analysis, logic and theory that fits the data. Other ways of being, knowing, and seeing are equally meaningful, and are critical in efforts to understand the complex world we live in and create the possibility for transformational social change that is relevant to multiple human experiences and contexts. This course will guide students in developing a framework to better understand and act in meaningful and interdependent ways in the world. Students will explore concepts, worldviews and art and cultural practices from many points of view, challenging the concept of universality in favor of a multiplicity of ways of being, knowing, seeing, and doing. Students will be better prepared to address the pressing needs of arts and cultural organizations and social movements within a global and multicultural context.

ACL 6002. Capstone: Applied Research Project. (; 1 cr. ; S-N only; Every Fall)
Course provides an environment that will motivate, support, and assist students in the completion of their Capstone Project through development of a Project Proposal. Student projects explore personal, organizational, community, and/or systems change and as such generate valuable experiences and insights. There will be a minimum of five classroom meetings of students and instructor. Additional one-on-one meetings with the instructor are required. The instructor is also available for individual consultation as needed.

ACL 6003. Capstone: Reflections and Presentation. (; 2 cr. ; S-N only; Every Spring)
Course provides an environment that will motivate, support, and assist students in the completion of an excellent Capstone Paper that reflects knowledge and skills acquired during the course of study in the Arts and Cultural Leadership Program and place them in a meaningful and theoretical context. Past student projects explored personal, organizational, community, and/or systems change and as such generated valuable experiences and insights. There will be a minimum of five classroom meetings of students and instructor in addition to a final presentation event. Additional one on one meetings with the instructor are required. The instructor is also available for individual consultation as needed.

ACL 6201. Reimagining Cultural Leadership. (; 3 cr. ; A-F or Audit; Fall Even Year)
Seismic societal change has intensified calls for relevant, bold, innovative leadership to reimagine the roles and possibilities of arts and culture. Students will reflect on how their personal passions, strengths, and capabilities can help them meet this moment as cultural leaders. Students will examine cultural competency models and develop their vision of culturally intelligent leadership. They will explore systems of privilege and power in relation to arts and culture, and conceive of ways to promote diversity, equity, access, and inclusion. The course will cover other core leadership accountabilities, including strategic thinking, organizational change, community engagement, board and staff development, fiscal solvency, public advocacy, and crisis management. Students will be assigned to case presentation teams that explore specific arts and culture leadership challenges and generate corresponding strategies and solutions. Three cultural leaders will visit the class. Finally, students will write a synthesis paper identifying their personal mission and values, career aspirations, and how they will apply strategic and behavioral aspects of cultural leadership covered in class.

ACL 6202. Service Leadership and Board Practicum. (; 2 cr. ; A-F only; Every Fall)
Effective chief executives of nonprofit arts and cultural organizations differ most from their less effective counterparts in the ways in which they work with their boards of directors, their staff and their artistic leadership, not in their fundraising prowess or their management expertise. In fact, the degree to which nonprofit executives work in genuine partnership with their boards, staff and artistic leadership often makes the difference between successful and unsuccessful organizations. Complicating matters is the fact that while nonprofits are increasingly in need of experienced, qualified board members, there are limited opportunities for preparing new or prospective board members for board service or for developing more experienced board members into effective board leaders. Often it is the chief executive who must train the board. This practicum has two primary areas of focus: The first is on continuing to develop your own leadership skills and values, and establishing practices that can be sustained after you graduate from the program. The second is on the role of the chief executive

in determining the effectiveness of his or her board of directors and in engaging board members in meaningful governance as well as their respective roles and responsibilities. It will be our goal to build upon the voluntary leadership and life experiences of each individual class member and to explore ways in which students can increase their own leadership competencies during the course and then throughout their careers. The course will cover the changing roles of arts and cultural organizations in today's world, the funding environments affecting arts nonprofit governance, review basic roles and responsibilities of the chief executive in relation to the board as well as the roles and responsibilities of arts board membership. Particular attention will be paid to board dynamics, especially those between the board as a whole, the board's key leadership and the nonprofit's executive leadership and how our own life and leadership experiences affect our ability to work in concert with others in voluntary capacities.

Asian & Middle Eastern Studies (AMES)

AMES 5220. Pedagogy of Asian Languages and Literatures. (; 3 cr. [max 9 cr.] ; A-F only; Every Fall & Spring)
Second language acquisition theory, methods, testing, and technology applicable to the teaching of less commonly taught languages.

AMES 5351. Chinese New Media. (3 cr. ; A-F only; Periodic Fall & Spring)
This course explores new media and intermediality from specific moments in the history of modern China. The new visuality of the late Qing Dynasty offers examples of how new forms of visual culture became both reflexive and constitutive of modernity. Later, silent cinema of the Republican era both drew upon and defined itself against existing Chinese dramatic forms, particularly opera. In the 1930s, the arrival of sound in cinema provided a space for phonographic modernity to be expressed through film. In the People?s Republic, the productive interplay between traditional art forms and cinema entered a new era, culminating in the cinematic adaptations of the ?model plays? of the Cultural Revolution. Finally, recent years have seen the explosive growth of digital cinema, computer animation, internet culture, and gaming communities.

AMES 5358. Realism, Revolution, and the Moving Image. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Cinema associated with socialist realism as a global, transnational phenomenon at the heart of the aesthetics of the 20th-century's communist movement. The work of revolutionary filmmakers from China, Soviet Union, North Korea, Cuba, Eastern Europe, and Africa informs our exploration of socialist realism. Formalized by Maxim Gorky and other Soviet artists, theorists, and cultural officials in the early 1930s, socialist realism would become the official literary and artistic style of Communist revolutionary movements and resulting states throughout the world. Certain consistencies of style and theme spread to various sites across histories and geographies, yet much variation also was evident and will be explored in this class. Rejecting the dismissal of socialist realism as mere propaganda, we will take seriously its theorization and its aesthetic innovations, as well as its relationships with classical Hollywood narration, melodrama, and the psychoanalytic concept of sublimation. Through an examination of socialist realism?s variations and limits, we will grapple with larger questions of modernity, authority, and the function of art in modern societies.

AMES 5359. Early Shanghai Film Culture. (3 cr. ; Student Option; Periodic Fall & Spring)
Shanghai film culture, from earliest extant films of 1920s to end of Republican Era in 1949. Influences on early Chinese film, from traditional Chinese drama to contemporary Hollywood productions. Effects of leftist politics on commercial cinema. Chinese star system, material film culture.

AMES 5374. The Monkey King and Transcultural China: Chinese Myth, Legend, and Ideology. (; 3 cr. ; Student Option No Audit; Periodic Fall & Spring)
Early Chinese myths/legends/historical narratives about the Monkey King. Cultural formations from later periods, including contemporary popular culture and Asian American literature. Construction of China/ Chinese in 20th Century seen through the Monkey as a figure of otherness and in-betweenness in relation to globalization and cross-cultural identity.

AMES 5420. Topics in Japanese Culture. (; 3 cr. [max 9 cr.] ; A-F only; Periodic Fall & Spring)
Topics specified in course schedule.

AMES 5446. Kabuki: A Pop, Queer, and Classical Theater in Japan. (3 cr. ; A-F only; Periodic Fall & Spring)
Kabuki, an all-male theater of "song (ka)/ dance (bu)/acting (ki)" that came into being in the 17th century, still boasts popularity in Japan. This course explores kabuki in several contexts: historical, theatrical, literary, and theoretical. It aims to historicize this performing art in its four-hundred-year dynamic trajectory against the static understanding that it is a national, high culture. No less importantly, we inquire into theoretical implications of subject matter, such as citationality, gender construction, and the like. Furthermore, this course attends to what is usually marginalized and overlooked in kabuki historiography: koshibai (unlicensed small troupes of kabuki); onna yakusha (women kabuki actors who mastered the acting techniques established by male kabuki actors--including the technique of female impersonation). Open to anyone with an interest, no previous knowledge of Japanese studies, theater studies, or Japanese is required. All of the readings will be available in English. Audio-visual materials will be used whenever available and appropriate.

AMES 5486. Images of "Japan". (3 cr. ; A-F only; Periodic Fall & Spring)
This course examines non-Japanese texts that deploy the imagination of "Japan" in their narratives. Discussions will take up such focal points as: ethnographic cinema, the politics of travel and translation, the intersections of race and gender, the cultural politics of alternate histories, and the ramifications of techno-orientalist discourse.

AMES 5556. Korean Film and Media. (3 cr. ; Student Option; Periodic Fall & Spring)
This course is an introduction to Korean film from the Japanese colonial period (1910-1945) to the present day. We discuss the emergence of the Korean film industry under the conditions of colonial modernity and the various political pressures put on film production in South Korea until the 1990s. We will then turn to the last twenty years, during which South Korean film and television have experienced a boom in popularity in East Asia and globally. Throughout, we will focus on the formal and technical aspects of film, representations of history and historical memory, genre borrowing and genre mixing, and the relationships between art-house and culture industry productions.

AMES 5620. Topics in South Asian Culture. (; 3 cr. ; A-F only; Periodic Fall & Spring)
Topics specified in Class Schedule.

AMES 5636. South Asian Women Writers. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Survey of South Asian women's writing, from early years of nationalist movement to present. Contemporary writing includes works by immigrant writers. Concerns, arguments, and nuances in works of women writing in South Asia and diaspora.

AMES 5720. Topics in Southeast Asian Culture. (; 1-3 cr. ; Student Option; Periodic Fall & Spring)
Selected topics in Southeast Asian culture. Topics specified in the Class Schedule.

AMES 5820. Topics in Arab Culture. (; 3 cr. [max 9 cr.] ; A-F only; Periodic Fall & Spring)
Topics specified in Class Schedule.

AMES 5837. Arab Prison Writing. (3 cr. ; Student Option; Periodic Fall & Spring)
From colonial-era prisons to post-colonial regimes' widespread use of detention to neo-colonial spaces of confinement such as Guantanamo and Abu Ghraib, incarceration and its threat have been prominent features of modern Arab life spawning a distinct genre: prison writing. This course surveys novels and memoirs of this genre to examine the various forms imprisonment and incarceration take in Arab literature and the often surprising ways in which they are represented.

AMES 5866. Gender and Sexuality in Modern Arabic Literature. (3 cr. ; Student Option; Periodic Fall & Spring)
Survey of modern Arabic literature?s key role in the articulation, construction, and subversion of gendered subjectivities. Explores the construction of masculine and feminine subjectivities, as well as the blurring of the dichotomy between the two. Also explores how homoerotic desire is presented in modern Arabic novels. Engages the complex interplay

between the gender politics of literary texts, and the broader historical and political contexts from which they emerge. All texts covered in this course will be in English translation, however those able to read texts in the original Arabic are encouraged to do so.

AMES 5877. The Arab Renaissance: Narrating Modernity. (3 cr. ; Student Option; Periodic Fall & Spring)
The Nah?a, a word meaning renaissance, awakening, or simply the act of standing up, is the name Arab writers and intellectuals of the 19th c. gave their own historical period. What does it mean to view oneself as living through a revival? How does this view shape the contours of the past, or of the future? This class will address these questions through a survey of the political, intellectual, social, and cultural aspects of Arab modernity. We will examine how Arab thinkers of the late 19th and early 20th century produced new genres, identities, and communal affiliations to narrate their experience of modernity, which they often coded as ?the encounter with the West.? Our readings, all in English translation, will cover the first confrontations (and love affairs) with European powers, the self-professed urgency of projects of reforming language, literature, and cultural institutions, the growing schism between religious and secular thought, and the attempts to articulate indigenous alternatives to Western-style modernity.

AMES 5886. Petrofictions: Oil Wars, Wealth, and Waste in the Middle East. (3 cr. ; A-F only; Periodic Fall & Spring)
In 1992, the novelist Amitav Ghosh wondered why the "oil-encounter," the most significant, culture-altering development of the twentieth century, has not been narrativized. Twenty years later, in The Great Derangement, he concluded that our prevalent narrative forms are inadequate to narrate the slow catastrophe of climate change, simply because they are so implicated, even complicit, in the extractive logics of petromodernity. This course explores our contemporary modernity of oil dependence through critical engagement with Middle Eastern cultural production. It postulates that to think about oil is not solely to think about derricks or spectacular spills or barrel prices, but about the basic narratives, fictions, and ideologies that underline our daily lives; that reading fictions (conceived broadly) is both a method and resource to map and critique ways in which the world's resources are unevenly produced, extracted, and exploited on a global-local scale; and that humanistic inquiry can challenge the common assumption that existing energy systems are inevitably necessary in modern life. Throughout the semester, the students will engage in critical readings of novels, films, and visual art that emerge from and react to the networked reality of an oil-addicted world. They will critically analyze the narrative forms and visual vocabularies through which the petro-industry has been depicted, as well as learn about the violent history of oil extraction and its environmental effects. Finally, they will consider how creative works allow us to imagine and promote alternative and more sustainable energy futures.

AMES 5920. Topics in Asian Culture. (; 3 cr. [max 12 cr.] ; A-F only; Periodic Fall & Spring)
Topics specified in Class Schedule.

AMES 5993. Directed Study. (1-4 cr. [max 16 cr.] ; Student Option; Every Fall, Spring & Summer)
Individual reading/study, with guidance of a faculty member, on topics not covered in regular courses. Prereq-instr consent, dept consent, college consent.

AMES 8001. Critical Approaches to Asian and Middle Eastern Studies. (3 cr. ; Student Option; Periodic Fall)
This course aims to provide critical and theoretical foundations for incoming graduate students in Asian Literatures, Cultures, and Media program, while also addressing broader questions that would be of interest to students in other departments in the Humanities and Social Sciences. Our project will be to generate discussion about the theoretical and political complexities of studying Asia and the Middle East from a cross-cultural and transnational perspective, taking account of several inter-related questions at the heart of the work of Asian and Middle Eastern Studies. Beginning with Edward Said?s critique of orientalism as our point of departure, we will take up a range of questions revolving around debates over historiography (e.g., capitalism and the formations of race and gender, nationalism and imperialism, etc.) and the relationship between cultural studies and political-economy (e.g., the political unconscious, national allegory, translation and translingual practice, ethnographic gaze, etc.) with a particular attention to the complications posed by taking ?Asia? as the object of intellectual inquiry in any such analysis. Our discussions will consider key problematics in cultural theory, the uses of such theory in the Asian context and some of the issues thereby raised, and critical interventions by scholars of Asia.

AMES 8002. Research Seminar. (3 cr. ; Student Option; Periodic Spring)
Issues/approaches in academic study of Asian and/or Middle Eastern area studies. Problems in contemporary academic theory in humanities. Application of theory to issues in area studies raised. Interventions of critical theory. Ethics of professional peer review. Crisis in higher education.

AMES 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
x prereq: Master's student, [adviser, DGS] consent

AMES 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
x prereq: Doctoral student, [adviser, DGS] consent

AMES 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
x prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

AMES 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Thesis Credits: Master's prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

AMES 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
x

AMES 8920. Topics in Asian culture. (; 1-3 cr. [max 9 cr.] ; S-N only; Every Fall & Spring)
Topics specified in Class Schedule.

AMES 8993. Directed Study. (; 1-4 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
Directed readings in foreign language(s) of specialty, where appropriate. prereq: PhD student

Asian American Studies (AAS)

AAS 5993. Directed Readings. (; 1-4 cr. [max 8 cr.] ; Student Option; Periodic Fall)
Directed reading--must be set up with individual instructor.

Astronomy (AST)

AST 5012. The Interstellar Medium. (; 4 cr. ; Student Option; Periodic Fall & Spring)
Survey of physical processes in the interstellar medium. Dynamic processes, excitation processes, emission and absorption by gas and dust. Hot bubbles, HII regions, molecular clouds. prereq: 2001, Phys 2601 or instr consent

AST 5022. Relativity, Cosmology, and the Universe. (; 4 cr. ; Student Option; Periodic Fall & Spring)
Large-scale structure/history of universe. Introduction to Newtonian/relativistic world models. Physics of early universe, cosmological tests, formation of galaxies. prereq: [2001, Phys 2601] or instr consent

AST 5031. Interpretation and Analysis of Astrophysical Data. (4 cr. ; A-F only; Every Spring)
Introduction to analysis techniques with applications to modern astrophysics. Methods to interpret/analyze large data sets from experiments. Principles/methods of analysis, with applications to current research. For graduate students in Physics/Astronomy

AST 5201. Methods of Experimental Astrophysics. (; 4 cr. ; Student Option; Spring Even Year)
Contemporary astronomical techniques and instrumentation. Emphasizes data reduction and analysis, including image processing. Students make astronomical observations at O'Brien Observatory and use department's computing facilities for data analysis. Image

processing packages include IRAF, AIPS, IDL, MIRA. prereq: Upper div CSE or grad or instr consent

AST 5731. Bayesian Astrostatistics. (4 cr. ; A-F only; Every Fall)
This course will introduce Bayesian methods for interpreting and analyzing large data sets from astrophysical experiments. These methods will be demonstrated using astrophysics real-world data sets and a focus on modern statistical software, such as R and python. Prerequisites: MATH 2263 and MATH 2243, or equivalent; or instructor consent Suggested: statistical course at the level of AST 4031, AST 5031, STAT 3021, or STAT 5021

AST 8001. Radiative Processes in Astrophysics. (; 4 cr. ; Student Option; Periodic Fall & Spring)
Introduction to classical/quantum physics of electromagnetic radiation as it applies to astrophysics. Emphasizes radiative processes (e.g., emission, absorption, scattering) in astrophysical contexts (e.g., ordinary stars, ISM, neutron stars, active galaxies). prereq: instr consent

AST 8011. High Energy Astrophysics. (; 4 cr. ; Student Option; Periodic Fall & Spring)
Energetic phenomena in the universe. Radiative processes in high energy regimes; supernovae, pulsars, and X-ray binaries; radio galaxies, quasars, and active galactic nuclei. prereq: instr consent

AST 8021. Stellar Astrophysics. (; 4 cr. ; Student Option; Periodic Fall)
Stellar structure, evolution, and star formation. Emphasizes contemporary research. prereq: instr consent

AST 8031. Astrophysical Fluid Dynamics. (; 4 cr. ; Student Option; Periodic Fall)
Introduction to physics of ideal/non-ideal fluids with application to problems of astrophysical interest. Steady/unsteady flows, instabilities, turbulence. Conducting fluid flows. Magnetohydrodynamics. prereq: instr consent

AST 8051. Galactic Astronomy. (; 4 cr. ; Student Option; Periodic Fall)
Content, structure, evolution, and dynamics of Milky Way Galaxy. Emphasizes recent observations from space-/ground-based telescopes. prereq: instr consent

AST 8110. Topics in Astrophysics. (; 4 cr. ; A-F or Audit; Periodic Fall & Spring)
Sample topics include Understanding Supernovae, Structure Formation, and Gravitational Lensing.

AST 8120. Topics in Astrophysics. (; 4 cr. ; Student Option; Periodic Fall & Spring)
N/A prereq: instr consent

AST 8200. Astrophysics Seminar. (; 1-3 cr. ; Student Option; Every Fall & Spring)
TBD prereq: instr consent

AST 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

AST 8444. FTE: Doctoral. (; 1 cr. [max 20 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

AST 8581. Big Data in Astrophysics. (4 cr. ; A-F only; Every Spring)
This course will introduce key concepts and techniques used to work with large datasets, in the context of the field of astrophysics. Prerequisites: MATH 2263 and MATH 2243, or equivalent; or instructor consent. Suggested: familiarity with astrophysics topics, such as star formation and evolution, galaxies and clusters, composition and expansion of the universe, gravitational wave sources and waveforms, and high-energy astrophysics.

AST 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

AST 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

AST 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

AST 8990. Research in Astronomy and Astrophysics. (; 1-4 cr. ; Student Option; Every Fall & Spring)
Research under supervision of a graduate faculty member. prereq: instr consent

Biochemistry (BIOC)

BIOC 5002. Critical Evaluation of Biochemistry Research. (1 cr. ; S-N only; Every Fall & Spring)
BioC 5002 guides advanced undergraduates and new graduate students as they learn how to design experiments and to critically evaluate a wide variety of cutting-edge research projects, both as readers and as researchers. Introductory lectures include peer review, experimental design, critical thinking and the psychology of judgment and decision-making. This is followed by a series of guest speakers who will guide students as they develop their skills in evaluation of current research papers.

BIOC 5216. Current Topics in Signal Transduction. (; 2 cr. ; A-F only; Every Spring)
Mechanisms by which biological signals evoke biochemical responses.

BIOC 5225. Graduate Laboratory in NMR Techniques. (; 1 cr. ; S-N only; Every Spring)
Practical aspects of nuclear magnetic resonance (NMR) spectrometry. Hands-on experience with 500/600 MHz instruments. Sample preparation/handling, contamination sources, tube/probe options, experiment selection, experimental procedures, software, data processing. prereq: 8001 or instr consent

BIOC 5309. Biocatalysis and Biodegradation. (3 cr. ; Student Option; Every Spring)
Fundamentals of microbial enzymes/metabolism as pertaining to biodegradation of environmental pollutants/biosynthesis for making commodity chemicals. Practical examples. Guest speakers from industry.

BIOC 5351. Protein Engineering. (3 cr. ; A-F or Audit; Every Fall)
Key properties of enzymes/molecular basis, computer modeling strategies, mutagenesis strategies to create protein variants, expression/screening of protein variants. Evaluate research papers, identify unsolved practical/theoretical problems, plan protein engineering experiment.

BIOC 5352. Biotechnology and Bioengineering for Biochemists. (; 3 cr. ; A-F or Audit; Periodic Spring)
Protein biotechnology. Microorganisms used as hosts for protein expression, protein expression, and engineering methods. Production of enzymes of industrial interest. Applications of protein biotechnology in bioelectronics. Formulation of therapeutic biopharmaceuticals. Recommended prerequisites: Biochemistry (BiOC 3021 or 3022 or 4331) and Microbiology MICB 3301

BIOC 5361. Microbial Genomics and Bioinformatics. (; 3 cr. ; Student Option; Every Fall & Spring)
Introduction to genomics. Emphasizes microbial genomics. Sequencing methods, sequence analysis, genomics databases, genome mapping, prokaryotic horizontal gene transfer, genomics in biotechnology, intellectual property issues. Hands-on introduction to UNIX shell scripting, genomic data analysis using R and Excel in a computer lab setting. prereq: College-level courses in [organic chemistry, biochemistry, microbiology]

BIOC 5444. Muscle. (; 3 cr. ; Student Option; Every Spring)
Muscle molecular structure/function and disease. Muscle regulation, ion transport, and force generation. Muscular dystrophy and heart disease. prereq: 3021 or BIOL 3021 or 4331 or BIOL 4331 or PHSL 3061 or instr consent

BIOC 5528. Spectroscopy and Kinetics. (; 4 cr. ; Student Option; Every Spring)
Biochemical dynamics from perspectives of kinetics and spectroscopy. Influence of structure, molecular interactions, and chemical transformations on biochemical reactions. Focuses on computational, spectroscopic, and physical methods. Steady-state and transient kinetics. Optical and magnetic resonance spectroscopies. prereq: Intro physical chemistry or equiv; intro biochemistry recommended

BIOC 5535. Introduction to Modern Structural Biology -- Diffraction. (2 cr. ; A-F or Audit; Every Fall)
Theory and practice in the determination of three-dimensional structures of macromolecules using x-ray and neutron diffraction and electron microscopy. prereq: (Introductory biochemistry, introductory physics, college calculus] or physical chemistry or instr consent

BIOC 5536. Introduction to Modern Structural Biology - Nuclear Magnetic Resonance. (2 cr. ; Student Option; Every Fall)
Theory and practice in the determination of three-dimensional structures of macromolecules using NMR. Recommended prerequisite courses: (Introductory biochemistry, introductory physics, college calculus) or physical chemistry

BIOC 5960. Biophysical Spectroscopy. (; 2 cr. [max 4 cr.] ; A-F only; Every Spring)
In-depth study of topics in biochemistry. prereq: [[3021 or equiv], CHEM 2301]] or instr consent or grad

BIOC 6011. Biochemistry for Dental Students. (; 4 cr. ; A-F or Audit; Every Fall)
Survey of chemical properties, biosynthesis, catabolism, structure/function of biomolecules. Fundamentals of molecular biology/metabolic regulation. prereq: Dental student

BIOC 6021. Biochemistry. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Fundamentals of biochemistry. Structure/function of proteins, nucleic acids, lipids and carbohydrates. Metabolism, regulation of metabolism. Quantitative treatments of chemical equilibria, enzyme catalysis, and bioenergetics. Chemical basis of genetic information flow. prereq: general biology, organic chemistry, instr consent; intended for MBS students

BIOC 8001. Biochemistry: Structure, Catalysis, and Metabolism. (; 3 cr. ; Student Option; Every Fall)
Protein structure, methods to determine structure, protein folding, forces stabilizing macromolecular structure, protein engineering, design. Dynamic properties of proteins/enzymes, enzyme substrate complexes, mechanism of enzyme catalysis. Enzymology of metabolic regulation and cell signaling. prereq: BMBB or MCDBconcurrent registration is required (or allowed) in G grad student or instr consent

BIOC 8002. Molecular Biology and Regulation of Biological Processes. (; 3 cr. ; A-F only; Every Fall)
Classical to current topics in molecular biology. Aspects of DNA, RNA, and protein biology. DNA replication, repair, and recombination. RNA transcription, editing, and regulation. Protein translation/modification. Technologies such as deep-sequencing micro-RNA and prions. prereq: [BMBB or MCDBG] grad student or instr consent

BIOC 8005. Biochemistry: Structure and Catalysis. (2 cr. ; A-F or Audit; Every Fall)
Protein structure, methods to determine structure, protein folding, forces stabilizing macromolecular structure, protein engineering, design. Dynamic properties of proteins/enzymes, enzyme substrate complexes, mechanism of enzyme catalysis.

BIOC 8006. Biochemistry: Metabolism and Control. (2 cr. ; A-F or Audit; Every Fall)
Enzymology of metabolism, metabolic regulation, metabolic control and cell signaling.

BIOC 8007. Molecular Biology of the Genome. (; 2 cr. ; A-F or Audit; Every Fall)
This course explores the molecular biology of the eukaryotic genome and transcriptome, focusing on fundamental genetic processes, molecular mechanisms, and their relationships to biology and disease. Students gain a firm understanding of the key concepts and techniques through lectures, reading, and discussions. Students learn to critically analyze scientific papers through student-led presentations and discussions. They gain experience in articulating scientific questions, formulating testable hypotheses, and designing experiments. This course promotes development of science writing skills.

BIOC 8008. Molecular Biology of the Transcriptome. (2 cr. ; A-F or Audit; Every Fall)
This course explores the molecular biology of the eukaryotic genome and transcriptome, focusing on fundamental genetic processes, molecular mechanisms, and their relationships to biology and disease. Students gain a firm understanding of the key concepts and techniques through lectures, reading, and discussions. Students learn to critically analyze scientific papers through student-led presentations and discussions. They gain experience in articulating scientific questions, formulating testable hypotheses, and designing experiments. This course promotes development of science writing skills.

BIOC 8084. Research and Literature Reports. (; 1 cr. [max 5 cr.] ; S-N or Audit; Every Fall & Spring)
Current developments. prereq: Grad BMBB major or instr consent

BIOC 8101. Milestones in the Biology of Aging. (1 cr. ; Student Option No Audit; Fall Even Year)
This course introduces the participant to historical perspectives and emerging topics on the biology of aging. The course utilizes original literature, including both seminal, historical background papers and the most recent advances in the field of biogerontology. The participants use these resources to advance in-depth discussions on each of the topics. This course is directed to graduate students and post-doctoral fellows currently engaged in conducting research in the area of biological aging.

BIOC 8102. Hot Topics in the Biology of Aging. (1 cr. ; Student Option; Spring Odd Year)
This course is intended to provide a platform of understanding about the major issues surrounding biological research in aging. This course will include a combination of student- and faculty-led discussions on select research topics that are highly relevant to the field of biogerontology research, along with instruction/discussions on scientific integrity. Student participants will lead discussions focused on their area of research expertise, utilizing a combination of review articles and research articles. Discussion of scientific misconduct will include case studies. This course is open to graduate students and post-doctoral fellows involved in the National Institutes on Aging (NIA) training grant ?Functional Proteomics of Aging?. This course is also open to other graduate students or post-doctoral fellows who are conducting biological research in aging with instructor?s permission.

BIOC 8103. Application of New Technologies to the Study of Biology of Aging. (1 cr. ; Student Option; Fall Odd Year)
This course is intended to provide a platform of understanding about the use of proteomic and other large-scale "omics" technologies in aging research. This course will include a combination of faculty- and student-led discussions on select topics that are highly relevant to the field of mass spectrometry and proteomic research. This course also includes an introduction to the NIH/NRSA fellowship applications. This course is directed to graduate students and post-doctoral fellows currently engaged in conducting research in the area of biological aging.

BIOC 8104. Fostering a Career in Aging Research. (1 cr. ; Student Option No Audit; Spring Even Year)
This course is intended to provide a platform for preparing pre-doctoral students and post-doctoral fellows for the next step in their academic career. The course will include a combination of student- and faculty-led discussions on topics such as preparing for the job interview, composing a CV and cover letter, and developing a course syllabus based on the biology of aging. Trainees will also participate in a one-day symposium conducted by the MN Gerontological Society to raise their awareness of broad issues within the local aging community. This course is directed to graduate students and post-doctoral fellows currently engaged in conducting research in the area of biological aging. prereq: Graduate students and post-doctoral fellows on the NIA Training Grant "Functional Proteomics of Aging" and those who are interested in biological research in aging with instructor permission.

BIOC 8184. Graduate Seminar. (; 1 cr. [max 5 cr.] ; S-N or Audit; Every Fall & Spring)
Reports on recent developments in the field and on research projects in the department. prereq: grad BMBB major or DGS consent

BIOC 8216. Signal Transduction and Gene Expression. (; 3 cr. ; Student Option; Every Fall & Spring)
Cell signaling, metabolic regulation in development. Procaryotic/eucaryotic systems used as models for discussion. Literature-based course. prereq: 8002 or instr consent

BIOC 8290. Current Research Techniques. (; 1-3 cr. [max 9 cr.] ; S-N or Audit; Every Fall & Spring)
Research project carried out in laboratory of a staff member. prereq: Grad BMBB major

BIOC 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

BIOC 8401. Ethics, Public Policy, and Careers in Molecular and Cellular Biology. (; 1 cr. [max 2 cr.] ; S-N or Audit; Every Spring)
Ethics of scientific investigation from viewpoint of western scientific enterprise. Relationship between science, culture, and public policies. Careers in molecular/cellular biology. Nontraditional career tracks. Invited speakers, case studies, small-group discussions, lectures. prereq: Grad student in [BMBB or MCDBconcurrent registration is required (or allowed) in G]

BIOC 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

BIOC 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

BIOC 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

BIOC 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Bioethics, Center for (BTHX)

BTHX 5000. Topics in Bioethics. (; 1-4 cr. [max 8 cr.] ; Student Option; Periodic Fall & Spring)
Bioethics topics of contemporary interest. Topics specified in Class Schedule.

BTHX 5010. Bioethics Proseminar. (; 2 cr. ; A-F only; Every Fall)
Introduction to topics in bioethics. prereq: Bioethics grad student or grad minor

BTHX 5100. Introduction to Clinical Ethics. (; 3 cr. ; Student Option; Every Fall & Spring)
Most frequent ethical problems faced by clinicians, patients/families, and ethics consultants. Forgoing life sustaining treatment, decisional capacity, informed consent, treatment refusals, death/dying, pediatric ethics, reproductive issues, research ethics, psychiatric illness. Real cases.

BTHX 5110. Ethical Issues in Pediatrics. (; 2 cr. ; Student Option; Fall Odd Year)
Bioethics concerns the identification, analysis, and resolution of ethical problems that arise in planning for the care of patients in biomedical research, and in relation to the natural world. This course deals with ethical problems that occur frequently in pediatrics settings, in clinical and public health venues, in research and in the environment. The course emphasizes the ethical responsibilities of laypersons, health professionals, researchers and policy makers in planning for and resolving bioethics issues in pediatrics, including the prenatal and perinatal period. Issues addressed include reproductive issues, death and dying, forgoing life-sustaining treatment, conflicts and war, research with children and pregnant women, genetics, public and global health, social justice and other topics.

BTHX 5120. Dying in Contemporary Medical Culture. (2 cr. ; Student Option; Every Fall)
Examines practices of dying and death in contemporary U.S. culture, moral problems associated with these practices, possible solutions, and practical applications. Readings will consist of cultural critiques, bioethics literature, and empirical research.

BTHX 5210. Ethics of Human Subjects Research. (; 3 cr. ; Student Option; Fall Even Year)
Issues in ethics of human subjects research. prereq: Grad student or instr consent

BTHX 5220. Standards for Research with Human Participants: A Lecture Series for Researchers. (1 cr. ; Student Option; Fall Even Year)
This series of lectures presents various legal and regulatory standards that apply to research using human participants. Some are of general interest (e.g., Informed Consent); others will interest more specialized researchers (e.g., International Research).

BTHX 5300. Foundations of Bioethics. (3 cr. ; Student Option; Every Spring)
Overview of major contemporary frameworks used to approach ethical issues in bioethics. prereq: Grad student or instr consent

BTHX 5325. Biomedical Ethics. (; 3 cr. ; Student Option; Every Fall)
This course, delivered entirely online, examines issues in bioethics spanning clinical ethics, public health ethics, and research ethics. The course also introduces conceptual frameworks and methods that can be used to analyze these issues. prereq: Jr or sr or grad student or instr consent

BTHX 5400. Intro Ethics in Hlth Policy. (3 cr. ; Student Option; Spring Even Year)
Topics vary to reflect issues of current significance. Relates to law/politics as appropriate but focuses on moral analyses of policy issues. prereq: Grad student or professional student or instr consent

BTHX 5411. Health Law and Policy. (; 3 cr. ; A-F or Audit; Spring Even Year)
Organization of health care delivery. Physician-patient relationship. informed consent. Quality control. Responses to harm and error, including through medical malpractice litigation. Access. Proposals for reform. prereq: Grad student or instr consent

BTHX 5453. Law, Biomedicine, and Bioethics. (; 3 cr. ; A-F only; Spring Even Year)
Law/bioethics as means of controlling important biomedical developments. Relationship of law and bioethics. Role of law/bioethics in governing biomedical research, reproductive decisionmaking, assisted reproduction, genetic testing/screening, genetic manipulation, and cloning. Definition of death. Use of life-sustaining treatment. Organ transplantation. prereq: Grad student or instr consent

BTHX 5510. Gender and the Politics of Health. (3 cr. ; Student Option; Periodic Fall & Spring)
Significance of gender to health and health care. Feminist analysis regarding moral/ political importance of gender, possibly including contemporary western medicine? s understanding of the body, childbirth, and reproductive technologies; cosmetic surgery; chronic illness; disability; participation in research; gender and classification of disease. Care work, paid/non-paid. Readings from feminist theory, history, social science, bioethics, and moral philosophy.

BTHX 5520. Social Justice and Bioethics. (3 cr. ; Student Option; Fall Even Year)
This course explores matters of social justice related to health. Readings from multiple disciplinary perspectives ground examination of how to understand social justice in this context. Class sessions will predominantly focus on specific practical issues such as health disparities, the politics of inclusion and exclusion in clinical research, resource allocation in resource poor settings, and health professional roles during war. Discussions incorporate consideration of these issues? institutional and broader social contexts. This course is appropriate for a wide audience including students from the health professions, philosophy, social science, and law.

BTHX 5530. Investigative Journalism and Bioethics. (3 cr. ; Student Option; Periodic Fall & Spring)
This seminar will explore the links between bioethics and journalism, examining classic and contemporary works of investigative health journalism, works of literary non-fiction related to medicine and health, and investigative work by bioethicists. It will also examine the art of muckraking, non-profit investigative journalism, the public relations industry, the decline of print journalism and the rise of digital media, and how these developments are shaping the relationship between bioethicists and the press.

BTHX 5540. Bioethics, Psychiatry & Psychology. (3 cr. ; A-F only; Periodic Fall & Spring)
Explore philosophical and ethical issues in psychiatry and psychology. Potential topics include the moral responsibility of psychopaths for their actions, false memories of Satanic ritual abuse, insanity pleas, the sociology of

institutionalization, clinical trials of psychiatric drugs, cosmetic psychopharmacology, recent work in experimental philosophy, and classic experiments in social psychology.

BTHX 5610. Research & Publication Seminar. (1 cr. ; A-F only; Every Fall)
Publication strategy/venues. Authorship issues/ethics in publication. Manuscript formatting/letters of submission. Peer review. prereq: [Junior or senior or grad student], bioethics grad majors must register A-F

BTHX 5620. Social Context of Health and Illness. (; 3 cr. ; Student Option; Spring Even Year)
Social context in which contemporary meanings of health and illness are understood by providers/patients. Ethical implications. Readings from history, social science, literature, and first-person accounts. prereq: Grad student or instr consent

BTHX 5630. Bioethics Colloqium. (1 cr. [max 2 cr.] ; S-N only; Every Fall & Spring)
This course features presentations from a variety of departments and programs across campus that deal in some way with ethics as a theoretical and/or applied concept. Students will attend these presentations; engage with scholars thinking about ethics from multiple perspectives; and be able to bring these perspectives to bear upon their own research. The course is thus an opportunity to explore ethics as it might be conceptualized or practiced in the social sciences, law, public policy, global health, and many other arenas, and in turn to think about how these disparate frameworks and practices can be usefully put into conversation with bioethics, and with their own projects.

BTHX 5650. Disability Ethics. (3 cr. ; A-F only; Spring Odd Year)
This course is an examination of ethical issues pertaining to disability, with an emphasis on discussion and consideration of widely contrasting perspectives. Issues discussed include physician-assisted suicide, euthanasia, selective abortion, cochlear implant technology, sterilization, special versus inclusive education, Universal Design/Universal Instructional Design, disability accommodations, and built and social environments, examined within social, legal, policy, and cultural environments. Assignments include, readings, viewings, journaling, field projects, and research papers.

BTHX 5710. Ethical Issues in Global Health. (3 cr. ; Student Option; Fall Even Year)
This course examines ethical issues related to global health. Topics may include religion, morality, public policy, and the connection between health and human rights. Open to juniors, seniors, graduate and professional students.

BTHX 5800. Animal Ethics. (3 cr. ; Student Option; Periodic Fall & Spring)
Human relationships with animals are changing and this course offers a venue for exploring some of the ethical issues in these evolving relationships. The course will discuss the differences between animal ethics and animal welfare and examine the morality and ethics of human-animal interactions in various contexts. These include cultural and historical views of animals; animals as companions; the use of animals in scientific research, entertainment, and service work; euthanasia; animal production and sustainability; and conservation issues.

BTHX 5900. Independent Study in Bioethics. (; 1-4 cr. [max 8 cr.] ; Student Option; Every Fall, Spring & Summer)
Students propose area for study with faculty guidance, write proposal which includes outcome objectives and work plan. Faculty member directs student's work and evaluates project. prereq: instr consent

BTHX 8000. Advanced Topics in Bioethics. (; 1-4 cr. [max 8 cr.] ; Student Option; Every Fall & Spring)
Advanced study of bioethics topics of contemporary interest. prereq: Grad or professional student

BTHX 8100. Advanced Theory & Practice of Clinical Ethics. (2 cr. ; Student Option; Every Spring)
This graduate seminar examines the principles and practices of health care ethics consultation. Focuses on the Core Competencies for Health Care Ethics Consultation promulgated by the American Society for Bioethics and Humanities. Topics include the nature and goals of health care ethics consultation, methods and processes of health care ethics consultation, evolving standards of clinical practice, core skills and core knowledge for ethics consultation, consultation evaluation, accountability, and institutional relationships, and special obligations of ethics consultants and institutions. The course serves graduate students in bioethics, ethics committee members (including community/lay members) and ethics consultants, clinical staff and faculty, law students, student clinicians, and students of the social and behavioral sciences and other disciplines. prereq: BTHX 5100 or instr consent

BTHX 8110. Ethical Issues in Pediatrics. (; 2 cr. ; Student Option; Fall Odd Year)
Bioethics concerns the identification, analysis, and resolution of ethical problems that arise in planning for the care of patients in biomedical research, and in relation to the natural world. This course deals with ethical problems that occur frequently in pediatrics settings, in clinical and public health venues, in research and in the environment. The course emphasizes the ethical responsibilities of laypersons, health professionals, researchers and policy makers in planning for and resolving bioethics issues in pediatrics, including the prenatal and perinatal period. Issues addressed include reproductive issues, death and dying, forgoing life-sustaining treatment, conflicts and war, research with children and pregnant women, genetics, public and global health, social justice and other topics.

BTHX 8114. Ethical and legal Issues in Genetic Counseling. (; 2 cr. [max 3 cr.] ; A-F or Audit; Every Fall)
Professional ethics. Ethical/legal concerns with new genetic technologies. prereq: [MCDG MS, genetic counseling specialization] or instr consent

BTHX 8120. Dying in Contemporary Medical Culture. (2 cr. ; Student Option; Every Fall)
Examines practices of dying and death in contemporary U.S. culture, moral problems associated with these practices, possible solutions, and practical applications. Readings will consist of cultural critiques, bioethics literature, and empirical research.

BTHX 8331. The Psychology of Morality. (3 cr. ; A-F or Audit; Fall Even Year)
Current research topics in socio-political moral judgment and moral development prereq: Grad

BTHX 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Master's student, adviser consent, DGS consent

BTHX 8500. Practicum in Bioethics. (1-4 cr. [max 16 cr.] ; Student Option No Audit; Every Fall & Spring)
Supervised placement to apply knowledge/skills from core courses. Individualized plan is developed between student, bioethics adviser or DGS, and mentor at practicum site. prereq: Bioethics grad [major or minor] or instr consent

BTHX 8510. Gender and the Politics of Health. (3 cr. ; Student Option; Spring Even Year)
Significance of gender to health and health care. Feminist analysis regarding moral/political importance of gender, possibly including contemporary western medicine? s understanding of the body, childbirth, and reproductive technologies; cosmetic surgery; chronic illness; disability; participation in research; gender and classification of disease. Care work, paid/non-paid. Readings from feminist theory, history, social science, bioethics, and moral philosophy. prereq: instr consent

BTHX 8520. Social Justice and Bioethics. (3 cr. ; Student Option; Fall Even Year)
This course explores matters of social justice related to health. Readings from multiple disciplinary perspectives ground examination of how to understand social justice in this context. Class sessions will predominantly focus on specific practical issues such as health disparities, the politics of inclusion and exclusion in clinical research, resource allocation in resource poor settings, and health professional roles during war. Discussions incorporate consideration of these issues? institutional and broader social contexts. This course is appropriate for a wide audience including students from the health professions, philosophy, social science, and law.

BTHX 8540. Bioethics, Psychiatry & Psychology. (3 cr. ; A-F only; Periodic Fall & Spring)
Explore philosophical and ethical issues in psychiatry and psychology. Potential topics include the moral responsibility of psychopaths for their actions, false memories of Satanic ritual abuse, insanity pleas, the sociology of institutionalization, clinical trials of psychiatric

drugs, cosmetic psychopharmacology, recent work in experimental philosophy, and classic experiments in social psychology.

BTHX 8610. Medical Consumerism. (; 3 cr. ; Student Option; Spring Even Year)
Roots/implications of "medical consumerism." How consumerist model shapes concepts of disease/disability. Larger historical developments that have led to current situation. How movement toward consumerism changes the profession of medicine. How tools of medical enhancement shape the way we think about our identities and live our lives. Texts from philosophy, history, literature, law, film, and social sciences.

BTHX 8650. Bioethics, Psychiatry & Psychology. (3 cr. ; A-F only; Periodic Fall & Spring)
Explore philosophical and ethical issues in psychiatry and psychology. Potential topics include the moral responsibility of psychopaths for their actions, false memories of Satanic ritual abuse, insanity pleas, the sociology of institutionalization, clinical trials of psychiatric drugs, cosmetic psychopharmacology, recent work in experimental philosophy, and classic experiments in social psychology.

BTHX 8710. Ethical Issues in Global health. (3 cr. ; Student Option; Every Fall)
This course examines ethical issues in global health which encompasses issues of religion, morality, public policy, disability rights, and health system structure. During this course, we draw from the literature on policies, traditions in the ethics of health, public health, health care and transnational cases.

BTHX 8755. Plan B Capstone. (1-7 cr. [max 14 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Research project. Topic arranged between student/instructor. Written report required. Prereq: Advanced Plan B MA student.

BTHX 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd

BTHX 8800. Animal Ethics. (3 cr. ; Student Option; Periodic Fall & Spring)
Human relationships with animals are changing and this course offers a venue for exploring some of the ethical issues in these evolving relationships. The course will discuss the differences between animal ethics and animal welfare and examine the morality and ethics of human-animal interactions in various contexts. These include cultural and historical views of animals; animals as companions; the use of animals in scientific research, entertainment, and service work; euthanasia; animal production and sustainability; and conservation issues.

BTHX 8900. Advanced Independent Study in Bioethics. (; 1-4 cr. [max 8 cr.] ; Student Option; Every Fall, Spring & Summer)
Students propose area for individual study with faculty guidance. Students write proposal, which includes outcome objectives and work plan. Faculty member directs student's work and evaluates project. prereq: instr consent

Biology (BIOL)

BIOL 5272. Applied Biostatistics. (; 4 cr. ; A-F only; Every Fall & Spring)
Conceptual basis of statistical analysis. Statistical analysis of biological data. Data visualization, descriptive statistics, significance tests, experimental design, linear model, simple/multiple regression, general linear model. Lectures, computer lab. prereq: High school algebra; BIOL 2003 recommended.

BIOL 5309. Molecular Ecology And Ecological Genomics. (; 3 cr. ; Student Option; Fall Even Year)
Application of molecular tools (PCR, sequencing, AFLP, SNPs, QTL) and analyses of molecular data for understanding ecological/evolutionary processes. Strengths/weaknesses of techniques/analyses. Questions molecular tools are used to answer. prereq: BIOL 3407 or BIOL 3409 or BIOL 4003

BIOL 5701. Science Communication: A Primer for Scientists. (; 2 cr. [max 3 cr.] ; Student Option; Every Fall, Spring & Summer)
Are you interested in honing your skills as a communicator? This class will help you improve your skills and gain confidence through practice and feedback. At the end of the course, you will have two finished pieces that you can use for fellowship applications or to publish. Topics covered include, translating technical concepts and avoiding jargon, understanding your audience and employing storytelling to engage them, identifying what makes science newsworthy, exploring concepts in inclusive science communication, and writing science stories and a three-minute thesis talk. The skills and practice from this course will help you in your future writing, presentations, and networking whether you want a career in academia, industry, nonpro?t, government, or beyond. In addition to gaining a solid foundation in science communication, you will hear from guest speakers and experts about careers translating science.

BIOL 5910. Special Topics in Biology for Teachers. (; 1-4 cr. [max 12 cr.] ; Student Option; Every Spring & Summer)
Courses developed for K-12 teachers depending on topics or subtopics which might include any of the following: plant biology, animal biology, genetics, cell biology, biochemistry, microbiology. prereq: BA or BS in science or science education or elementary education or K-12 licensed teacher

BIOL 5950. Special Topics. (; 1-4 cr. [max 8 cr.] ; Student Option; Periodic Fall, Spring & Summer)
In-depth study of special topic in life sciences.

BIOL 6793. Directed Studies. (; 1-7 cr. ; Student Option; Every Fall, Spring & Summer)
Individual study on selected topics/problems. Emphasizes either readings/use of scientific literature or laboratory/field techniques. prereq: MBS, 7 cr max, instr consent

BIOL 6794. Directed Research. (; 1-7 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Laboratory or field investigation of selected areas of research. prereq: MBS, instr consent

BIOL 6999. Capstone Project. (; 2 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Independent, original investigation of a relevant subject, challenge, or issue within biological sciences. Project takes approximately 120 hours. prereq: MBS, instr consent

BIOL 8100. Improvisation for Scientists. (1 cr. ; S-N or Audit; Every Fall)
This is a 7-week course designed to practice a wide array of strategies in order to gain awareness and control over your personal expression. Students will develop more effective ways to expand their ability to navigate the stress generally associated with delivering content in front of others. By learning how to manage their personal expression more effectively, students will be able to use specific tools in order to adapt their expression to various settings (large audiences, small groups, or one on one interviews/counseling). Adapting exercises from techniques such as improvisation and storytelling, this class will provide a comfortable and safe environment for students who want to expand their confidence when presenting for others.

Biomedical Engineering (BMEN)

BMEN 5001. Advanced Biomaterials. (; 3 cr. ; A-F or Audit; Every Fall)
Commonly used biomaterials. Chemical/physical aspects. Practical examples from such areas as cardiovascular/orthopedic applications, drug delivery, and cell encapsulation. Methods used for chemical analysis and for physical characterization of biomaterials. Effect of additives, stabilizers, processing conditions, and sterilization methods. prereq: 3301 or MatS 3011 or grad student or instr consent

BMEN 5031. Engineering Extracellular Matrices. (3 cr. ; A-F only; Every Fall)
This class explores the complex set of fibrous and linking proteins of tissues, namely the extracellular matrix (ECM). The ECM is crucial not only for maintaining the structure of tissues but also for guiding and maintaining cellular functions and fate processes. The purpose of the course is to become acquainted with ECM proteins and to investigate how control or manipulation of ECM proteins impacts on cell and tissue function with an emphasis on impacts for regenerative medicine. In the course of this study, we will apply fundamentals of physics, chemistry, and mathematics to make predictions, solve problems and optimize outcomes related to ECM engineering. Required prerequisites: Upper Division Undergraduate or Graduate level student standing in CSE. Recommended prerequisites: BMEn 2501, 3011/3015, 3111/3115, 3311/3315, or equivalents (introductory cell/molecular biology, biomaterials, biotransport, biomechanics).

BMEN 5041. Tissue Engineering. (; 3 cr. ; Student Option; Every Spring)
Fundamentals of wound healing and tissue repair; characterization of cell-matrix

interactions; case study of engineered tissues, including skin, bone marrow, liver, vessel, and cartilage; regulation of biomaterials and engineered tissues. prereq: CSE upper div or grad student or med student or instr consent

BMEN 5101. Advanced Bioelectricity and Instrumentation. (; 3 cr. ; Student Option; Periodic Spring)
Instrumentation, computer systems, and processing requirements for clinical physiological signals. Electrode characteristics, signal processing, and interpretation of physiological events by ECG, EEG, and EMG. Measurement of respiration and blood volume/ flow. prereq: [CSE upper div, grad student] or instructor consent

BMEN 5111. Biomedical Ultrasound. (; 3 cr. ; Student Option; Every Spring)
Introduction to biomedical ultrasound, including physics of ultrasound, transducer technology, medical ultrasound imaging, photoacoustic imaging, applications of non-linear acoustics, and high-intensity ultrasound. prereq: [[PHYS 1302 or equiv], [MATH 2374 or equiv]] or instr consent

BMEN 5151. Introduction to BioMEMS and Medical Microdevices. (; 2 cr. ; A-F or Audit; Every Spring)
Design/microfabrication of sensors, actuators, drug delivery systems, microfluidic devices, and DNA/protein microarrays. Packaging, biocompatibility, ISO 10993 standards. Applications in medicine, research, and homeland security. prereq: CSE sr or grad student or medical student

BMEN 5201. Advanced Biomechanics. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Introduction to biomechanics of musculoskeletal system. Anatomy, tissue material properties. Kinematics, dynamics, and control of joint/limb movement. Analysis of forces/motions within joints. Application to injury, disease. Treatment of specific joints, design of orthopedic devices/implants. prereq: [[3001 or equiv], [CSE upper div or grad student]] or instr consent

BMEN 5311. Advanced Biomedical Transport Processes. (3 cr. ; Student Option; Every Spring)
Fluid flow and mass transfer in the body, bioreactors, and medical devices. Pulsatile flows. Flows around curved and deformable vessels. Boundary layer flows. Blood rheology. Interstitial (porous media) flows. Oxygenation. Cell migration. Student critiques of published papers.

BMEN 5321. Microfluidics in Biology and Medicine. (3 cr. ; A-F or Audit; Every Fall)
Fundamentals of microfluidics. Fluid mechanics/transport phenomena in microscale systems. Pressure/surface driven flows. Capillary forces, electrokinetics, hydraulic circuit analysis. Finite element modeling for microfluidic systems. Design/fabrication methods for microfluidic devices. prereq: [3111, AEM 4201, ChEn 4005, [ME 3331 or ME 3332 or CSE grad student or instr consent]

BMEN 5351. Cell Engineering. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Engineering approaches to cell-related phenomena important to cell/tissue engineering. Receptor/ligand binding. Trafficking/signaling processes. Applications to cell proliferation, adhesion, and motility. Cell-matrix interactions. prereq: [2401, [2501 or concurrent registration is required (or allowed) in 5501], [MATH 2243 or MATH 2373]] or CSE upper div or grad student or instr consent

BMEN 5361. 3D Bioprinting. (2 cr. ; A-F only; Every Spring)
3D Bioprinting has recently emerged as a new biofabrication technology that merges many engineering fields (eg. BME, MechE, ChemE) with other disciplines such as Materials Science, Stem Cell Biology, Physiology, Surgery and Pharmacology. This course serves as an introduction to the field and how its disciplines interface, while providing the student with knowledge of many of the most common bioprinting methods and applications being developed today through lectures by experts in the field (academia and industry) as well as hands-on lab exercises in the UMN 3D Bioprinting Facility.

BMEN 5401. Advanced Biomedical Imaging. (; 3 cr. ; A-F or Audit; Every Fall)
Functional biomedical imaging modalities. Principles/applications of technologies that offer high spatial/temporal resolution. Bioelectromagnetic and magnetic resonance imaging. Other modalities. prereq: CSE upper div or grad student or instr consent

BMEN 5411. Neural Engineering. (; 3 cr. ; Student Option; Every Fall)
Theoretical basis. Signal processing techniques. Modeling of nervous system, its response to stimulation. Electrode design, neural modeling, cochlear implants, deep brain stimulation. Prosthetic limbs, micturition control, prosthetic vision. Brain machine interface, seizure prediction, optical imaging of nervous system, place cell recordings in hippocampus. prereq: 3401 recommended

BMEN 5412. Neuromodulation. (3 cr. ; A-F or Audit; Every Fall)
Fundamentals of bioengineering approaches to modulate the nervous system, including bioelectricity, biomagnetism, and optogenetics. Computational modeling, design, and physiological mechanisms of neuromodulation technologies. Clinical exposure to managing neurological disorders with neuromodulation technology.

BMEN 5413. Neural Decoding and Interfacing. (; 3 cr. ; A-F or Audit; Every Spring)
Neural interface technologies currently in use in patients as well as the biophysical, neural coding, and hardware features relating to their implementation in humans. Practical and ethical considerations for implanting these devices into humans. prereq: CSE upper division student, CSE graduate student, or instructor approval. recommended: BMEn 3411

BMEN 5421. Introduction to Biomedical Optics. (; 3 cr. ; A-F or Audit; Periodic Spring)
Biomedical optical imaging/sensing principles, laser-tissue interaction, detector design, noise analysis, interferometry, spectroscopy. Optical coherence tomography, polarization, birefringence, flow measurement, fluorescence, nonlinear microscopy. Tours of labs. prereq: CSE sr or grad student

BMEN 5501. Biology for Biomedical Engineers. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Concepts of cell/tissue structure/function. Basic principles of cell biology. Tissue engineering, artificial organs. prereq: Engineering upper div or grad student

BMEN 5601. Cardiovascular Devices. (1 cr. ; A-F or Audit; Every Spring)
Design of cardiovascular devices with experts from local medtech companies. Discussion of clinical need, the generic design (emphasizing use of engineering principles), typical testing and validation methods, and major limitations of the available devices. Design, analysis, and testing of these and related devices. prereq: BMEN 3011, 3111, 3211, or equivalents with instr consent

BMEN 5701. Cancer Bioengineering. (3 cr. ; A-F or Audit; Every Fall)
Cancer-specific cell, molecular/genetics events. Quantitative applications of bioinformatics/ systems biology, optical imaging, cell/matrix mechanics. Drug transport (with some examination of design of novel therapeutics). prereq: [Upper division CSE undergraduate, CSE graduate student] or instr consent

BMEN 5910. Special Topics in Biomedical Engineering. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Special topics in biomedical engineering.

BMEN 5920. Special Topics in Biomedical Engineering. (; 1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Special topics in biomedical engineering.

BMEN 8001. Polymeric Biomaterials. (; 3 cr. ; A-F or Audit; Every Spring)
Introduction to polymeric biomaterial research. Molecular engineering, characterization of properties, material-cell interaction, biocompatibility/bioactivity. Applications in biology and medicine. prereq: [5001, [CHEN 4214 or MATS 4214 or equiv]] or instr consent

BMEN 8041. Advanced Tissue Engineering Lab. (3 cr. ; A-F or Audit; Every Spring)
Tissue engineering refers to the generation of biological substitutes to restore, maintain or improve tissue function. Toward this end, tools and knowledge from several disciplines might be applied including biological sciences (molecular, cellular and tissue anatomy and physiology), engineering (transport phenomena, material science, mechanical characterization) and biotechnology (cell culture, gene transfer, metabolomics). This course will cover some introductory and advanced lab techniques used in tissue engineering.

BMEN 8101. Biomedical Digital Signal Processing. (; 3 cr. ; A-F or Audit; Every Fall)
Signal processing theory for analyzing real world digital signals. Digital signal processing

and mathematically derived algorithms for analysis of stochastic signals. Spectral analyses, noise cancellation, optimal filtering, blind source separation, beamforming techniques. prereq: [[MATH 2243 or MATH 2373], [MATH 2263 or MATH 2374]] or equiv

BMEN 8151. Biomedical Electronics and Implantable Microsystems. (3 cr. ; Student Option; Every Spring)
This class is about bioelectronics and the synergy between electronics and biomedical applications. It discusses how to architect robust ultra-low-power electronics with applications in implantable, noninvasive, wireless, sensing, and stimulating biomedical systems. Half of the classes span feedback systems, transistor device physics, noise, and circuit-analysis techniques to provide a circuit-foundation. The other half are research papers that describe the utilization of these circuits in implantable and wearable systems. Some of these systems include cochlear implants for the deaf, brain implants for the blind and paralyzed, cardiac devices for noninvasive medical monitoring, and biomolecular sensing systems. Prerequisites: BMEn 5101 or equivalent background in bioinstrumentation and electric circuits.

BMEN 8201. Advanced Tissue Mechanics. (3 cr. ; A-F or Audit; Every Spring)
Tissues exist in dynamic mechanical environments where they must maintain a fine balance between applied loads and internal tension. Active adaptability of biological materials can significantly complicate measurement of their mechanical behavior. This course will cover fundamental continuum approaches for determining the complex stress states of actively responsive tissues as well as the force-feedback relationships that drive early development and allow mature tissues to maintain mechanical equilibrium. Topics will include theoretical approaches for active force generation, soft tissue finite growth, extracellular matrix remodeling, and constrained mixtures. These methods are applicable to a wide range of biomechanical systems. In this course, they will be applied to mechanics of two model systems: arterial growth and remodeling in hypertension and sheet folding in early organogenesis and morphogenesis. prereq: 3011 or AEM 2021 or equiv

BMEN 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

BMEN 8334. Laboratory Neuroengineering. (; 1 cr. [max 6 cr.] ; S-N only; Every Fall, Spring & Summer)
Lab rotation in neuroengineering. prereq: Grad student in CSE or neuroscience

BMEN 8335. Neuroengineering Practicum. (; 3 cr. [max 6 cr.] ; A-F only; Every Spring)
Topics/issues in neuroengineering. Ethics, professional conduct, conflicts, plagiarism, copyright, authorship, research design considerations, IRB, intellectual properties, review process, professional presentations, proposal writing. prereq: PhD student in BMEn, EE, ME, or NSci or instr consent

BMEN 8381. Bioheat and Mass Transfer. (; 3 cr. ; Student Option; Periodic Spring)
Analytical/numerical tools to analyze heat/mass transfer phenomenon in cryobiological, hyperthermic, other biomedically relevant applications. prereq: CSE grad student, upper div transport/fluids course; [physics, biology] recommended

BMEN 8401. New Product Design and Business Development. (4 cr. ; A-F or Audit; Every Fall)
Student teams work with CSE and CSOM faculty and company representatives to develop a product concept for sponsoring company. Assignments include concept/detail design, manufacturing, marketing, introduction strategy, profit forecasting, production of product prototype. prereq: BME graduate student, some design experience; 8401, 8402 must be taken same yr

BMEN 8402. New Product Design and Business Development. (4 cr. ; A-F or Audit; Every Spring)
Student teams work with CSE and CSOM faculty and company representatives to develop a product concept for sponsoring company. Assignments include concept/detail design, manufacturing, marketing, introduction strategy, profit forecasting, production of product prototype. prereq: 8401

BMEN 8411. Neuroengineering Seminar. (2 cr. [max 4 cr.] ; S-N only; Every Fall & Spring)
Lectures presented by researchers in the field of neuroengineering. Students will discuss speaker papers in advance of the talks and meet with presenters afterwards. Each student will also deliver one seminar presentation per semester.

BMEN 8421. Biophotonics. (3 cr. ; A-F or Audit; Every Spring)
Understanding light microscopy and the interaction of light with biological materials is widely applicable to numerous research programs. In fact, it is a fundamental approach to addressing critical questions at the cellular and subcellular scales. This course will emphasize the fundamentals of light microscopy and microscopes, fundamentals of fluorescence and fluorescence microscopy (transitions, quantum yield, bleaching, lifetime etc.) and practical applications of fluorescence microscopy (confocal microscopy for optical sectioning, multiphoton microscopy, harmonic generation, FRET, FRAP, and fluorescence lifetime in the time and frequency domains). Course material will span theory, practical applications of microscopy and published literature. prereq: Graduate students in physical sciences (engineering, physics, chemistry etc.), or graduate students with an undergraduate degree in the physical sciences or mathematics, or consent of instructor. In addition to previous course work in engineering and/or physics, a working understanding of microscopy is recommended. Although not required, concurrent or previous enrollment in BMEn 5421 (Biomedical Optics) is recommended.

BMEN 8431. Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models. (; 4 cr. ; A-F or Audit; Every Spring)
Physical, chemical, physiological, mathematical principles underlying design of delivery systems for drugs. Small molecules, proteins, genes. Temporal controlled release. prereq: Differential equations course including partial differential equations or instr consent

BMEN 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

BMEN 8501. Dynamical Systems in Biology. (3 cr. ; A-F or Audit; Every Fall)
Nonlinear dynamics with specific emphasis on behavior of excitable systems (neurons/cardiac myocytes). prereq: Grad student in engineering or physics or math or physiology or neuroscience

BMEN 8502. Physiological Control Systems. (3 cr. ; A-F only; Every Spring)
Simulation, identification, and optimization of physiological control systems. Linear and non-linear systems analysis, stability analysis, system identification, and control design strategies, including constrained, adaptive, and intelligent control. Analysis and control of physiological system dynamics in normal and diseased states. prereq: 8101 or equiv

BMEN 8511. Systems and Synthetic Biology. (3 cr. ; A-F or Audit; Every Fall)
Systems/synthetic biology methods used to characterize/engineer biological systems at molecular/cellular scales. Integration of quantitative experimental approaches/mathematical modeling to elucidate biological design principles, create new molecular/cellular functions.

BMEN 8601. Biomedical Engineering Seminar. (; 1 cr. ; S-N or Audit; Every Fall)
Lectures and demonstrations of university and industry research introducing students and faculty to methods and goals of biomedical engineering.

BMEN 8602. Biomedical Engineering Seminar. (; 1 cr. ; S-N or Audit; Every Spring)
Lectures and demonstrations of university and industry research introducing students and faculty to methods and goals of biomedical engineering.

BMEN 8611. Professional Skills and Ethics for Biomedical Engineers. (2 cr. ; Student Option; Every Fall)
This course covers a number of practical aspects surrounding research, including: how to prepare a fellowship application (or more generally a proposal); how to write a manuscript; how to give a seminar; career advice for non-academic career paths; how to network with companies; research ethics; data management; research integrity. The format of the course will be a two hour meeting each week. The first hour will cover specific issues using historical literature references

with the second hour devoted to a guest lecture presentation on topics relevant to the themes of the course. Students will be required to complete the online Responsible Conduct of Research (RCR) Core Curriculum for Engineering and Technology and pass the final assessment as part of this course.

BMEN 8630. Biomedical Engineering Graduate Student Seminar. (; 1 cr. [max 3 cr.] ; S-N or Audit; Periodic Fall)
Student presentations of current thesis research or other areas of biomedical engineering. prereq: Grad BMEn major

BMEN 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

BMEN 8710. Directed Research. (; 1-4 cr. ; Student Option; Every Fall, Spring & Summer)
TBD

BMEN 8720. Internship in Biomedical Engineering. (; 1-3 cr. [max 6 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Supervised lab or industrial experience unrelated to student's normal academic or employment experience. prereq: Grad BMEn major

BMEN 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

BMEN 8820. Plan B Project. (; 2-3 cr. ; Student Option; Every Fall, Spring & Summer)
Project chosen by student and adviser to satisfy M.S. Plan B project requirement. Written report required. prereq: BMEn MS student

BMEN 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Thesis credit: doctoral. prereq: PhD student in biomedical engineering; max 14 cr per semester or summer; 24 cr required

BMEN 8900. Special Topics in Biomedical Engineering. (; 1-4 cr. [max 8 cr.] ; A-F or Audit; Periodic Fall & Spring)
Topics in biomedical engineering.

BMEN 8910. Independent Study. (; 1-3 cr. ; Student Option; Every Fall, Spring & Summer)
Research or study of a topic determined by interests of student in consultation with faculty supervisor. Requires approval by faculty supervisor and director of graduate studies. prereq: Grad BMEn major

Biomedical Science (BMSC)

BMSC 8990. Research: Biomedical Sciences. (; 1-7 cr. [max 42 cr.] ; S-N or Audit; Periodic Fall)
Content determined by interest of student in consultation with staff. prereq: Enrollment in MD/PhD program

Bioproducts and Biosystems Eng (BBE)

BBE 5001. Chemistry of Biomass and Biomass Conversion to Fuels and Products. (; 4 cr. ; A-F or Audit; Every Fall)
Chemistry of biomass. Sustainable utilization for biofuels/bioproducts. Bio-based materials, chemicals, energy. Environmental implications. Chemical principles/reactions underlying the structure, properties, processing, and performance of plant materials. prereq: Grad student or instr consent

BBE 5023. Process Control and Instrumentation. (; 3 cr. ; Student Option; Every Fall)
Fundamental principles in system dynamics/control. Emphasizes process systems and problems faced by process engineers. prereq: Grad student or instr consent

BBE 5093. Directed Study. (; 1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
A course in which a student designs and carries out a directed study on selected topics or problems under the direction of a faculty member; eg, literature review. Directed study courses may be taken for variable credit and special permission is needed for enrollment. Students enrolling in a directed study will be required to use the University-wide on-line directed study contract process in order to enroll. prereq: department consent, instructor consent, no more than 6 credits of directed research counts towards CFANS major requirements.

BBE 5094. Directed Research. (; 1-5 cr. ; Student Option; Every Fall, Spring & Summer)
Advanced individual-study project. Application of engineering principles to specific problem. prereq: instr consent

BBE 5301. Applied Surface and Colloid Science. (; 3 cr. ; Student Option; Every Fall)
Introduction to surface/colloid science concepts. Surface tension, wetting, adsorption, capillarity. Formation/stability of sols, emulsions, and foams. Water solubility. Partition coefficients of organic species. Properties of both surfactants and water soluble polymers. Focuses on interdisciplinary applications.

BBE 5302. Biodegradation of Bioproducts. (; 3 cr. ; Student Option; Every Spring)
Organisms and their importance to bio-based products: deterioration, control, bioprocesses for benefit. prereq: Grad student or instr consent

BBE 5303. Introduction to Bio-based Materials Science. (; 3 cr. ; Student Option; Every Spring)
Principles of materials science, their application to bio-based materials. Project required. prereq: Grad student or instr consent

BBE 5305. Pulp and Paper Technology. (; 3 cr. ; Student Option; Every Spring)
Pulping processes, fiber refining/processing, paper manufacturing, fiber/paper properties, paper recycling. Water requirements, effluent treatment. Chemical/mechanical pulping, pulp preparation, secondary fiber, de-inking, wet end additives. Lab problems/exercises supplemented by lectures. Online course.

BBE 5333. Off-road Vehicle Design. (4 cr. ; A-F only; Every Spring)
Mechanics involved in designing/testing off-road vehicles. Vehicle mechanics, traction, performance. Complexity/modeling of vehicle interaction with soil, muskeg, snow. Case study or literature review. Develop paper for publication. prereq: [[2001, 4303] or [AEM 2021, AEM 3031], [3012 or concurrent registration is required (or allowed) in 3012 or CEGE 3502 or concurrent registration is required (or allowed) in CEGE 3502], upper div CSE] or instr consent

BBE 5401. Bioproducts Separation and Purification Processes. (; 3 cr. ; A-F or Audit; Every Fall)
Unit operations of bioproducts engineering/manufacture. Project required. prereq: Grad student or instr consent

BBE 5402. Bio-based Products Engineering Lab II. (; 2 cr. ; A-F or Audit; Every Fall)
Unit operations laboratory exercises in bio-based products engineering/manufacture.

BBE 5403. Bio-based Products Engineering Lab I. (2 cr. ; A-F or Audit; Every Spring)
Laboratory exercises in bio-based products engineering. prereq: Grad student or instr consent

BBE 5404. Biopolymers and Biocomposites Engineering. (; 3 cr. ; A-F or Audit; Every Fall)
Structure/properties of biopolymers. Engineering of composites from biopolymers/plant-based materials. prereq: grad student or instr consent

BBE 5480. Special Topics. (; 1-4 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Topics specified in Class Schedule.

BBE 5513. Watershed Engineering. (; 3 cr. ; A-F or Audit; Every Fall)
Application of engineering principles to managing surface runoff from agricultural, range, and urban watersheds. Design of facilities and selection of land use practices for controlling surface runoff to mitigate problems of flooding and degradation of surface-water quality. prereq: 3023, upper div CSE or grad student

BBE 5523. Ecological Engineering Design. (; 3 cr. ; A-F only; Every Spring)
Application of ecological engineering to design of remediation systems. Artificial ecosystems, ecosystem/wetland restoration, constructed wetlands, biological engineering for slope stability, waste treatments. Restoring ecological service of watersheds. prereq: Graduate student or instr consent

BBE 5535. Assessment and Diagnosis of Impaired Waters. (; 3 cr. ; A-F only; Every Fall)

Assessing impaired waters and developing TMDL for conventional pollutants. Preparing/communicating legal, social and policy aspects. TMDL analysis of real-world impaired waters problem. Field trip to impaired waters site. prereq: Grad student or instr consent

BBE 5608. Environmental and Industrial Microbiology. (; 3 cr. ; A-F only; Every Fall)
Use of microbes/enzymes to detoxify contaminants in field or in containment facilities. Contaminants, sources, fates. Biological organisms, pathways, catalysts utilized in bioremediation. Site inspection practices, bioremediation technologies, application in real-world situations. prereq: [BIOL 1001 or BIOL 1009], CHEM 1011

BBE 5713. Biological Process Engineering. (; 3 cr. ; A-F only; Every Spring)
Material/energy balances. Homogeneous reactions of bioprocess engineering and biological systems. Fermentation engineering, reactor design fundamentals. Filtration, centrifugation, separation, absorption, extraction, chromatography. Biorefining. Conversion of biomass into bioenergy, biochemicals, and biomaterials. prereq: [3033, [4013 or concurrent registration is required (or allowed) in 4013], or instr consent

BBE 5723. Food Process Engineering. (; 3 cr. ; A-F or Audit; Every Spring)
Food processing engineering. Applications of material balance, energy balance, fluid dynamics, and heat/mass transfer to refrigeration, freezing, psychometrics, dehydration, evaporation, non-thermal processing, and separation. Development/control for food products. prereq: [[4013 or concurrent registration is required (or allowed) in 4013], or instr consent

BBE 5733. Renewable Energy Technologies. (; 3 cr. ; A-F or Audit; Every Spring)
Energy security and its environmental, economic and societal impacts. Current and emerging technologies for production and use, characteristics of renewable energy, key methods for efficient production, current and probable future, and impact on sustainable development. prereq: Grad student or instr consent

BBE 5743. Nanobioengineering & Nanobiotechnology. (3 cr. ; Student Option; Every Spring)
This course will educate on the interdisciplinary areas of bionanotechnology/nanobiotechnology and nanobioengineering, including engineering principles and inherent technological applications. prereq: Instructor consent

BBE 5753. Air Quality and Pollution Control Engineering. (3 cr. ; A-F or Audit; Every Spring)
Air quality and pollution control engineering systems. Air pollutant sources, emissions transformations, dispersion, fate and impacts. Introduction to air quality and pollution laws, regulations and permits. Control technologies including energy conservation, cyclones, electrostatic precipitators, fabric filters, absorbers, adsorbers, incinerators and biofilters. Course Prerequisites Graduate student or instructor consent Credit will not be granted if credit has been received for CEGE 5561

BBE 8001. Seminar I. (; 1 cr. ; A-F only; Every Fall)
Presentation/discussions on current research topics, research philosophy/principles, proposal writing, professional presentations.

BBE 8002. Seminar II. (; 1 cr. [max 2 cr.] ; A-F only; Every Spring)
Organization/critique of seminars on new developments in biosystems and agricultural engineering. prereq: 8001 or concurrent registration is required (or allowed) in 8001 or equiv

BBE 8003. Research Seminar II. (; 1 cr. [max 2 cr.] ; S-N or Audit; Every Spring)
Moderate and critique seminars in biosystems and agricultural engineering. prereq: 8002 or equiv

BBE 8005. Supervised Classroom or Extension Teaching Experience. (; 2 cr. ; S-N or Audit; Every Fall & Spring)
Teaching experience is offered in the following departments: Biosystems and Agricultural Engineering; Agronomy and Plant Genetics; Horticultural Science; Soil, Water, and Climate; Plant Pathology. Discussions about effective teaching to strengthen skills and develop a personal teaching philosophy. prereq: instr consent

BBE 8013. Parameter Estimation in Biosystems and Agricultural Engineering. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Procedures for estimating parameter values and parameter uncertainty from experimental data. Values and interpretation of linear and nonlinear models using ordinary and weighted least-square methods. Design of experiments. Application to biosystems and agricultural engineering problems. prereq: Stat 3021 or equiv, computer programming course

BBE 8094. Advanced Problems and Research. (; 2-6 cr. ; Student Option; Periodic Fall & Spring)
tbd prereq: 5095

BBE 8300. Research Problems. (; 1-10 cr. ; Student Option; Every Fall & Spring)
Independent research under faculty guidance. prereq: instr consent

BBE 8303. Machinery Modeling. (3 cr. ; Student Option; Periodic Fall & Spring)
Machinery systems modeling using multibody dynamics simulation software (MBS). Review models presented in literature. Report on limitations of modeling approaches used. Models developed in students' areas of interest. prereq: [3012 or CEGE 3502], AEM 2021

BBE 8304. Advanced Topics in Wood Drying. (; 2 cr. ; Student Option; Every Fall)
Rheological behavior of first-dried solid wood. Significance of creep to stress-strain pattern, shrinkage, and degrade development in lumber drying. Interpretation/evaluation of schedules, processes, and primary/auxiliary equipment used in commercial drying processes. Energy consideration in drying processes. prereq: 4304

BBE 8307. Advances and Methods in Forest Products Pathology and Preservation. (; 2 cr. ; Student Option; Every Spring)
Principles of wood protection, methods of evaluating preservatives. Emphasizes international developments. prereq: 4303

BBE 8311. Mechanics of Wood and Wood Composites. (; 2 cr. ; Student Option; Every Spring)
Advanced topics on behavior of wood composites. prereq: instr consent

BBE 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

BBE 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

BBE 8513. Hydrologic Modeling of Small Watersheds. (3 cr. ; Student Option; Spring Even Year)
Study/representation of hydrologic processes by mathematical models. Stochastic meteorological variables, infiltration, overland flow, return flow, evapotranspiration, channel flows. Approaches for model calibration/evaluation. prereq: [3012 or CEGE 3502], hydrology course

BBE 8523. Coupled Heat, Moisture, and Chemical Transport in Porous Media. (; 3 cr. ; A-F or Audit; Periodic Fall)
Mathematical study of coupled heat, moisture, and chemical transport in porous media. Derivation of governing equations for coupled heat, moisture, and chemical transport. Derivation of numerical solution techniques to solve coupled equations. Comparison of numerical solutions to analytical solutions. prereq: [CSci 5301 or equiv], [[Math 5512, Math 5513] or equiv], [Soil 5232 or equiv], computer programming

BBE 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

BBE 8703. Managing Water in Food and Biological Systems. (; 3 cr. ; Student Option; Periodic Fall)
Qualitative and quantitative analysis of water in foods and biological materials using NMR and MRI. Water and chemical reactivity, microbial activity, physiochemical properties and changes, and structural properties and changes in foods and biological materials. prereq: Chem 3501 or FScN 5451 or MatS 3011 or instr consent

BBE 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)

(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

BBE 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Business Administration (BA)

BA 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

BA 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

BA 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Business Law (BLAW)

BLAW 6158. The study of laws affecting private business and publicly-traded companies.. (; 2 cr. [max 4 cr.] ; A-F only; Every Spring)
This course highlights topics that are important to any business manager, with particular emphasis on areas of interest for those aspiring to high level executive/management positions with publicly-traded companies. General topics include: contracts, real estate law, the law of agency, employment law, certain discrimination laws (including Minnesota's fairly recent protections for women in the workplace), and forms of business entity. Public company subjects include: pros and cons of going public, the IPO process, federal securities laws and SEC regulations regarding public company reporting requirements, insider trading, the Sarbanes-Oxley Act of 2002 and its impact on corporate governance, trends in shareholder democracy rights and shareholder activism, and the role of boards and audit committees. Throughout the course, we will examine the impact of the Supreme Court on American business. prereq: MBA or Mgmt Sci MBA student

Carlson Executive MBA (CMBA)

CMBA 5554. International Residency. (1.5 cr. ; A-F only; Every Spring)
Students travel to an international location for nine days, engage in discussions with international colleagues, to apply program concepts and develop broader sensitivity to cultural/social differences. Pre-trip preparation, on-site disucssion, and trip assignment are also required. Held in late March.

CMBA 5625. Entrepreneurship and Innovation. (3 cr. ; A-F only; Every Spring)
Entrepreneurial role of employee/management in increasing organizational value through creation/formation of new businesses, products, or markets within entities ranging from early stage companies to social ventures to F500 corporations.

CMBA 5710. Leadership. (1.5 cr. ; A-F only; Every Fall)
Self-awareness/insight concerning personal leadership/core values. Increase capabilities to understand potential personal derailment patterns/create effective strategies to address challenges. Develop lifelong executive leadership practices/habits for high performance in demanding circumstances.

CMBA 5711. Negotiation. (; 3 cr. ; A-F only; Every Fall)
Securing agreements between two or more parties who are interdependent and are seeking to maximize their own outcomes. Negotiation in various settings. Simulations, role-playing, cases.

CMBA 5712. Information Technology. (1.5 cr. ; A-F only; Every Fall)
Course prepares you with an inside-out and an outside-in perspective of how information technology is disrupting a variety of industries, how to compete in such an environment and how to strategically manage the IT function within companies to have an efficiency-innovation duality. Key principles covered in the class are developing a state-of-the-art IT strategy, getting first-hand exposure to ERP systems and learning the organizational changes involved in implementing such systems, applying disruptive and big-bang theories of IT enables disruption and learning the nuances of platform competition and multi-sided markets to fight such disruption.

CMBA 5713. Managerial Accounting. (; 3 cr. ; A-F only; Every Fall)
How to analyze accounting for management decisions. Planning/control. Transfer pricing, performance measurements, cost behavior, cost allocation, activity-based costing, standard costs.

CMBA 5714. Advanced Marketing. (; 3 cr. ; A-F only; Every Fall)
Product markets in which organization should compete. Sustainable competitive advantage. Matching marketing strategy with environment. Coordinating marketing/business functions. Organizing/managng marketing process. Cases.

CMBA 5715. Advanced Financial Management. (; 3 cr. ; A-F only; Every Fall)
Executive-level corporate financial policy. Rigorous case-oriented approach. Students apply principles of finance on their own initiative.

CMBA 5721. Advanced Management Topics. (1.5 cr. [max 3 cr.] ; A-F only; Every Spring)
Topics reflects strengths, talents, and interests of class. Topics integrate different aspects of curriculum while not being limited by specific area/paradigm.

CMBA 5722. International Business. (; 3 cr. ; A-F only; Every Spring)
Developing an integrative framework for international activities of firm. How international environment constrains decision-making. How currancy prices are determined. Managing exchange risk.

CMBA 5723. Ethics. (1.5 cr. ; A-F only; Every Fall & Spring)
Role of ethics in corporate strategy. Stakeholder management, individual/collective responsbility, international business ethics. Business's responsibility to the environment. Truthful/tasteful advertising. Obligations to local community. Managing diverse workforce.

CMBA 5724. International Residency. (; 1.5 cr. ; A-F only; Every Spring)
Students travel to international location for 11 days. Discussions with international colleagues. Applying program concepts. Sensitivity to cultural/social differences. Pre-trip preparation, on-site disucssion, trip assignment.

CMBA 5810. Introduction to Statistics and Business Analytics. (3 cr. ; A-F only; Every Fall)
This course focuses on the use of data to solve business problems and the development of skills necessary to (1) formulate a management problem as a statistical problem; (2) collect appropriate data and perform fundamental procedures of statistical analysis; and (3) to interpret, critically evaluate, and implement the results of the statistical analysis. In particular, the student should be able to: generate and use basic graphical and numerical descriptive methods; apply basic estimation and testing procedures; estimate and interpret the parameters of simple and multiple regression model; to test the utility of the model and to use it for estimation and prediction; think statistically about issues facing her/his organization; recognize when statistical methods are effective, and when they are not; and to translate, communicate, and critically evaluate the results of statistical analyses.

CMBA 5811. Financial Accounting. (3 cr. ; A-F only; Every Fall)
Students learn about the accounting system used by firms to measure and report their economic performance and financial position to external parties. Students analyze corporate financial reports to discover the impact of significant economic events. Discussions and cases focus on the role of financial reporting standards in informing financial intermediaries and contributing to the efficient allocation of capital in a modern economy.

CMBA 5812. Organizational Behavior. (3 cr. ; A-F only; Every Fall)
Course's main purpose is to prepare you to successfully engage and lead people to achieve organizational goals. Effective managers must not only develop winning strategies, but they must also implement them.

Doing so requires a thorough understanding of organizational behavior. Broadly speaking, organizational behavior is the systematic study of how people behave in organizational settings. This course is designed to develop your understanding of the complexity of orgs and how they affect behavior, build your self-knowledge and people-leadership skills, and help you learn and apply appropriate tactics and tools to improve organizational functioning and facilitate personal career success. Course topics include: organizational (e.g. structure and culture), interpersonal (e.g. power and influence, social networks, conflict), and individual (e.g. decision making, motivation) aspects of organizational behavior.

CMBA 5813. Competing In The Digital Age. (1.5 cr. ; A-F only; Every Fall)
This course covers the crucial and current topics of how information technology disrupts a variety of industries, how to compete in such an environment, and how to strategically manage the IT function in the companies to stay relevant in the digital age. Key principles covered in the class are developing a state-of-the-art IT disruption strategy, learning the nuances of platform competition and multi-sided markets to fight such disruption, understanding the organizational changes involved in implementing enterprise wide systems, and utilizing social and data-driven techniques to enhance marketing outcomes.

CMBA 5814. Economics. (1.5 cr. [max 3 cr.] ; A-F only; Every Fall)
The goal is to improve corporate decision-making by developing better understanding of the economic environment. Emphasis is strategic, not theoretic (this is not a standard macro course.) We shall consider two primary kinds of economic phenomena (and models): i. long-run economic growth; ii. business cycles. Also and importantly, we will learn about what a central bank does and spend some time on the current world financial/macroeconomic mess. How could we do otherwise? Students will learn appropriate tools to analyze these phenomena and apply them to their own decision-making environs, both organizational and personal.

CMBA 5815. Marketing Management. (3 cr. ; A-F only; Every Spring)
This is a study of management of the marketing function. We strive for an understanding of foundational marketing concepts and of the skills needed for strategy development. We also consider the importance of integrating financial data, operational factors, and human resource issues along with marketing research pertaining to product offering decisions, distribution channels, pricing and communication.

CMBA 5816. Strategic Management. (3 cr. ; A-F only; Every Spring)
Course provides an integrated, top management viewpoint for business students. It frames the functional courses in the CEMBA curriculum by providing a 'total' business perspective. The course objective is to develop analytic skills and deep understandings in identifying key issues and formulating and implementing appropriate strategies for creating and sustaining a competitive edge in complex business situations. The course will familiarize students with the most current theories, concepts, and techniques of strategic management using a combination of readings, case discussions, presentations and videos. Student progress will be assessed through class participation, an in-class exam, and a group project comparing the strategies of two competing firms.

CMBA 5817. Financial Management. (; 3 cr. ; A-F only; Every Spring)
Students apply concepts of risk, return, and valuation to decisions that a corporate financial officer or person in small business must make about sources/uses of funds during changing financial markets.

CMBA 5818. Supply Chain and Operations. (3 cr. ; A-F only; Every Spring)
A majority of the people and physical assets of a company are involved in operations. The operations function represents the physical core of every company: The systems and processes that generate the goods and services to be sold to customers. World-class operations can lead to a significant and enduring competitive advantage. Failing operations mean low productivity and bad press at best, and company failure at worst. Understanding operations means understanding processes and supply chains. This course is designed to develop a basic framework to comprehend key design decisions and trade-offs within that context. As such, the course encompasses both manufacturing and service operations. Course also highlights why successful supply chain and operations management has to be strategic in nature, and how the operations function relates to other business functions such as marketing or product development.

CMBA 5820. Negotiation Strategies: Creative Solutions for Difficult Problems. (3 cr. ; A-F only; Every Fall)
Negotiation is the art and science of securing agreements between two or more parties who are interdependent and who are seeking to maximize their own outcomes. As such, this course deals with understanding the behavior of individuals, groups, and organizations in the context of competitive situations. We focus on understanding both the theory and process of negotiation in a variety of settings. This course is designed to be relevant to the broad spectrum of negotiation problems that are faced by managers and professionals. It is designed to complement the technical and diagnostic skills learned in other courses in the program. A basic premise of the course is that while a manager needs analytical skills to discover optimal solutions to problems, a broad array of negotiation skills are needed to get these solutions accepted and implemented. This course will allow participants the opportunity to develop these skills experientially and to understand negotiation in useful analytic frameworks. As such, considerable emphasis will be placed on simulations, role-playing, and cases.

CMBA 5821. Managerial Accounting. (3 cr. ; A-F only; Every Fall)
This course presents the topic of management accounting in depth. The purpose of management accounting is to provide information to management for costing products and decision making as well as for planning, controlling, and evaluating business activities. The student who successfully completes this class will be able to identify a managerial issue and create a solution to the problem.

CMBA 5822. Applied Leadership. (1.5 cr. ; A-F only; Every Fall)
The course objectives are to build stronger self-awareness and insight concerning personal leadership and core values, increase capabilities to understand potential personal derailment patterns and create effective strategies to address these challenges, better nurture and leverage strengths for executive leadership performance, effectively coach and motivate others as a key executive leadership attribute, and develop deeper lifelong executive leadership practices and habits for high performance in demanding circumstances.
prereq: CMBA student

CMBA 5823. Competing Globally. (3 cr. ; A-F only; Every Fall)
In this course we explore the many faces of global competition. We challenge the assumptions that global strategy is a precursor to success by exploring a set of complex forces that drive firms to internationalize. The course places special emphasis on emerging markets, given that they are home to most of the global growth and population, as well as institutional voids. We focus on factors that determine strategic choices firms make as they build their international presence, by exploring how firms: build international presence by selecting countries, and modes of entry; benefit from national competitive advantage in developed and emerging markets; diagnose and address cultural challenges of working across borders, organize to share knowledge across borders; build and sustain their multifaceted global legitimacy; collaborate across borders; prepare their managers to address cultural, personal, and career challenges in expatriate roles and on global teams.

CMBA 5824. Corporate Responsibility & Ethics. (1.5 cr. ; A-F only; Every Fall)
In this course we will explore both ethical challenges in the contemporary business environment as well as the strategic opportunities offered by corporate social responsibility. Students will conduct stakeholder analysis, apply ethical principles, consider alternatives, and recommend and defend an "ethical" final decision. We will seek to answer the question "can business do good, and also do well?"

CMBA 5825. Strategic Marketing. (3 cr. ; A-F only; Every Spring)
Marketing begins and ends with the buyer. Hence, marketing strategy is the study of delivering value to buyers in a manner that exceeds the value proposition of marketplace rivals, using both internal and external

resources. From determining consumer needs to assuring customer satisfaction, a clear understanding of buyer behavior is critical to the successful formulation and implementation of marketing strategy. To that end, this course is designed to provide prospective general managers the intellectual tools necessary to design actionable marketing strategies. There will be a strong emphasis on managerial action and multiple theoretical perspectives will be discussed.

CMBA 5826. Corporate Strategy. (1.5 cr. ; A-F only; Every Spring)
This course focuses on the strategic management of firm scope (i.e., choosing what your firm does and does not do). It provides understanding about strategic choices such as outsourcing or ?insourcing? activates and entering or leaving lines of business. We develop and employ a set of tools that provide a disciplined way to investigate these issues. Why companies exist, notion of added value, how companies add value through resources and incentives to develop resources, why a company would participate in more than one line of business, and what considerations should guide corporate renewal.

CMBA 5827. Advanced Financial Management. (3 cr. ; A-F only; Every Spring)
Financial Management introduced the theory of corporate finance and the application of value creation principles to, mainly, business operating decisions at the level of the project or initiative. This course moves on to consider decisions at the firm level. Among the questions addressed in this course are how best to measure overall firm performance, how to best finance the company, including debt versus equity questions, when to include options in the firm?s financing arrangements, when to lease resources rather than buy them, when to pay a dividend and/or repurchase shares and whether mergers and acquisitions generate value added.

CMBA 5828. International Residency - Study Abroad. (1.5 cr. ; A-F only; Every Spring)
Students travel to an international location for 9-10 days. This provides the opportunity to engage in discussions with international colleagues, apply program concepts, and develop a broader sensitivity to cultural and social differences. Pre-trip preparation, assignments, on-site discussions and activities, and post-trip assignments are required.

CMBA 5829. International Residency ? Global Team Project. (1.5 cr. ; A-F only; Every Spring)
The Global Team Project (GTP) provides Carlson School Executive MBA students with the unique opportunity to work in a collaborative team environment across cultures, industries, and markets alongside students from our Vienna Executive MBA program and our China Executive MBA program. As participants in the GTP, students develop advanced skills in teamwork, cross-cultural collaboration, and business plan development within a dynamic environment shaped by academic rigor and the demands of real-world international business.

CMBA 5830. Advanced Management Topic Elective: Power & Influence. (; 1.5 cr. ; A-F only; Every Spring)
Elective courses are offered across cohorts on preference basis. Course topics may change from year to year and can cover a variety of areas including entrepreneurship/innovation, strategy, IT, and others.

CMBA 5831. Advanced Management Topic Elective: Entrepreneurship & Innovation. (; 1.5 cr. ; A-F only; Every Spring)
Elective courses are offered across cohorts on preference basis. Course topics may change from year to year and can cover a variety of areas from entrepreneurship/innovation, strategy, IT, and others.

CMBA 5832. Advanced Management Topic Elective: Business Analytics for Competitive Advantage. (; 1.5 cr. ; A-F only; Every Spring)
Elective courses are offered across cohorts on preference basis. Course topics may change from year to year and can cover a variety of areas from entrepreneurship/innovation, strategy, IT, and others.

CMBA 5833. Advanced Management Topics Elective - Healthcare Innovations. (; 1.5 cr. ; A-F only; Every Spring)
Elective courses are offered across cohorts on preference basis. Course topics may change from year to year and can cover a variety of areas from entrepreneurship/innovation, strategy, IT, and others.

CMBA 5838. Financial Accounting. (1.5 cr. ; A-F only; Every Fall)
Financial Accounting

CMBA 5839. Management of Teams. (1.5 cr. ; A-F only; Every Fall)
Management of Teams

CMBA 5842. Marketing Management. (3 cr. ; A-F only; Every Fall)
Marketing Management

CMBA 5843. Data Driven Decision Making. (3 cr. ; A-F only; Every Fall)
Data Driven Decision Making

CMBA 5844. Organizational Behavior. (3 cr. ; A-F only; Every Fall)
Course's main purpose is to prepare you to successfully engage and lead people to achieve organizational goals. Effective managers must not only develop winning strategies, but they must also implement them. Doing so requires a thorough understanding of organizational behavior. Broadly speaking, organizational behavior is the systematic study of how people behave in organizational settings. This course is designed to develop your understanding of the complexity of orgs and how they affect behavior, build your self-knowledge and people-leadership skills, and help you learn and apply appropriate tactics and tools to improve organizational functioning and facilitate personal career success. Course topics include: organizational (e.g. structure and culture), interpersonal (e.g. power and influence, social networks, conflict), and individual (e.g. decision making, motivation) aspects of organizational behavior.

CMBA 5845. Executive Perspectives. (0-1.5 cr. ; S-N only; Every Fall & Spring)
Top Management Perspectives

CMBA 5846. Executive Leadership Insights. (0.5-3 cr. ; A-F only; Every Fall & Spring)
Executive Leadership Insights

Carlson School of Management (CSOM)

CSOM 8101. Methods and Topics in Applied Economics. (; 2-4 cr. ; Student Option; Every Spring)
Intermediate methods/topics in business research.

Center for Allied Health Prog (CAHP)

CAHP 5110. Foundations of Interprofessional Communication and Collaboration. (; 1 cr. ; S-N only; Every Fall)
Interprofessional approach to health care. Directed group activities in five two-hour sessions: personal/professional image; teamwork, self/peer assessment; health professions; professional identity/integrity; relationships between professions and those they serve. Includes online modules. prereq: Enrolled CLSP or OT student

Chemical Engineering (CHEN)

CHEN 5531. Electrochemical Engineering and Renewable Energy. (; 3 cr. ; A-F only; Every Fall)
Fundamentals of electrochemical engineering. Electrochemical mass transfer electrokinetics, thermodynamics of electrochemical cells, modern sensors. Formation of thin films and microstructured materials. Computer-based problems. prereq: [MATS 3011 or instr consent], [upper div CSE or grad student]

CHEN 5595. Special Topics. (; 1-4 cr. [max 12 cr.] ; A-F only; Every Fall, Spring & Summer)
New or experimental special topics. prereq: ChEn major upper div

CHEN 5751. Biochemical Engineering. (; 3 cr. ; A-F or Audit; Every Fall)
Chemical engineering principles applied to analysis/design of complex cellular/enzyme processes. Quantitative framework for design of cells for production of proteins, synthesis of antibodies with mammalian cells, or degradation of toxic compounds in contaminated soil. prereq: [3005 or 4005], [concurrent registration is required (or allowed) in 3006 or concurrent registration is required (or allowed) in 4006], [concurrent registration is required (or allowed) in 3102 or concurrent registration is required (or allowed) in 4102]

CHEN 5753. Advanced Biomedical Transport Processes. (; 3 cr. ; A-F or Audit; Every Spring)
Fluid, mass, heat transport in biological systems. Mass transfer across membranes, fluid flow in capillaries, interstitium, veins, and

arteries Heat transfer in single cells/tissues. Whole organ, body heat transfer issues. Blood flow, oxygenation. Heat/mass transfer in respiratory systems. Biotransport issues in artificial organs, membrane oxygenators, drug delivery applications. prereq: 3005 or 4005 or equiv

CHEN 5771. Colloids and Dispersions. (; 3 cr. ; A-F or Audit; Every Fall)
Preparation, stability, coagulation kinetics or colloidal solutions. DLVO theory, electrokinetic phenomena. Properties of micelles, other microstructures. prereq: Physical chemistry

CHEN 5801. Optimization in Chemical and Energy Systems Engineering. (3 cr. ; A-F or Audit; Every Fall)
Mathematical optimization is a rigorous and systematic method for modeling and solving decision-making problems. It has become an indispensable tool in various disciplines, including economics, science, and engineering. In this course, students are introduced to the theory of mathematical optimization, systematic approaches to modeling complex optimization problems, and state-of-the-art algorithms for solving them. While the presented methods are general, we focus on applications in chemical engineering, energy systems engineering, and related disciplines. Many of the applications are directly related to the efficient design and operation of sustainable industrial systems.

CHEN 5802. Applied Machine Learning in Chemical Engineering and Materials Science. (3 cr. ; A-F or Audit; Every Spring)
Machine learning is an increasingly prominent tool used by engineers to aid in the design and characterization of materials and molecules. This course will introduce advanced undergraduates and graduate students to fundamental concepts and practical skills that enable the application of machine learning to these problems. These concepts and skills will be contextualized with examples of recent advances at the intersection of chemical engineering, materials science, and machine learning.

CHEN 5803. Chemical and Materials Technology Commercialization. (3 cr. ; A-F only; Every Fall)
Introduction to chemical and materials technology commercialization including a focus on products, markets, customers, and processes for brining innovations to market. prereq: courses: ChEn 3101 or MatS 3001

CHEN 8001. Structure and Symmetry of Materials. (3 cr. ; Student Option; Every Fall)
Comprehensive description of structure of materials, including metals, semiconductors, organic crystals, polymers, and liquid crystals. Atomic and molecular ordering, influence of intermolecular forces on symmetry and structure. Principles of scattering and use of X-ray, neutron, and electron diffraction.

CHEN 8101. Fluid Mechanics. (; 3 cr. ; A-F or Audit; Every Spring)
Equations of change of mass, momentum, angular momentum. Kinematics of deformation, convective transport. Applications to fluid statics/dynamics of Newtonian fluids. Examples of exact solutions of Navier-Stokes equations, useful simplifications. prereq: Chemical engineering grad student or instr consent

CHEN 8102. Introduction to Rheology. (; 2 cr. ; A-F or Audit; Every Fall)
Deformation and flow of non-Newtonian and viscoelastic fluids, plastic materials, and perfectly elastic solids. Phenomenological and molecular interpretation of rheology of elastomers, polymer melts, and polymer solutions, application of rheology to polymer processing. prereq: 8101. Undergraduate physics. Undergraduate courses in fluid mechanics and mechanics of materials will be helpful.

CHEN 8103. Fluid Mechanics III: Porous Media. (; 3 cr. ; A-F or Audit; Periodic Fall)
Geometry/topology of porous materials. Fundamentals of flow, transport, and deformation. One-/two-phase Darcy flows, convective dispersion in microporous materials. Relations of macroscopic properties/behavior to underlying microscopic structures/mechanisms. Nanoporous materials. prereq: chemical engineering grad student or instr consent

CHEN 8104. Coating Process Fundamentals. (; 2 cr. ; A-F or Audit; Every Spring & Summer)
Process functions. Viscous flow and rheology of polymer solutions and particulate suspensions. Capillarity, wetting. Electrostatic effects. Phase change, colloidal transformations, mass/heat transfer in drying. Kinetics in curing. Stress and property development in solidifying polymeric coatings. Illustrations drawn from theoretical modeling, flow visualization, and stopped-process microscopy. prereq: Chemical engineering grad major or instr consent

CHEN 8112. Rheology Laboratory Project. (; 1 cr. ; A-F or Audit; Every Spring)
How to make rheological lab measurements. Students select/characterize rheologically interesting material with help of instructor. Oral/written report. Half-semester course. prereq: 8101, [4702 or concurrent registration is required (or allowed) in 4702 or 8102 or concurrent registration is required (or allowed) in 8102]

CHEN 8115. Electron Microscopy of Soft Matter. (; 2 cr. ; A-F or Audit; Periodic Fall)
Operation principles of transmission electron microscope (TEM) and scanning electron microscope (SEM). How these instruments are applied in study of soft materials (e.g., liquid, semi-liquid material systems). Unique specimen preparation techniques, low image contrast, electron-beam radiation-damage, and limited signal-to-noise ratio. TEM/SEM digital imaging. prereq: Chemical engineering or materials science/engineering grad major or instr consent

CHEN 8201. Applied Math. (; 3 cr. ; A-F or Audit; Every Fall)
Integrated approach to solving linear mathematical problems. Linear algebraic equations. Linear ordinary and partial differential equations using theoretical/numerical analysis based on linear operator theory. prereq: Chemical engineering grad student or instr consent

CHEN 8202. Applied Mathematics II: Nonlinear Analysis. (; 2 cr. ; A-F or Audit; Every Spring)
Nonlinear mathematical problems. Nonlinear ordinary and partial differential equations using theoretical/numerical analysis. prereq: [Grad-level course in linear analysis, chemical engineering grad major] or instr consent

CHEN 8211. Physical Chemistry of Polymers. (; 4 cr. ; Student Option; Every Spring)
Chain conformations. Thermodynamics of polymer solutions, blends, copolymers. Light, neutron, X-ray scattering. Dilute solutions, polymer characterization. Melts, viscoelasticity. Rubber elasticity, networks, gels. Glass transitions. Crystallization. prereq: Undergrad physical chem or instr consent

CHEN 8221. Synthetic Polymer Chemistry. (; 4 cr. ; A-F or Audit; Every Fall)
Condensation, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties. prereq: [Undergrad organic chemistry course, undergrad physical chemistry course] or instr consent

CHEN 8301. Physical Rate Processes I: Transport. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Survey of mass transfer, dilute, and concentrated diffusion. Brownian motion. Diffusion coefficients in polymers, of electrolytes, and at critical points. Multicomponent diffusion. Mass transfer correlations/predictions. Mass transfer coupled with chemical reaction.

CHEN 8302. Physical Rate Processes II: Mass Transfer. (; 3 cr. ; A-F or Audit; Periodic Fall)
Applications of mass transfer. Membranes, including gas separation and reverse osmosis. Controlled drug release. Dispersion, including examples of pollution modeling. Adsorption/chromatography. Coupled heat/mass transfer, including cooling towers. Double-diffusive effects. prereq: Chemical engineering grad student or instr consent

CHEN 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

CHEN 8401. Physical and Chemical Thermodynamics. (; 3 cr. ; A-F or Audit; Every Fall)
Principles of thermodynamics with emphasis on solving problems encountered in chemical engineering and materials science. An organized exposition of fundamental concepts that will help students understand and analyze the systems they are likely to encounter while conducting original research. This course is for students who seek a much deeper

understanding than a typical undergraduate course provides. prereq: Undergraduate engineering course or chemistry course in thermodynamics, Chemical Engineering graduate student, or instructor consent.

CHEN 8402. Statistical Thermodynamics and Kinetics. (; 3 cr. ; A-F or Audit; Every Spring)
Introduction to statistical mechanical description of equilibrium and non-equilibrium properties of matter. Emphasizes fluids, classical statistical mechanics. prereq: Chemical engineering grad student or instr consent

CHEN 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

CHEN 8501. Chemical Rate Processes: Analysis of Chemical Reactors. (; 3 cr. ; A-F or Audit; Every Spring)
Design of reactors for heat management and with catalytic processes. Steady state and transient behavior. Polymerization, combustion, solids processing, and environmental modeling. Design of multiphase reactors. prereq: [Course in chemical reactor engineering, chemical engineering grad student] or instr consent

CHEN 8502. Process Control. (; 3 cr. ; A-F or Audit; Periodic Fall)
For linear systems: stability, controllability, observability, pole-placement via state feedback state observers, output feedback, and robustness of control systems. For nonlinear systems: solution properties, stability analysis, singular perturbations, feedback linearization via state feedback, and direct synthesis via output feedback. prereq: Chemical Engineering grad major or instr consent

CHEN 8503. Chemical Rate Processes: Homogeneous Reactions. (; 3 cr. ; A-F or Audit; Periodic Fall)
Description/characterization of chemically reacting systems. Theories of elementary reactions. Experimental methods for investigating elementary reactions. Applications of chemical kinetics to complex reactions, such as combustion, flames, and the atmosphere. prereq: Chemical engineering grad student or instr consent

CHEN 8555. Chemical Engineering Teaching Practicum. (1-6 cr. [max 24 cr.] ; S-N only; Every Fall, Spring & Summer)
Experience in instruction including grading of student work, holding of office hours, and in special cases, lecturing. Students will work with and receive feedback from a faculty member in CEMS. prereq: Grad ChEn major and DGS permission

CHEN 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CHEN 8752. Quantitative Biology for Engineers. (; 3 cr. ; A-F or Audit; Periodic Fall)
Structural basis of biological systems. Communication between cells and environment. Gene expression. Proteins, their functional classes. Metabolic pathways, their reactions. From gene/genome to physiology. Biological fundamentals of biotechnology. Genomics/proteomics as technologies. Biotechnology and society: ethics, law, public policy. Biotechnology-based commercial enterprises. Readings, two reports, final presentation. prereq: Chemical engineering grad student or instr consent

CHEN 8754. Systems Analysis of Biological Processes. (; 3 cr. ; Student Option; Every Spring)
Relating biological processes at molecular level to physiological level of cells/organisms/ populations. Methodology for analyzing data. Quantification of molecular interplays. prereq: Grad student in [life sciences or chemical/ physical sciences or engineering]; ChEn students must take A/F

CHEN 8771. Interfaces and Colloids. (3 cr. ; A-F or Audit; Every Fall)
Interfacial tension/thermodynamics, capillarity, contact anglek wettability, adhesion, preparation/stability of colloids, DLVO theory, electrokinetic phenomena, micelles, rheology of dispersions. prereq: Physical Chemistry

CHEN 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

CHEN 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

CHEN 8900. Seminar. (; 1 cr. ; S-N or Audit; Every Fall)
Presentation and discussion of papers concerning newer developments in chemical engineering, materials science, and related fields.

CHEN 8901. Seminar. (; 1 cr. [max 9 cr.] ; S-N only; Every Spring)
Presentation and discussion of papers concerning the newer developments in chemical engineering.

CHEN 8902. Seminar: Finite Element Methods of Computer-aided Analysis. (; 1 cr. ; A-F or Audit; Every Spring)
Fundamentals of finite element method as applied mathematics. How to construct finite element codes and put them into operation. prereq: Chemical engineering grad student or instr consent

CHEN 8993. Directed Study. (; 1-12 cr. ; Student Option; Every Fall, Spring & Summer)

CHEN 8994. Directed Research. (; 1-12 cr. ; Student Option; Every Fall, Spring & Summer)

CHEN 8995. Special Topics. (; 1-4 cr. ; Student Option; Every Fall, Spring & Summer)
New or experimental courses offered by department or visiting faculty

Chemical Physics (CHPH)

CHPH 8081. M.S. Plan B Project I. (; 4 cr. ; A-F only; Every Fall, Spring & Summer)
Topic arranged by student adviser. Written report required. prereq: Grad chem phys major

CHPH 8082. M.S. Plan B Project II. (; 4 cr. ; A-F only; Every Fall, Spring & Summer)
Topic arranged by student adviser. Written report required. prereq: Grad chem phys major

CHPH 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

CHPH 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

CHPH 8601. Seminar: Modern Problems in Chemical Physics. (; 1 cr. [max 2 cr.] ; S-N only; Every Fall & Spring)
Topics in chemical physics. prereq: Grad chem physics major or instr consent

CHPH 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CHPH 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

CHPH 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Chemistry (CHEM)

CHEM 5210. Materials Characterization. (; 4 cr. ; Student Option; Every Spring)
Modern tools/techniques for both bulk- and thin-film characterization. Topics may include ion-solid interactions, Rutherford back scattering, secondary ion mass spectrometry, solid-state NMR, x-ray photoelectron spectroscopy, small-angle x-ray/neutron scattering, transmission/scanning electron/ probe microscopy, near-field scanning optical microscopy, porosimetry, adsorption techniques, and ellipsometry. prereq: grad student or instr consent

CHEM 5245. Introduction to Drug Design. (; 3 cr. ; A-F or Audit; Periodic Fall)
Concepts that govern design/discovery of drugs. Physical, bioorganic, medicinal chemical principles applied to explain rational design and mechanism of action drugs. prereq: 2302 or equiv

CHEM 5755. X-Ray Crystallography. (; 4 cr. ; A-F or Audit; Every Spring)
Essentials of crystallography as applied to modern, single crystal X-ray diffraction methods. Practical training in use of instrumentation in X-ray crystallography facility in Department of Chemistry. Date collection, correction/refinement, structure solutions, generation of publication materials, use of Cambridge Crystallographic Structure Database. prereq: Chem grad student or instr consent

CHEM 8011. Mechanisms of Chemical Reactions. (; 4 cr. ; Student Option; Every Fall)
Reaction mechanisms and methods of study. Mechanistic concepts in chemistry. Gas phase reactions to mechanisms, "electron pushing" mechanisms in organic reactions, mechanism of enzymatic reactions. Kinetic schemes and other strategies to investigate mechanisms. prereq: 2302 or equiv

CHEM 8021. Computational Chemistry. (; 4 cr. ; Student Option; Every Spring)
Modern theoretical methods used in study of molecular structure, bonding, reactivity. Concepts/practical applications. Determination of spectra, relationship to experimental techniques. Molecular mechanics. Critical assessment of reliability of methods. prereq: 4502 or equiv

CHEM 8066. Professional Conduct of Chemical Research. (; 1 cr. ; S-N or Audit; Every Fall & Spring)
Builds sensitivity to ethical issues in chemical research. Readings/case studies, small-group/large-group discussion, summarizing comments from instructors/guests/panels having special expertise. Weekly seminar. prereq: Chem grad student

CHEM 8081. M.S. Plan B Project I. (; 1-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Satisfies project requirement for Plan B master's degree. May appear on M.S. degree program, but does not count toward 14-credit minimum in major field. Topic arranged by student adviser; written report required. 8081 required; 8082 optional. prereq: grad chem major

CHEM 8082. M.S. Plan B Project II. (; 1-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Satisfies project requirement for Plan B master's degree. May appear on M.S. degree program, but does not count toward 14-credit minimum in major field. Topic arranged by student adviser; written report required. 8081 required; 8082 optional. prereq: grad chem major

CHEM 8151. Analytical Separations and Chemical Equilibria. (; 4 cr. ; Student Option; Every Fall & Spring)
Advanced treatment of principles of analytical chemistry, chemical equilibria, and dynamics. Chromotographic and other modern analytical scale separation techniques. Emphasizes column dynamics and retention mechanisms. prereq: instr consent

CHEM 8152. Analytical Spectroscopy. (; 4 cr. ; Student Option; Every Fall)
Survey of analytical spectroscopic methods. Design/application of spectroscopic instruments, including signal generation, acquisition, and interpretation. May include nuclear magnetic resonance, electron paramagnetic resonance, infrared and ultraviolet/visible spectroscopy, and mass spectrometry. prereq: grad chem major or instr consent

CHEM 8153. Extracting Signal From Noise. (; 5 cr. ; A-F or Audit; Every Spring)
Use of analog/digital electronics and computational methods in experiments. Passive circuits, operational amplifiers, filters, oscillators and Laplace transform techniques in analysis, domain conversion for data acquisition/control, statistics, experimental design. Introduction to chemometrics, Fourier analysis, convolution/deconvolution, curve fitting. prereq: [4101 or equiv], differential equations course

CHEM 8155. Advanced Electroanalytical Chemistry. (; 4 cr. ; Student Option; Every Spring)
Thermodynamics/kinetics of electron/ion transfer, electric double layer, mass transfer by diffusion/migration. Ion-selective potentiometry, chronoamperometry, chronocoulometry, cyclic voltammetry, pulse voltammetry, ion-transfer voltammetry, impedance spectroscopy, bioelectroanalysis, rotating disk electrodes, microelectrodes, chemically modified electrodes. Scanning electrochemical microscopy. EC-STM, quartz crystal microbalance.

CHEM 8157. Bioanalytical Chemistry. (; 4 cr. ; A-F or Audit; Periodic Spring)
Theory and practical aspects of analytical methods used in determination/characterization of biologically important materials. Enzymatic/kinetic methods in study of proteins, carbohydrates, lipids, and nucleic acids.

CHEM 8201. Materials Chemistry. (; 4 cr. ; A-F or Audit; Every Fall)
Crystal systems/unit cells, phase diagrams, defects/interfaces, optical/ dielectric properties, electrical/thermal conductivity, X-ray diffraction, thin film analysis, electronic structure, polarons/phonons, solid state chemistry, liquid/molecular crystals, polymers, magnetic/optical materials, porous materials, ceramics, piezoelectric materials, biomedical materials, catalysts. prereq: [4701, 3502] or instr consent

CHEM 8211. Physical Polymer Chemistry. (; 4 cr. ; Student Option; Every Spring)
Chain conformations. Thermodynamics of polymer solutions, blends, and copolymers. Light, neutron, and X-ray scattering. Dynamics in dilute solution and polymer characterization and in melts and viscoelasticity. Rubber elasticity, networks, gels. Glass transition. crystallization. prereq: Undergrad physical chem course

CHEM 8221. Synthetic Polymer Chemistry. (; 4 cr. ; Student Option; Every Fall)
Condensation, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties. prereq: [Undergrad organic chemistry course, undergrad physical chemistry course] or instr consent

CHEM 8280. Special Topics in Materials Chemistry. (; 2-4 cr. ; Student Option; Periodic Fall & Spring)
Topics (and availability) vary by year depending on instructor and development of the field. prereq: Grad chem major or instr consent

CHEM 8321. Organic Synthesis. (; 4 cr. ; Student Option; Every Fall)
Core course; fundamental concepts, reactions, reagents, structural and stereochemical issues, and mechanistic skills necessary for understanding organic chemistry. prereq: 2302 or equiv

CHEM 8322. Advanced Organic Chemistry. (; 4 cr. ; Student Option; Every Spring)
Modern studies. Topics, which vary by year, include natural products, heterocycles, asymmetric synthesis, organometallic chemistry, and polymer chemistry. prereq: 2302 or equiv

CHEM 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

CHEM 8352. Physical Organic Chemistry. (; 4 cr. ; Student Option; Every Spring)
Fundamental concepts, mechanistic tools for analyzing organic reaction mechanisms. Solvation, reactive intermediates, gas phase chemistry, photochemistry, strained-ring chemistry. prereq: 4011 or 8011

CHEM 8361. Interpretation of Organic Spectra. (; 4 cr. ; Student Option; Every Fall)
Practical application of nuclear magnetic resonance, mass, ultraviolet, and infrared spectral analyses to solution of organic structural problems. prereq: 2302 or equiv

CHEM 8380. Special Topics in Organic Chemistry. (; 1-4 cr. ; Student Option; Periodic Spring)
Topics (and availability) vary by year depending on instructor and development of the field. prereq: grad chem major or instr consent

CHEM 8411. Introduction to Chemical Biology. (; 4 cr. ; Student Option; Every Fall)
Chemistry of amino acids, peptides, proteins, lipids, carbohydrates, and nucleic acids. Structure, nomenclature, synthesis, and reactivity. Overview of techniques used to characterize these biomolecules. prereq: 2302 or equiv

CHEM 8412. Chemical Biology of Enzymes. (; 4 cr. ; Student Option; Periodic Spring)
Enzyme classification with representative examples from current literature. Strategies used to decipher enzyme mechanisms. Chemical approaches for control of enzyme catalysis. prereq: 2302 or equiv

CHEM 8413. Nucleic Acids. (; 4 cr. ; Student Option; Periodic Fall)
Chemistry and biology of nucleic acids: structure, thermodynamics, reactivity, DNA repair, chemical oligonucleotide synthesis, antisense approaches, ribozymes, overview of techniques used in nucleic acid research, interactions with small molecules and proteins. prereq: 2302 or equiv

CHEM 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

CHEM 8480. Special Topics in Biological Chemistry. (; 2-4 cr. ; Student Option; Periodic Spring)
Topics (and availability) vary by year, depending on instructor and development of the field. prereq: Grad chem major or instr consent

CHEM 8541. Dynamics. (; 4 cr. ; Student Option; Periodic Fall)
Mathematical methods for physical chemistry. Classical mechanics/dynamics, normal modes of vibration. Special topics such as rotational motion, Langevin equation, Brownian motion, time correlation functions, collision theory, cross sections, energy transfer, molecular forces, potential energy surfaces, classical electrostatics, Shannon entropy. prereq: Undergrad physical chem course

CHEM 8551. Quantum Mechanics I. (; 4 cr. ; Student Option; Every Fall)
Review of classical mechanics. Postulates of quantum mechanics with applications to determination of single particle bound state energies and scattering cross-sections in central field potentials. Density operator formalism with applications to description of two level systems, two particle systems, entanglement, and Bell inequality. prereq: undergrad physical chem course

CHEM 8552. Quantum Mechanics II. (; 2 cr. ; Student Option; Every Spring)
Second Quantization;Density matrices; Molecular Electronic Structure Theory; Hartree-Fock Theory; Electron Correlation; Configuration Interaction; Perturbation Theory; Energy Derivatives; Coupled-Cluster;Density Functional Theory; Relativistic Quantum Chemistry; prereq: 8551

CHEM 8561. Thermodynamics, Statistical Mechanics, and Reaction Dynamics I. (; 4 cr. ; Student Option; Every Fall)
Two-part sequence. Thermodynamics, equilibrium statistical mechanics, ensemble theory, partition functions. Applications, including ideal gases/crystals. Theories of simple liquids, Monte Carlo, and molecular dynamics simulations. Reaction dynamics from microscopic viewpoint. prereq: undergrad physical chem course

CHEM 8562. Thermodynamics, Statistical Mechanics, and Reaction Dynamics II. (; 4 cr. ; Student Option; Every Spring)
Two-part sequence. Thermodynamics, equilibrium statistical mechanics, ensemble theory, partition functions. Applications, including ideal gases/crystals. Theories of simple liquids, Monte Carlo, and molecular dynamics simulations. Reaction dynamics from microscopic viewpoint. prereq: 8561

CHEM 8563. Molecular Simulations. (2 cr. ; Student Option; Every Spring)
Principles of Monte Carlo/molecular dynamics simulations. Algorithms, simulation set-up/analysis, applications to chemical systems. Hands-on computational project that requires writing of computer code. prereq: grad chem major or instr consent

CHEM 8564. Laser Spectroscopy. (2 cr. ; Student Option; Every Spring)
Fundamentals of light-molecule interactions/manifestation in spectroscopic observables. Time correlation functions, spectroscopic lineshapes, linear/nonlinear material responses, material susceptibilities. Role of lasers in measuring quantities. prereq: grad chem major or instr consent

CHEM 8565. Chemical Reaction Dynamics. (; 2 cr. ; Student Option; Periodic Spring)
Fundamentals of chemical reaction dynamics including potential energy surfaces, collision theory, statistical mechanical background and transition state theory, variational transition state theory, activation energy, tunneling, unimolecular reactions, energy transfer, reactions in solution, solvation free energy, potential of mean force, quasithermodynamic treatment, reactions in solution, diffusion control, Kramers? theory, and photochemistry

CHEM 8566. Spin Dynamics. (2 cr. ; Student Option; Periodic Spring)
Chemistry 8566 is a 1/2-semester course on spin dynamics. The course prerequisites are described in the CSE Bulletin. Briefly, they are: one year of college-level chemistry, one year of college-level physics, and one year of college-level calculus. All of the prerequisites should have been completed before enrollment in this course. Students who do not satisfy the course prerequisites, please contact the instructor.

CHEM 8567. Biophysical Chemistry. (2 cr. ; Student Option; Periodic Spring)
CHEM 8567 is a graduate level course which emphasizes how macromolecular and membrane structure and dynamics impact biological function. Topics to be covered include high-resolution structure determination, biomolecular spectroscopy, and microscopy as applied to folding, solvation, and reaction dynamics. The objectives for this course are to become well-versed in the language of biophysics, at a level sufficient to understand and critically evaluate the literature and to understand fundamental concepts related to structure determination and structure-function relationships of biomolecules, and to be able to apply those concepts to a variety of biological systems.

CHEM 8568. Chemical Bonding at Surfaces. (2 cr. ; Student Option; Periodic Spring)
A brief overview of surface science, chemical reactions at surfaces, and interactions of surfaces with light. Students will also be exposed to physical principles of chemical reactions such as transition-state theory and kinetics in within the framework of surface science.

CHEM 8569. Electronic Structure. (2 cr. ; Student Option; Periodic Spring)
This course covers electronic structure theory applied to atoms and molecules and includes a hands-on computational project that requires writing of computer code. It will cover Hartree-Fock theory, Density Functional Theory, electron correlation theories, relativistic effects, and other related topics.

CHEM 8580. Special Topics in Physical Chemistry. (; 2-4 cr. [max 8 cr.] ; Student Option; Periodic Spring)
Topics (and availability) vary depending on instructor and development of the field. prereq: grad chem major or instr consent

CHEM 8601. Seminar: Modern Problems in Chemistry. (; 1 cr. ; S-N or Audit; Every Fall & Spring)
Weekly seminar series on modern chemical topics. prereq: grad chem major or instr consent

CHEM 8602. Seminar Presentation: Modern Problems in Chemistry. (; 1 cr. ; A-F or Audit; Every Fall & Spring)
Weekly seminar series on modern chemical topics presented by students. prereq: grad chem major or instr consent

CHEM 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CHEM 8715. Physical Inorganic Chemistry. (; 4 cr. ; Student Option; Every Fall)
Physical methods and concepts applied to inorganic and organometallic systems, including many of the following methods: NMR, IR, UV-VIS, ESR, M[?]ssbauer and mass spectroscopy, magnetic measurements, X-ray diffraction. prereq: 4701 or equiv, grad chem major or instr consent

CHEM 8725. Organometallic Chemistry. (; 4 cr. ; Student Option; Periodic Fall)
Synthesis, reactions, structures, and other important properties of main group and transition metal organometallic compounds; treatment in terms of modern electronic and structural theory; emphasis on their use as stoichiometric and homogeneous catalytic reagents in organic and inorganic systems. prereq: 4701 or equiv, grad chem major or instr consent

CHEM 8735. Bioinorganic Chemistry. (; 4 cr. ; Student Option; Periodic Fall)
Survey of role of metal ions in biology; emphasizes structure, function, and spectroscopy of metalloproteins and their synthetic analogs. prereq: 4701 or equiv, grad chem major or instr consent

CHEM 8745. Advanced Inorganic Chemistry. (; 4 cr. ; Student Option; Periodic Spring)
Survey of topics in main group and transition metal chemistry; emphasizes synthesis, structure, physical properties, and chemical reactivity. prereq: 8715, grad chem major or instr consent

CHEM 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

CHEM 8780. Special Topics in Inorganic Chemistry. (; 2-4 cr. ; Student Option; Periodic Fall)
Topics (and availability) vary by year depending on instructor and development of the field. prereq: Grad chem major or instr consent

CHEM 8880. Special Topics in Chemistry. (; 2-4 cr. ; Student Option; Every Spring)
Topics (and availability) vary depending on instructor and development of the field. prereq: Grad chem major or instr consent

CHEM 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Chicano Studies (CHIC)

CHIC 5216W. Chicana and Chicano Art. (AH,WI,CIV; 3 cr. ; Student Option; Periodic Fall & Spring)
A Chicana/o has been described as a Mexican-American with a political sense of identity that emerges from a desire for social justice. One journalist bluntly stated, "A Chicano is a Mexican-American with a non-Anglo image of himself" (Ruben Salazar, Los Angeles Times, 1970). This identity emerged through the Chicano Movement, a social and political mobilization that began in the 1960s and 1970s. The Chicano Movement witnessed the rise of community-based political organizing to improve the working conditions, education, housing opportunities, health, and civil rights for Mexican-Americans. For its inception, the Chicano Movement attracted artists who created a new aesthetic and framework for producing art. A major focus of Chicana/o artists of the 1960s and 1970s was representation, the right to self-determination, and the role of art in fostering civic and public engagement. This focus continues to inform Chicana/o cultural production. Social intervention, empowerment, and institutional critique remain some of the most important innovations of American art of the last several decades, and Chicana/o artists played a significant role in this trend.

CHIC 5374. Migrant Farmworkers in the United States: Families, Work, and Advocacy. (CIV; 4 cr. ; Student Option; Every Spring)
Socioeconomic/political forces that impact migrant farmworkers. Effects of the laws and policies on everyday life. Theoretical assumptions/strategies of unions and advocacy groups. Role/power of consumer. How consuming cheap food occurs at expense of farmworkers.

CHIC 5412. Comparative Indigenous Feminisms. (GP; 3 cr. ; Student Option; Periodic Fall & Spring)
The course will examine the relationship between Western feminism and indigenous feminism as well as the interconnections between women of color feminism and indigenous feminism. In addition to exploring how indigenous feminists have theorized from 'the flesh' of their embodied experience of colonialism, the course will also consider how indigenous women are articulating decolonization and the embodiment of autonomy through scholarship, cultural revitalization, and activism.

CHIC 5920. Topics in Chicana(o) Studies. (; 3 cr. ; Student Option; Every Fall & Spring)
Multidisciplinary themes in Chicana(o) studies. Issues of current interest.

CHIC 5993. Directed Studies. (; 1-3 cr. [max 16 cr.] ; Student Option; Every Fall, Spring & Summer)
Guided individual reading, research, and study for completion of the requirements for a senior paper or honors thesis. prereq: instr consent

Child & Adolescent Psychiatry (CAPY)

CAPY 5672. Children's Exposure to Domestic Violence: Effects on Child Functioning, Treatment Implications. (; 1 cr. ; Student Option; Periodic Spring)
Efects of exposure to domestic violence in context of development, from infancy to late adolescence. Assessment strategies, best practices in intervention/prevention for vulnerable children and adolescents. Multidisciplinary approaches to working with children exposed to violence (e.g., judicial, medical, law enforcement partnerships).

CAPY 7201. Diagnostic Practicum in Child and Adolescent Psychiatry. (; 1-6 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Multidisciplinary evaluations of children, adolescents, and their families are presented for discussion, dynamic and diagnostic formulations, and disposition planning in a conference setting. Consultation to schools, residential treatment centers, and community agencies may be included. prereq: instr consent

CAPY 7203. Child and Adolescent Psychiatry for Psychology Interns: Fairview-University Medical Center. (; 1-6 cr. ; O-N or Audit; Every Fall, Spring & Summer)
Assessment/therapeutic interventions with children, adolescents, and families in child/adolescent psychiatric settings. prereq: instr consent

CAPY 7521. Outpatient Clinical Child and Adolescent Psychiatry for Primary Care Physicians. (; 2-12 cr. ; O-N or Audit; Every Fall, Spring & Summer)
Supervised diagnostic and therapeutic experiences in an outpatient setting. Consultation to schools, residential treatment centers, and community agencies may be included. prereq: cr ar, reg med

CAPY 7602. Introductory Readings and Research Methods in Child, Adolescent, and Family Psychiatry. (; 2-6 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Child development, diagnostic/therapeutic techniques, psychopathology. Readings/discussions with faculty. prereq: Med student, instr consent

CAPY 7603. Acting Internship Clinical Child Psychiatry. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
In this elective, the student will have an opportunity to experience the clinical practice of child and adolescent psychiatry across settings. Students will be exposed to a broad range of child and adolescent disorders and will assume responsibility for patient management commensurate with their demonstrated ability and initiative.

CAPY 7609. Directed Study, Anesthesia Project: Clinical. (; 2-12 cr. ; H-N or Audit; Every Fall, Spring & Summer)
tbd

Child Psychology (CPSY)

CPSY 5171. Field Experience: Applying Instructional Methods in the Elementary School. (2 cr. ; S-N only; Every Fall)
Field Experience: Applying Instructional Methods in Elementary School is a semester long, full day experience during which teaching candidates gradually increase teaching responsibilities through observation and guided practice in an elementary (grade K-3) classroom, in a co-teaching model. The field experience is taken in connection with the Elementary Methods Teaching Block. Methods course teaching assignments are done during the field experience.

CPSY 5181. Clinical Experience in Elementary School Teaching. (10 cr. [max 20 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Students spend full days in the elementary classroom gradually assuming responsibility for teaching the class. Students prepare a portfolio based on criteria given. One seminar per week.

CPSY 5187. Capstone Project: Improvement of Teaching in Early Childhood Education. (2 cr. ; Student Option No Audit; Every Spring)
This is the capstone for teaching candidates in the M.Ed. in Early Childhood Education.

Students will complete an in-depth reflective teaching portfolio and parallel assignments. The course requires demonstration of the linking of child development theory, knowledge of developmentally appropriate teaching, and reflective practice. prereq: Completion of all requirements for Early Childhood Teacher Licensure, other than CI 5181, which is taken concurrently.

CPSY 5241. Field Experience in Early Childhood Education. (; 3 cr. ; A-F only; Every Fall & Spring)
This course offers a great introduction to the early childhood experience for those interested in working with young children. Helpful first course to explore Early Childhood major (can also count in CPSY BA). Students will review early development and learn how this knowledge is applied in educational and early care settings. Spend time observing early childhood programs through field experiences around the city.

CPSY 5251W. Social and Philosophical Foundations of Early Childhood Education. (WI; 3 cr. ; A-F only; Every Fall)
This course traces the history of early childhood education from Plato to the present, as well as explores various program models and the standards movement, including the Minnesota Early Learning Indicators. The course includes lecture, discussion, videos and vignettes, assignments, and requires students to begin developing a personal teaching philosophy. It is also a writing intensive course which incorporates writing instruction and professional writing expectations throughout all course assignments and activities.

CPSY 5252. Facilitating Social and Emotional Learning in Early Childhood Education. (3 cr. ; A-F only; Every Spring)
This course explores social and emotional development throughout the early childhood (0-8) years. Explore the variety of ways that social interactions and emotional understanding occur in young children with a special emphasis on the role of adults in facilitating these processes. Students will encounter a blend of theory and application as they learn to promote children's mental health, understand special circumstances such as trauma, and respond to challenging behaviors across early learning settings. prereq: CPSY 2301 or equiv or inst consent. For Early Childhood or ECSE students.

CPSY 5253. Facilitating Cognitive and Language Learning in Early Childhood Education. (; 3 cr. ; A-F only; Every Fall)
This is a required methods course for students in the Early Childhood Education major (Licensure and Individualized-Studies Tracks) and the Early Childhood Education Initial Licensure Program. It is intended to prepare students to work with and teach typically and non-typically developing children from birth to age 8. Through lecture, videos, small group projects, hands-on exploration of materials and actual implementation of course principles with children, students will practice and learn to: -carefully observe children to identify their individual learning characteristics. -assess children?s developmental characteristics in the cognitive and language domains. -plan relevant and appropriate curriculum to foster growth and development in the areas of cognition, language, and literacy. -write goals and lesson plans focusing on the curriculum areas of math, science, language and literacy. -document and reflect on children?s learning and development. prereq: CPSY 2301 or equiv or inst consent. For Early Childhood or ECSE students.

CPSY 5254. Facilitating Creative and Motor Learning in Early Childhood Education. (2 cr. ; A-F only; Every Spring)
Learn how young children develop creativity and motor skills from birth - age 8. Engage in hands-on exploration of creative classroom materials and reflection. Complete action-oriented and applied assignments with small groups of children in early childhood education settings. prereq: CPSY 2301 or equiv or inst consent. For Early Childhood and ECSE students.

CPSY 5261. Early Learning in Infancy and Toddlerhood. (; 3 cr. ; Student Option; Periodic Summer)
This course provides an understanding of infant and toddler development. It offers multiple perspectives and current research related to the timetable of infant and toddler development, as well as the role of caregivers, environment, and culture in development. Special attention will be given to policies/ programming that concern infants, toddlers, and their families. Students will be expected to understand the nuanced and varied ways in which development unfolds, including areas of exceptionalities, as well as explore the roles of professionals and community members in supporting infant and toddler development.

CPSY 5281. Student Teaching in Early Childhood Education. (; 6-8 cr. ; S-N or Audit; Every Fall & Spring)
Student teaching plus weekly seminar for students pursuing the Early Childhood teaching licensure. Application of theory/research relating to teaching preschool children. Student teach either 5 mornings per week (7:45-12:30) for 8 credits or 3 afternoons per week (11:45-4:30) for 6 credits. In addition, ALL students participate in weekly (Fridays 12:30-2) seminars. Prereq: Early Childhood or ECSE student plus successful completion of CPSY 5241, 5252, 5253, and 5254.

CPSY 5301. Advanced Developmental Psychology. (; 3 cr. ; A-F or Audit; Every Fall & Summer)
This course is an exploration of life span development through the lenses of social, cultural, cognitive, biological, and learning theories and research. A primary emphasis of the class is on gaining better conceptual understanding of different perspectives on healthy development in order to support informed practical understanding of how to help children, adolescents, and adults progress through the developmental periods and to help them with the challenges they face across their lifespan. This course is intended for graduate students. Undergraduate students should take CPSY 2301 or 3301 and not also 5301.

CPSY 5302. Cognitive and Biological Development. (; 3 cr. ; Student Option; Every Fall)
This course concerns the development and function of thinking skills throughout the lifespan, touching upon several aspects of what makes humans unique. How are humans able to perceive, evaluate, interpret, infer, remember, symbolize, plan, evaluate, problem solve, and hypothesize? What influences the very emergence of such abilities and the nature of their function? What obstacles interfere with the development or the quality of cognitive processes? Brain development and other biological factors, and our relationships and other environmental factors influence our thinking and its development. Throughout this course, we will discuss how knowledge about cognitive development can influence our work with children, adolescents, and adults, in daily life, professional practice, and public policy. Among the many applications of our knowledge of cognitive development, in this course we will focus on select examples relevant to parenting, education, and media exposure, and on topics initiated by students. The course will address individual differences and cultural differences in cognitive development, and how knowledge about variation in ?typical? cognitive development provides an important foundation for understanding atypical cognitive development.

CPSY 5303. Social and Emotional Development. (; 3 cr. ; Student Option; Every Spring)
What are the roots of becoming who we are, as individuals in society? What roles do others ?parents, siblings, peers, teachers, and communities -- play in the socialization of an individual, and how stable are the forces and outcomes of these influences? This course focuses on social development throughout the human lifespan, with an emphasis on how biology, culture, and relationships influence that development. Throughout this course, we will discuss how knowledge about social development can inform our interpretation of social issues and guide our reaction to them, in terms of behaviors, practices, and public policy. Among the many possible applications of social development, we focus in particular (but not exclusively) on positive psychology, widespread social problems such as poverty and social disparities, and prevention science. We emphasize individual differences in social development, and attend to the interplay between social development and cognition, learning, and biological development.

CPSY 5304. Research Methods in Applied Child and Adolescent Development. (; 3 cr. ; Student Option; Every Fall)
Applied child and adolescent development research builds upon on traditions of general, clinical, developmental, and educational psychology research, while focusing on efforts to address social needs, social problems, and public policy. Knowledge of scientifically sound and effective approaches to studying social problems and solutions will support those individuals who lead, contribute to, or use research. That is, knowledge gained from this

course will support your development as an investigator or research associate, and it will also empower your role as a savvy consumer of the research you intend to apply to practice or policy.

CPSY 5306. Ethics and Professionalism in Applied Child and Adolescent Development. (; 2 cr. ; A-F only; Every Fall)
This course concerns ethical principles, issues, and codes relevant to research and practice in applied developmental psychology. These ethical considerations pertain to the work of professionals and researchers in communities, school, medical, and social agencies that serve children, youth, families, and adults. Throughout the course, we will consider the general principles that guide ethical behaviors and decision-making across settings, unique issues that might arise in specific settings, and the roles served by formal codes of conduct. We also consider the roots of ethical thinking, behavior, and decision-making, and the social and cultural influences on individual's developing sense of ethics.

CPSY 5413. Early Childhood and Public Policy. (; 3 cr. ; Student Option; Every Fall)
State, federal, and international policies and legislative activity touching first five years of a child's life. Family, community, and institutional roles in promoting children's social, cognitive, and emotional development. Issues related to health, mental health, poverty, developmental delays, and special needs.

CPSY 5501. Foundations in Infant and Early Childhood Mental Health I. (3 cr. ; A-F only; Fall Odd Year)
History, theory, research, concepts, and issues in infant mental health. Issues pertinent to difficulties in development. Readings, visual material. Expert guest lectures. prereq: [Baccalaureate degree in an early-childhood-related field from an accredited U.S. institution or documented equiv], experience in early childhood [research or practice]

CPSY 5503. Development and Psychopathology in Early Childhood. (; 3 cr. ; Student Option; Every Spring)
History, theory, research, concepts, and issues in infant mental health. Typical development. Difficulties in development. Expert guest lectures. Readings, visual material. prereq: 5501 or enrolled in MA program or IECMH graduate minor

CPSY 5506. Infant Observation Seminar I. (; 1 cr. ; S-N only; Spring Odd Year)
How an infant develops in context of family relationships over a 9-12 month period. Students observe an infant for one hour a week, write a narrative, and discuss observations.

CPSY 5508. Infant Observation Seminar II. (; 1 cr. ; S-N only; Summer Odd Year)
How an infant develops in context of family relationships over a nine- to twelve-month period. Students observe an infant for one hour a week, write a narrative, and discuss observations.

CPSY 5511. Infant Observation Seminar III. (; 1 cr. ; S-N only; Fall Even Year)
How an infant develops in context of family relationships over 9-12 month period. Students observe an infant for one hour a week, write a narrative, and discuss observations.

CPSY 5513. Early Childhood Assessment. (; 3 cr. ; Student Option; Every Summer)
The course introduces processes and evidence-based methods of early childhood assessment and diagnosis from a developmental, multi-disciplinary framework. prereq: CPSY 5503 or instructor permission

CPSY 5518. Prevention and Intervention in Early Childhood: Principles. (; 3 cr. ; A-F only; Every Fall)
Students design prevention/intervention programs and apply evidence-based strategies in workplace/practicum settings. Readings, in-class reflective practice groups. prereq: CPSY 5513

CPSY 5521. Prevention and Intervention in Early Childhood: Practice. (; 3 cr. ; A-F only; Spring Odd Year)
Students design prevention/intervention programs and apply evidence-based strategies in workplace/practicum settings. Readings, in-class reflective practice groups.

CPSY 5523. Reflective Practice I. (; 1 cr. ; S-N only; Every Fall)
The capacity to reflect on one?s own behavior, thoughts, feelings, and implicit biases, and those of others, is among the essential competencies of infant and early childhood professionals. Reflective practice is a distinctive component of professional training designed to facilitate the development of self-awareness, perspective-taking, and the ability to work effectively across disciplines, cultures, and contexts. This course offers students the opportunity to explore elements of reflective practice, experience, and build their own reflective capacity. Students will integrate these competencies and IECMH coursework with their professional experience and goals in order to provide high quality services to young children and their families and leadership in the field of infant mental health.

CPSY 5525. Reflective Supervision in Infant and Early Childhood Mental Health: Clinical. (; 1 cr. ; S-N only; Spring Even Year)
Principles and strategies of reflective supervision/consultation. Discussion, final assignment designated by instructor.

CPSY 5601. Child Life Theory, Practice and Program Development. (; 3 cr. ; A-F only; Every Spring)
With a strong foundation in the theory and science of child development, Child Life Specialists promote effective coping for children experiencing the stress and uncertainty of illness, injury, disability, and hospitalization. Child Life Specialists translate the theory of developmental science into practice and advocate for patient- and family-centered care in medical settings. This course will provide an overview of history, fundamental theories, relevant research, and application of the Child Life Professional Practice. The Official Documents of the Child Life Council (2011) will be analyzed as a source of guiding principles for professional practice. An introduction to Child Life program development is also examined in this course. This course must be taken prior to a child life internship.

CPSY 5602. Developmental Perspectives on Illness and Injury in Healthcare. (; 3 cr. ; A-F only; Every Spring)
With a strong foundation in the theory and science of child development, Child Life Specialists promote effective coping for children experiencing the stress and uncertainty of illness, injury, disability, and hospitalization. Child Life Specialists translate the theory of developmental science into practice and advocate for patient- and family-centered care in medical settings. This course will provide an overview of developmental theories as they apply to children and adolescents experiencing illness and injury in healthcare. Child Life preparation, relaxation interventions, and patient support practices for ill children will be examined.

CPSY 5603. Therapeutic Play for Child Life Practice. (; 3 cr. ; A-F only; Every Summer)
With a strong foundation in the theory and science of child development, Child Life Specialists promote effective coping for children experiencing the stress and uncertainty of illness, injury, disability, and hospitalization. Child Life Specialists translate the theory of developmental science into practice and advocate for patient- and family-centered care in medical settings. This course will provide an overview of the theoretical framework of play across childhood development and its role within pediatric healthcare settings and Child Life practice. Students will gain a professional understanding of therapeutic play interventions essential for facilitation of children?s coping and adjustment in various healthcare experiences.

CPSY 5604. Therapeutic Relationships: Supporting Children in Healthcare. (; 3 cr. ; A-F only; Every Fall)
With a strong foundation in the theory and science of child development, Child Life Specialists promote effective coping for children experiencing the stress and uncertainty of illness, injury, disability, and hospitalization. Child Life Specialists translate the theory of developmental science into practice and advocate for patient- and family-centered care in medical settings. This course will provide an overview of the role of Child Life professionals in therapeutic relationships with patients, caregivers and families. The theoretical foundations of therapeutic relationships will be examined and students will gain a working knowledge of the philosophies and principles underpinning patient and family-centered care.

CPSY 5605. Childhood Death and Bereavement. (; 3 cr. ; A-F only; Every Spring)
With a strong foundation in the theory and science of child development, Child Life Specialists promote effective coping for children experiencing the stress and uncertainty of illness, injury, disability, and

hospitalization. Child Life Specialists translate the theory of developmental science into practice and advocate for patient- and family-centered care in medical settings. This course will provide an overview of the fundamental theories of children?s concept of death and the grief process across development. Students will gain an understanding of how Child Life Specialists collaborate with multidisciplinary care teams to support and provide culturally competent care to pediatric patients and their families at end-of-life and bereavement.

CPSY 5981. Cross-Cultural Experiences in Education and English Teaching in Brazil. (GP; 12 cr. [max 24 cr.] ; S-N only; Periodic Fall & Spring)
This course provides an experiential introduction to the process of learning and teaching a second language to young children in an international setting. Students will engage in inquiry, planning, classroom teaching and reflection as they participate on a team developing curriculum in a partial day English immersion classroom. Through readings, videos, a homestay experience, small group projects, classroom observations, and participation as part of a team of English teachers in Brazil, students will gain an introduction to Brazilian culture, learn the basics of the local education system, and experience firsthand what it is like to learn a new language. Students will next be exposed to some of the basic elements of early childhood second language teaching, will help to plan and co-deliver relevant and appropriate curriculum, write lesson plans and engage in reflective practice with their teaching team. Finally, because of the cultural immersion element of the class, students will be supported to 1) reflect on their personal cultural adjustment process, 2) develop an effective working relationship with their co-teachers, and 3) consider the ethical dilemma present in the provision of educational opportunity to Brazil?s marginalized communities.

CPSY 5991. Independent Study in Child Development. (1-12 cr. [max 24 cr.] ; Student Option No Audit; Periodic Fall & Spring)
Independent study arranged with child development faculty member.

CPSY 5996. Field Experience in Applied Child and Adolescent Development. (1-12 cr. [max 24 cr.] ; S-N only; Periodic Fall, Spring & Summer)
Emphasizes field experiences focusing on the development of children and adolescents as individuals or members of groups; may include interactions with children and adolescents in natural settings, or research on applied topics or with atypical populations.

CPSY 8101. Graduate Fellowship Proposal Writing Seminar. (1 cr. [max 2 cr.] ; S-N or Audit; Every Fall)
The primary purpose of this course is to prepare students to submit a competitive NSF Graduate Research Fellowship proposal. Students submitting to other organizations are welcome to join the course, but all of the assignments and focus will be on increasing NSF and predoctoral fellowship competitiveness. This course is intended primarily for doctoral students in their first or second year of study.

CPSY 8102. Writing Developmental Psych Grants for NIH and NSF. (1-3 cr. [max 4 cr.] ; A-F only; Spring Odd Year)
Research/identify potential funding sources at NIH/NSF, create right fit between proposals/ agency program goals, address guideline of proposals, write effective key elements of proposal, understand review criteria, complete grant review, interpret feedback from reviews. prereq: Doctoral students in second year of study or beyond

CPSY 8301. Developmental Psychology: Cognitive Processes. (; 4 cr. ; Student Option; Every Fall)
Perceptual, motor, cognitive, and language development, and biological bases of each. Conceptual framework of research issues. prereq: Doctoral student, instr consent

CPSY 8302. Developmental Psychology: Social and Emotional Processes. (4 cr. ; Student Option; Every Spring)
Normative issues and individual differences in social development from infancy through adolescence. Emphasizes developmental psychopathology, life span considerations. prereq: Doctoral student, instr consent

CPSY 8304. Developmental Research Methods. (3 cr. ; Student Option; Every Spring)
Review of research strategies and designs for conducting research in developmental psychology, as well as strengths and weaknesses of each. Students will learn to (a) communicate about empirical research, (b) critically review methods used in empirical studies, and (c) design research to maximize knowledge gained, while recognizing its limitations.

CPSY 8307. Prelim Seminar. (1 cr. ; S-N only; Every Spring)
Prepare for written preliminary examination during summer of second year of doctoral study. Critically discuss issues/ themes in field using key readings suggested by faculty/past readings from core child development doctoral courses. prereq: Developmental Psychology PhD student in second year of study

CPSY 8311. Landmark Issues and Great Controversies in Child Development. (; 2 cr. ; S-N or Audit; Every Fall)
History of developmental psychology and child development movement in context of conceptual/theoretical controversies. Presentations by students/instructor. prereq: CPsy doctoral student or instr consent

CPSY 8321. Seminar in Teaching Developmental Psychology. (; 1 cr. ; Student Option; Every Fall)
Apprentices attend weekly seminar meetings covering all aspects of university teaching. Planning course coverage, teaching techniques, developing learning activities and examinations. Preparation for CPSY 8322. prereq: Developmental psychology doctoral student or instr consent

CPSY 8322. Apprenticeship in Teaching Developmental Psychology. (; 1-3 cr. ; S-N only; Every Spring)
Co-instruct a section of a CPSY undergraduate course. Plan syllabus, prepare/deliver lectures, devise active learning activities, prepare exams/assignments, and grade. Meet with apprenticeship supervisor to discuss teaching progress/issues. prereq: Developmental psychology doctoral student, CPSY 8321 prereq: Child psychology doctoral student

CPSY 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

CPSY 8360. Special Topics in Developmental Psychology. (; 1-3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Intensive study in specialized areas of developmental psychology. Topics/credits vary. prereq: Doctoral student

CPSY 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

CPSY 8606. Advanced Developmental Psychopathology. (; 3 cr. ; Student Option; Every Fall)
Alternative formulation of childhood disorders, emphasizing competency training rather than medical nosology. prereq: Doctoral student or instr consent

CPSY 8607. Developmental Neurobiology of Stress and Emotion. (3 cr. ; Student Option; Periodic Fall)
Maladaptive responses to stress are components of both the etiology and expression of many psychiatric disorders. In addition, individuals differ in their stress vulnerability, with some seeming to thrive despite the odds, and others succumbing to even relatively mild adversity. These individual differences are likely the interactions of genes and experiences; early experiences may be particularly noteworthy.

CPSY 8608. Clinical Interventions Across the Lifespan. (3 cr. ; A-F only; Spring Even Year)
This course is designed to provide an overview of the historical foundations and contemporary applications of clinical interventions and psychotherapy; the design, conduct, and evaluation of clinical intervention research; fundamental elements of psychotherapy and the therapeutic process; the distal/ proximal contexts in which clinical intervention research and psychotherapy practice is conducted; and common practical and ethical issues in clinical intervention research and psychotherapy practice. Although students who complete this course become familiar with major theoretical and applied approaches to clinical interventions and psychotherapy practice, the focus is not on gaining mastery in any particular psychotherapy approach. Instead, this course focuses on developing an understanding of fundamental principles of

clinical interventions, therapeutic techniques, and psychotherapy practice, including the nature and underlying mechanisms of therapeutic change, research methods for evaluating the efficacy and effectiveness of clinical interventions and psychotherapy at the group and individual levels, a critical evaluation of contemporary psychotherapy approaches, and limitations in the current evidence base. In addition to readings and in-class discussions, students participate in in-person, group applications of basic clinical skills, including activities to help prepare them for beginning psychotherapy practice. This course thus provides a framework for understanding and applying the theories, principles, and methods of effective clinical interventions for students who will subsequently train in intervention-focused, in-person psychotherapy practica.

CPSY 8660. Advanced Developmental Psychology. (; 1-4 cr. [max 21 cr.] ; Student Option; Periodic Fall & Spring)
Intensive study in advanced areas of developmental psychology. Topics/credits vary. prereq: Doctoral student

CPSY 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CPSY 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

CPSY 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall & Spring)
24 total credits required, preferably 12 cr/ semester in the student's fourth of fifth year. Students should enroll in their advisor(s) section(s).

CPSY 8980. Research Seminar in Child Psychology. (; 1-3 cr. [max 15 cr.] ; Student Option; Every Fall, Spring & Summer)
Participation in organized research group in developmental psychology. prereq: Doctoral student

CPSY 8993. Directed Study in Child Psychology. (; 1-4 cr. ; Student Option; Every Fall & Spring)
tbd prereq: Doctoral student or instr consent

CPSY 8994. Research Problems in Child Psychology. (; 1-6 cr. [max 24 cr.] ; Student Option; Every Fall & Spring)
Individual empirical investigation. prereq: Doctoral student or instr consent

CPSY 8996. Directed Field Experiences in Child Psychology. (; 1-6 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Emphasizes field experiences focusing on intellectual and/or social development of children as individuals or members of groups; may include interactions with children in natural settings, or research on applied topics or with atypical populations. prereq: Doctoral student, instr consent

China Executive MBA (CHMB)

CHMB 5800. Organizational Behavior. (; 3 cr. ; A-F only; Every Fall)
Theories/frameworks for analyzing behavior of individuals, groups, and the organization itself. Emphasizes making decisions and developing action plans that enable managers to provide effective leadership. Personnel selection, reward/compensation systems, collective bargaining.

CHMB 5801. Financial Accounting. (; 3 cr. ; A-F only; Every Fall)
External accounting system used by firms to measure their economic performance and financial position. Students analyze corporate financial reports to discover impact of significant economic events. Rise of financial reporting standards and financial intermediaries in efficient allocation of capital in a modern economy. Discussions, cases.

CHMB 5802. Statistics and Decision Making. (; 3 cr. ; A-F only; Every Fall)
Exploratory data analysis, basic inferential procedures, statistical process control, regression analysis.

CHMB 5803. Operations Management. (; 3 cr. ; A-F only; Every Fall)
How to manage operations function in manufacturing/service organizations. Emphasizes strategic impact of operations decisions. Operations strategy, process design, productivity improvement, quality management, business process re-engineering, service quality, forecasting, demand management, inventory management, production planning, project management, scheduling, supply chain management, international operations management.

CHMB 5804. Managerial Accounting. (; 3 cr. ; A-F only; Every Spring)
How to analyze accounting for use in management decisions. Planning and control. Transfer pricing, performance measurements, cost behavior, cost allocation, activity based costing, standard costs.

CHMB 5805. Financial Management. (; 3 cr. ; A-F only; Every Spring)
Theory/practice of finance from analytical approach. Students apply basic financial concepts of risk, return, and valuation to decisions that a corporate financial officer or person engaged in small business must make about sources/uses of funds during changing financial markets.

CHMB 5806. Marketing Management. (; 3 cr. ; A-F only; Every Spring)
Developing/implementing most appropriate combination of variables to carry out a firm's strategy in its target markets. Applying analytic perspectives, concepts, and decision tools of marketing to decisions in product offering, distribution, pricing, and communication.

CHMB 5807. Business Strategy. (; 3 cr. ; A-F only; Every Spring)
Formulating strategy for an enterprise. Shaping mission, product-market choice, and organizational character. Shaping allocation of resources to meet organiational circumstances and conflicting stockholder interests. Situational analysis, strategy development. Written/ oral presentation of strategic analyses/ recommendations.

CHMB 5808. Strategic Marketing. (; 3 cr. ; A-F only;)
Product markets in which an organization should compete. Sustainable competitive advantage that should be developed. Matching marketing strategy with the environment. Coordination between marketing and other business functions. Organization/management of marketing. Case studies.

CHMB 5809. Advanced Financial Management. (; 3 cr. ; A-F only;)
Executive level corporate financial policy. Students are challenged to apply basic principles of finance on their own initiative. Rigorous case-oriented approach.

CHMB 5810. International Environment. (; 1.5 cr. ; A-F only; Every Fall)
How to develop an integrative framework for dealing with international activities of a newly exporting company or a full-fledged multinational. How international environment constrains decision-making, how currency prices are determined, and how to manage exchange risk in coordination with strategic choices of the firm. prereq: China Executive MBA student

CHMB 5811. Information Technology Management. (; 3 cr. ; A-F only;)
Managing information resources/technology. Students gain exposure to various information technologies, examine their applications, explore competitive advantages associated with information technology, and address organizational/managerial implications.

CHMB 5813. Ethics and Leadership. (; 3 cr. ; A-F only; Every Fall & Spring)
Role that ethics can play in corporate strategy. Key concepts include stakeholder management, individual/collective responsibility, and international business ethics. Theoretical considerations applied to issues such as a business's responsibility to the environment, truthful/tasteful advertising, obligations to local community, and managing a diverse workforce.

CHMB 5815. International Human Resources Management. (; 3 cr. ; A-F only; Every Spring)
Topics reflect the strengths, talents, and interests of the class. Integrates different aspects of the curriculum while not being limited by a specific area or paradigm.

CHMB 5816. International Residency. (6 cr. ; A-F only; Every Fall & Spring)
Students travel to an international location for 11 days and engage in discussions with international colleagues, apply program concepts, and develop a broader sensitivity to cultural/social differences. Pre-trip preparation,

on-site discussion, and trip assignment are required.

CHMB 5817. China's Economy. (; 1.5 cr. ; A-F or Audit; Every Spring)
Focusing on China's economy, this course is designed as a required course for all China Executive MBA students. prereq: China Executive MBA student

CHMB 5818. Law and Business. (; 3 cr. [max 6 cr.] ; A-F only; Every Spring)
Legal/regulatory environment of business operations in China.

Chinese (CHN)

CHN 5041. Media Chinese. (3 cr. ; A-F or Audit; Every Fall)
Conducted 100% in Mandarin Chinese, this course trains students to comprehend media Chinese by listening to and viewing Chinese television programs and online/ internet resources. Course content includes international and Chinese national news, social issues, historical events, and interpersonal relations relevant to modern Chinese society, history, and culture. Students must have taken 3-4 years of college-level Chinese or demonstrate the same level of Chinese proficiency.

CHN 5042. Contemporary Chinese Texts 1949-present. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Advanced Chinese language course focused on contemporary Chinese short stories, novelettes, and prose written since 1949, especially from 1978 to the present. These literary works explore various aspects of contemporary Chinese society, history, and culture including: social prejudices and discrimination against the mentally and physically disadvantaged, the Anti-Rightist Movement, the Cultural Revolution, the drug problem, male-female relationships, education, parental love (and lack thereof), traditional Chinese views of life, rape and sex, influence from the West, and more. Class discussion focuses on the use of the language, the social interpretation of the texts, and the Chinese cultural and philosophical implications found in those works. prereq: CHN 4042 or instructor consent. Recommended: CHN 5041

CHN 5211. Introductory Classical Chinese I. (3 cr. ; Student Option; Periodic Fall)
Reading excerpts from canonical Chinese texts. Transnational nature of Classical Chinese/its importance in study of East Asian cultures. Taught in English. prereq: Two years of an East Asian language (Chinese, Japanese, Korean) or equivalent or instr consent

CHN 5212. Introductory Classical Chinese II. (3 cr. ; Student Option; Periodic Spring)
Reading excerpts from canonical Chinese texts. Transnational nature of Classical Chinese/its importance in study of East Asian cultures. Taught in English. prereq: 5211 and two years of an East Asian language (Chinese, Japanese, Korean) or its equivalent or instr consent

CHN 5214. Classical Chinese Language and Culture. (3 cr. ; Student Option No Audit; Periodic Fall & Spring)
Classical Chinese, or literary Chinese, was the formal written language in China until the early 20th century, and also, during various periods, in Japan, Korea, and Vietnam. It is closely related to the modern Chinese language, especially for formal writing, and its literary heritage has laid the cornerstone of Chinese cultural values and worldviews. This class guides the students to comprehend the linguistic and cultural characteristics of classical Chinese, introduces them to key aspects of the tradition, and develops skills for translating classical Chinese into modern Chinese and English texts. The prerequisite is fourth-year Chinese (CHN 4042) or above. Please note that this class is entirely taught in modern Mandarin Chinese, although English study guides will be provided throughout the course.

CHN 5393. Directed Study. (1-5 cr. [max 18 cr.] ; Student Option; Every Fall & Spring)
Guided individual reading or study. Prereq-instr consent, dept consent, college consent.

CHN 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

CHN 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

CHN 8494. Directed Research. (; 1-5 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
Individual study/research with guidance of a faculty member.

CHN 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CHN 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

CHN 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Civic Engagement (CIVE)

CIVE 6001. Critical Approaches to Civic Engagement. (3 cr. ; A-F only; Every Fall)
This course serves as the introductory course for students in the Master of Professional Studies in Civic Engagement. Students in the course will be introduced to graduate level inquiry, and will augment critical thinking skills that frame applied professional and disciplinary practice. Students will grapple with real-world problems and topical content, engaging with relevant scholarship, readings, and disciplinary methodologies. In doing so, they will gain proficiency in critical thinking, community processes and cultural competency in collaboration with their peers. Students will also develop skills to be change agent leaders. This course offers students unique opportunities to engage in cross-disciplinary partnerships and creative problem-solving simulating real-world situations.

CIVE 6002. Civic Engagement Capstone. (3 cr. ; S-N only; Every Spring)
This course serves as the capstone course for students in the master of professional studies in civic engagement. This course will synthesize the disciplinary and applied business coursework taken by students during their graduate career and will facilitate completion of an individualized, applied capstone project based on their community engagement career focus. This culminating experience, taken in the final year of the program, will provide students with an opportunity to engage in creative problem solving to address pressing real-world needs.

CIVE 6311. Facilitating Community Driven Leadership. (; 3 cr. ; A-F or Audit; Fall Even Year)
In Facilitating Community Driven Leadership, students will expand their critical skills for working with diverse audiences, communities, and community leaders and will develop an understanding of how communities define leadership. Students will also clarify their positionality, define the stakes of their work, and take ownership of their individual power and organizational possibilities. The course combines contemporary theory in community engagement and leadership with applied projects that develop the student's critical and analytical skills as community leaders.

CIVE 6312. Finance Non-financial Managers. (; 3 cr. ; A-F or Audit; Every Fall)
This course explores organizational finance from the lens of a non-financial manager, helping students gain an applied understanding of financial and accounting concepts and the role finance plays in the economic viability of a business. Students will learn to construct financial statements and use these tools to strategically determine the overall business financial health. Students will forecast possibilities for future growth in relation to costs associated with operational expenses and the cost of capital. Students will review basic economic frameworks and complete case studies focusing on the connection of global economic influences to company and industry financial indicators. Specific topics include financial analysis; planning, forecasting, and budgeting; cash flow, and strategic financing.

CIVE 6313. Data for Decision Making. (; 3 cr. ; A-F or Audit; Every Spring)
This course aims to provide knowledge and equip students with techniques to transform data into information that decision makers can use in order to make decisions. Students

will learn the importance of source and quality of the data, input from and impact on stakeholders, and how social, community, and political or governmental dynamics come into play in the decision-making process. By the end of this course, students will understand and be able to apply decision-making data collection, analysis, synthesis, and presentation skills to incorporate an abundant and wide-variety of data in order to make an informed decision. This course will have didactic and application components where students will be able to apply the skills and knowledge learned.

CIVE 6314. Leading Projects and Teams. (; 3 cr. ; A-F or Audit; Every Spring)
This course provides students the background and skills needed to enhance teamwork, make informed business decisions, or resolve productivity issues effectively. This course will focus on the principles techniques, and tools used to plan, control, monitor, and review projects to meet organizational monetary and time constraints. Through case studies and practical application, students will practice project management skills along with setting team priorities, performance objectives, and the team decision making process.

Civil, Environ, and Geo-Engin (CEGE)

CEGE 5094. Directed Research. (; 1-4 cr. ; A-F only; Every Fall, Spring & Summer)
Special studies in the planning, design, or analysis of civil, environmental, and geo- engineering systems. Individual lab research problems, literature studies, reports. Supervised by staff. prereq: instr consent

CEGE 5180. Special Topics. (; 1-4 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Topics vary depending on faculty and student interests. prereq: upper division undergraduate, graduate student, or instructor consent

CEGE 5211. Traffic Engineering. (; 3 cr. ; A-F or Audit; Periodic Spring)
Principles of vehicle and driver performance as they apply to the safe and efficient operation of highways. Design and use of traffic control devices. Capacity and level of service. Trip generation and traffic impact analysis. Safety and traffic studies. prereq: CEGE 3201, CEGE 3102 or equivalent, Grad Student

CEGE 5212. Transportation Policy, Planning, and Deployment. (; 3 cr. [max 4 cr.] ; A-F or Audit; Every Fall)
Techniques of analysis and planning for transportation services. Demand-supply interactions. Evaluating transportation alternatives. Travel demand forecasting. Integrated model systems. Citizen participation in decision-making. prereq: 3201 or equiv, upper division CSE, or grad student

CEGE 5213. Transit Planning and Management. (3 cr. ; A-F only; Every Fall)
Principles/techniques related to transit systems. Historical perspective, characteristics of travel demand, demand management. Evaluating/benchmarking system performance. Transit-oriented development. Analyzing alternative transit modes. System design/ finance. Case studies, field projects. prereq: Upper Division CE, EnvE, or GeoE student, CE or GeoE grad student, or instructor consent

CEGE 5214. Infrastructure Systems Engineering. (; 3 cr. [max 4 cr.] ; A-F or Audit; Every Fall)
Systems approach, its application to transportation engineering/planning. Prediction of flows and level of service. Production functions, cost optimization, utility theory, demand modeling, transportation network analysis, equilibrium assignment, decision analysis, multidimensional evaluation of transportation projects. prereq: Math 2373 or equivalent, Math 2263 or equivalent. CEGE 3101 or equivalent, CEGE 3102 or eqiuvalent, CEGE graduate student or instructors consent.

CEGE 5219. Air Transportation Systems. (3 cr. ; A-F or Audit; Every Fall)
This course provides an overview of the civil air transportation system design and operations. After completing this course, you should be able to describe the operations of civil transport aircraft from the pilot and company, and air traffic control perspectives; conduct basic economic analysis on airline operations and demand; conduct capacity analysis for airspace and airports; and conduct basic optimization for air transportation operations. This course will prepare students for working with the civil aviation industry.

CEGE 5341. Wave Methods for Nondestructive Testing. (; 3 cr. ; A-F or Audit; Periodic Fall)
Introduction to contemporary methods for nondestructive characterization of objects of civil infrastructure (e.g., highways, bridges, geotechnical sites). Imaging technologies based on propagation of elastic waves such as ultrasonic/resonant frequency methods, seismic surveys, and acoustic emission monitoring. Lecture prereq: [AEM 2021, AEM 3031] or instr consent

CEGE 5342. Introduction to Inverse Problems. (3 cr. ; A-F only; Every Fall)
Introduction to principles and applications of the inverse problems theory -- the underpinning of model-driven data analytics. The course covers (i) basic ideas, (ii) mathematical foundation, (iii) discretization strategies, (iv) regularization techniques, (v) solution algorithms, and (vi) example problems. All advanced concepts, when recalled, are introduced in an intuitive engineering setting. The discussion, supported by ample numerical examples, focuses on the inversion of linear ``forward'' models. Numerical solutions are implemented in the Matlab environment, and make use of the regtools package that accompanies the textbook (P.C. Hansen, Discrete Inverse Problems -- Insight and Applications, SIAM, 2010). Prereqs: MATH 2243, MATH 2263, CEGE 3101 or equivalent

CEGE 5351. Advanced Engineering Mathematics I. (; 3 cr. ; A-F or Audit; Periodic Fall)
Emphasizes skills relevant for civil, environmental, and geo- engineers. Mathematical principles explained in an engineering setting. Applications from various areas in civil, environmental, and geo-engineering. prereq: [Math 2374 or equiv], upper division CSE student or grad student] or instr consent

CEGE 5411. Applied Structural Mechanics. (; 3 cr. ; A-F or Audit; Every Fall)
Principal Stresses and strain analysis; failure criteria. Introduction to plane elasticity, energymethods, torsion of beams, and bending of unsymmetrical beams. Introduction to structural dynamics and stability. prereq: AEM 3031, Upper div CSE or grad student or instr consent

CEGE 5414. Prestressed Concrete Design. (; 3 cr. ; A-F or Audit; Every Fall)
Design of prestressed concrete structures. Time dependent effects, behavior, flexure, shear, torsion, deflections, continuous systems. prereq: CEGE 4401, upper div CSE or grad student or instr consent

CEGE 5415. Masonry Structures. (; 3 cr. ; A-F or Audit; Periodic Fall)
Masonry materials and their production. Mortars, grouts. Design of unreinforced and reinforced masonry structural systems. Walls, columns, lintels. Codes/specifications, testing. prereq: CEGE 3401, upper div CSE or grad student or instr consent; 4401 recommended

CEGE 5416. Sensors in Infrastructure. (3 cr. ; A-F or Audit; Periodic Fall)
As sensors become part of practice in CEGE fields, an understanding of instrumentation and their application to engineering problems becomes essential. This course will highlight the interdisciplinary nature of using sensors in engineering applications and how previous coursework can be applied. The sensors covered will range from mechanical measurements (e.g. strain, displacement, and acceleration) to environmental measurements (e.g. temperature, oxygen concentration, and wind speed), and non-destructive techniques. In addition to class lectures, instruments and data acquisition will be explored in lab experiments. prereq: CEGE 3402, AEM 3031

CEGE 5417. Structural Engineering Design of Wood Buildings. (3 cr. ; A-F or Audit; Every Fall)
This course provides an in-depth presentation of topics in design of wood structures. The course is intended for advanced undergraduate and entering graduate students who have completed CEGE 4401 or equivalent. The course extends basic concepts of member design, which are covered in CEGE 4401, to wood members and simple wood structures. Knowledge of basic concrete and steel design, construction materials and structural analysis is presumed. Topics covered in the course include: wood properties and grading; design criteria using sawn wood, glue-laminated wood, and plywood; design of beams, columns, trusses, shear diaphragms and floors; connections for wood structures; and building codes and test methods. Prereqs: CEGE 4401 or equivalent

CEGE 5511. Urban Hydrology and Water Quality. (4 cr. ; A-F or Audit; Every Fall)

Urban hydrology for small watersheds and the management of storm water quality and quantity. prereq: CEGE 4501or BBE 5513, upper division CSE or grad student or instructor consent

CEGE 5512. Stochastic Ecohydrology. (3 cr. ; A-F or Audit; Every Fall)
This course will provide the theoretical and quantitative basis for understanding the interactions between the water cycle, vegetation, soil biogeochemistry, and the atmosphere. A main focus of the course will be on modeling the?water and carbon dynamics across the soil-plant-atmosphere system. We will provide probabilistic descriptions of this system at the daily, seasonal, and interannual timescales by incorporating various sources of?randomness and non-stationarity within the environment, particularly those from rainfall. These concepts and tools will be discussed in the context of?sustainable management of water resources and terrestrial ecosystems, especially in view of the changes in the hydrological regime from climate change and societal pressures. prereq: MATH 2373, MATH 2374

CEGE 5513. Energy Conversion from Wind, Hydro and Solar Resources. (3 cr. ; A-F only; Periodic Fall)
During this class the physical principles of energy conversion from alternative resources as wind, hydro and solar will be presented and discussed, with an emphasis on fluid mechanics and geophysical flows (atmospheric boundary layer, rivers, tidal flows). We will start with the resource assessment devoted to quantify the available energy in the environment (wind, rivers, and sun). Each energy resource module will include basic economic principles and assumption enabling the quantification of the efficiency and the costs of energy transformation, as well as an estimate of environmental effects (when possible). We will focus on the details on wind, streams, wave and solar power using conservation equations and basic principles of thermodynamics and fluid mechanics. prereq: CEGE 3502 or equivalent

CEGE 5514. Granular Physics with Environmental and Engineering Applications. (4 cr. ; A-F or Audit; Periodic Fall)
This class concerns ways in which relatively straightforward particle-scale phenomenology is directly related to larger-scale behaviors of concern to environmental and engineering processes. These larger scale behaviors include pattern formation driven by cooperative sorting and advection dynamics. They also include quasi-static and dynamic non-linear responses to stresses and other forcing. Applications we discuss include particle transport in rivers, wetlands reclamation, pavement compaction, and industrial mixing. As many large-scale and small-scale phenemonelogy can be counter-intuitive without experience, the in-class work is supplemented by two sets of hand-on activities. (1) students will explore these phenomenology in physical laboratories and (2) students will explore details unattainable in the physical laboratory by modifying existing computational simulations. (e.g., behavior in zero gravity, chaotic particle pathways, small-scale structures in colloidal suspensions). Minimal prior programming experience is expected. Programming assignments will be designed to be flexible for students of all levels of such experience. Prereqs: Graduate student in CSE or permission of instructor and/or CEGE 3502, MATH 2373, MATH 2374

CEGE 5515. Remote Sensing of Environment and Water Resources. (3 cr. ; A-F or Audit; Every Spring)
The course presents fundamentals of probability theory, statistical learning, and physics of remotes sensing to increase understanding and technical knowledge of undergraduate and graduate students about Earth data analysis and remote sensing. Prereqs: CEGE 4501 is recommended

CEGE 5541. Environmental Water Chemistry. (; 3 cr. [max 4 cr.] ; A-F or Audit; Every Fall)
Introduction to water chemistry. Physical chemical principles, geochemical processes controlling chemical composition of waters, behavior of contaminants that affect the suitability of water for beneficial uses. prereq: CEGE 3501, Chem 1061, Chem 1062 or Chem 1071H/1072H, upper division CSE or grad student or instructor consent

CEGE 5542. Experimental Methods in Environmental Engineering. (; 3 cr. ; A-F or Audit; Periodic Spring)
Tools necessary to conduct research in environmental engineering and chemistry. Theory of operation of analytical equipment. Sampling and data handling methods, statistical analyses, experimental design, laboratory safety. Lecture, laboratory. prereq: CEGE 3501, (CEGE 5541 recommended) Chem 1022, upper division CSE or grad student or instructor consent

CEGE 5543. Introductory Environmental Fluid Mechanics. (; 4 cr. ; A-F or Audit; Fall Odd Year)
Environmental fluid mechanics is the study of the interaction of fluid flows that occur in aquatic ecosystems with the growth and behavior of living organisms. prereq: CEGE 3502 or AEM 4201 or ChEn 3005, upper division CSE or grad students or instructor consent

CEGE 5551. Environmental Microbiology. (; 3 cr. ; A-F or Audit; Every Fall)
Role of microorganisms in environmental bioremediation, pollution control, water/wastewater treatment, biogeochemistry, and human health. prereq: Upper div or grad student or instructor consent

CEGE 5552. Environmental Microbiology Laboratory. (; 1 cr. ; A-F only; Periodic Fall)
Basic microbiological techniques: isolation, identification/enumeration of bacteria, BOD, biodegradable kinetics, disinfection. Lab. prereq: CEGE 5551 or concurrent registration is required (or allowed) in CEGE 5551

CEGE 5570. Design for Sustainable Development - India. (; 3-9 cr. ; A-F only; Every Summer)
In this interdisciplinary course in Bangalore (India's fast-growing mega-city and entrepreneurship hub) you will work in teams with local partners to research and design sustainable solutions to development challenges of water, energy, waste, agriculture, transportation, and health. Prereqs: Open to graduate students from all majors

CEGE 8022. Numerical Methods for Free and Moving Boundary Problems. (; 3 cr. ; A-F or Audit; Periodic Fall)
Examples of free and moving boundary problems: metal solidification, filling, polymer molding, flow in porous media, ground freezing. Solutions: analytical, fixed finite difference, fixed finite element, front tracking schemes, general deforming finite element methods. prereq: 8401 or instr consent

CEGE 8094. Directed Research. (; 1-4 cr. [max 12 cr.] ; A-F only; Every Fall, Spring & Summer)
Special studies in the planning, design, or analysis of civil, environmental, and geo- engineering systems. Individual lab research problems, literature studies, reports. Supervised by staff. prereq: instr consent

CEGE 8200. Seminar: Transportation. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Fall & Spring)
Content depends on instructor and student. Sample topics: traffic safety, traffic flow theory, transportation materials, transportation planning, transportation economics.

CEGE 8211. Theory of Traffic Flow. (; 4 cr. ; Student Option; Every Fall)
Definitions/measurements of basic traffic flow parameters, fundamental relationships. Macroscopic continuum and microscopic traffic flow models. Schockwaves and applications. Flow, speed, headway, and other statistical distributions of traffic parameters. Gap availability/acceptance. Simulation of traffic flow. Traffic control theory, queuing theory, applications.

CEGE 8212. Advanced Travel Demand Modeling and Supply Analysis. (; 3 cr. ; Student Option; Fall Odd, Spring Even Year)
Application of random utility theory to model travel demand; deterministic and stochastic trip assignment; network design problems; transportation planning software. prereq: 5211 or equiv, Stat 3021

CEGE 8213. Advanced Transportation Technologies Seminar. (; 1 cr. ; S-N or Audit; Periodic Fall & Spring)
Advanced technologies specifically related to transportation. Topics drawn from core science/technology areas of human factors, intelligent vehicles, traffic modeling/management, sensing, communications, and controls.

CEGE 8214. Transportation Economics. (; 4 cr. ; A-F or Audit; Periodic Spring)
Application of microeconomic theory to transportation. Demand/demand estimation, cost/cost estimation, pricing/investment,

regulation/deregulation. Urban/intercity passenger transportation, freight transportation.

CEGE 8215. Transportation Data Analysis. (; 3 cr. ; Student Option; Spring Even Year)
Maximum likelihood methods for generalized linear models, with logit/probit models. Linear regression as special cases. Applications to gap acceptance, discrete choice, speed/headway distributions, accident modeling. Introduction to Bayesian inference. prereq: [8210 or 8211], [STAT 5021 or equiv]

CEGE 8216. Urban Traffic Operations. (; 3 cr. ; Student Option;)
Capacity analysis techniques for urban streets, optimal traffic signal timing, coordination, real time control. Traffic signal hardware, including detectors/controllers. Operational techniques for traffic management. Use of computer program packages in traffic engineering practice. Freeway operations/control.

CEGE 8217. Transportation Network Analysis. (; 4 cr. ; A-F only; Fall Odd Year)
Concepts/tools for transportation system and network analysis. Analytical models, algorithms for formation/solution of equilibrium assignment problem for transportation networks. Static/dynamic user equilibrium traffic assignments. System optimal, stochastic user equilibrium, traffic paradox. Linear/nonlinear programming, variational inequalities.

CEGE 8218. Dynamic Transportation Network Analysis. (4 cr. ; A-F or Audit; Fall Odd Year)
Dynamic traffic assignment and its history as an extension to static traffic assignment. Issues related to traffic flow propagation and time-dependent travel times. Dynamic user equilibrium Variational Inequalities. Analytic and simulation-based DTA models. Dynamic transit assignment on schedule-based networks. Hyperpaths, stochastic route choice, and capacity constraints in transit networks. Introduction to activity-based modeling. Time-space prisms, activity-travel scheduling. prereqs: CEGE 5214 or IE 5531, CEGE 8217 recommended

CEGE 8231. Advanced Pavement Engineering. (; 3 cr. ; Student Option; Periodic Fall)
Advanced concepts in pavement analysis and design; computation of stresses and strains in flexible and rigid pavement systems; review of Boussinesq theory, Burmeister model, and Westergaard model; load transfer in rigid pavements; temperature induced stresses; mechanics of drainage. prereq: 4231 or instr consent

CEGE 8300. Seminar: Geomechanics. (; 1 cr. [max 2 cr.] ; S-N or Audit; Every Fall & Spring)
Presentations on various topics.

CEGE 8301. Fracture of Geomaterials. (; 3 cr. ; A-F or Audit; Periodic Fall)
Crack tip stress and displacement fields; stress intensity factors. Energy principles of fracture; compliance method. Process zone models. J integral. Mixed-mode fracture. Behavior of cracked solids. Numerical and experimental approaches. prereq: CSE grad student, 5321, GeoE 5321 or instr consent

CEGE 8302. Soil/Rock Plasticity and Limit Analysis. (; 4 cr. ; A-F or Audit; Spring Even Year)
Plasticity of soils and rocks. Yield conditions, flow rules. Theorems of limit analysis. Static solutions, method of characteristics. Kinematic solutions, hodograph. Energy balance. Applications to soil/rock engineering problems. prereq: CSE grad student, CE 4300 or instr consent

CEGE 8311. Advanced Rock Mechanics. (; 3 cr. ; A-F or Audit; Periodic Fall)
Stress transformations; principal stresses and directions. Friction and behavior of rock joints; stability of frictional sliding. Elastic waves; acoustic emission and seismic measurements. Fragmentation and rock breakage. prereq: CSE grad student, 4311 or GeoE 4311 or instr consent

CEGE 8321. Thermoporoelasticity. (; 4 cr. ; A-F or Audit; Periodic Fall)
Micro-mechanical description of porous media. Thermodynamics foundations. Linear theory of thermoporoelasticity: constitutive, transport, and balance laws; field equations. Determination of material constants. Singular solutions. Methods of solution: integral transform, method of singularities, finite and boundary element method. prereq: CSE grad student, 5321 or GeoE 5321 or instr consent

CEGE 8322. Storage and Flow of Granular Materials. (; 3 cr. ; A-F or Audit; Periodic Fall)
Plasticity of granular media. Static and dynamic method of slices. Storage and flow of granular materials in bins and hoppers. Stress concentrations, arching, piping. Experiments on granular material properties and flow. prereq: CSE grad student, 4301 or instr consent

CEGE 8331. Modeling Geomechanical Processes. (; 3 cr. ; A-F or Audit; Periodic Fall)
Data-limited nature of problems in geomechanics. Dimensional analysis. Regimes of solution. Similarity of solutions. Elements of fracture mechanics, elastoplasticity, poroelasticity. Applications to stability of underground excavations, fluid flow in fracture, tool-rock interaction, hydraulic fracturing. prereq: CSE grad student, 5321 or GeoE 5321

CEGE 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

CEGE 8336. Boundary Element Methods I. (; 3 cr. ; A-F or Audit; Fall Even Year)
Introduction to boundary element methods for elastostatics; stress discontinuity, displacement discontinuity, and direct boundary integral methods. Derivation of basic mathematical solutions from the theory of elasticity. Applications in geomechanics. prereq: CSE grad student

CEGE 8337. Boundary Element Methods II. (; 3 cr. ; A-F or Audit; Periodic Fall)
Transient and nonlinear problems. prereq: 8336, GeoE 8336 or instr consent

CEGE 8341. Wave Propagation in Solids and Structures. (; 4 cr. ; A-F or Audit; Periodic Fall)
Fundamentals of wave propagation theory in elastic media. Wave dispersion and packet distortion. Waves in one-dimensional structural systems: rods and beams. Waves in two- and three-dimensional media. Guided waves, Rayleigh waves and Lamb waves. Waves in heterogeneous media. Application of wave methods to structural and material diagnostics. Experimental methods for wavefield measurements and characterization. Signal processing for wave feature extraction. Introduction to nonlinear wave propagation. prereq: Basic courses in soil machanics/dynamics or instr consent

CEGE 8351. Advanced Engineering Mathematics II. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Emphasizes skills relevant for civil, environmental, and geo-engineers. Mathematical principles are explained in an engineering setting, with applications chosen from deformable body mechanics, rock mechanics, soil mechanics, fluid mechanics, and groundwater flow. prereq: [MATH 2374 or equivalent], [CEGE 5351], [CSE grad student or instr consent]

CEGE 8352. Advanced Groundwater Mechanics II. (; 3 cr. ; A-F or Audit; Periodic Fall)
Applying complex methods, including conformal mapping, in groundwater mechanics; solving problems with free boundaries using the hodograph method; drains in aquifers with free boundaries; superposition of solutions with drains; singular Cauchy integrals; boundary elements. prereq: 4351, CSE grad student or instr consent

CEGE 8361. Engineering Model Fitting. (; 3 cr. ; A-F or Audit; Fall Even Year)
Parameter estimation and inverse modeling for civil and geological engineering. Formulating engineering model fitting problems; comparing and selecting various fit criteria; implementing numerical algorithms; analyzing and interpreting results using both statistical and qualitative tools; designing future measurement plans. prereq: CSE grad student or instr consent

CEGE 8400. Seminar: Structures. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Fall & Spring)
Content depends on instructor and student. Sample topics: theory of elasticity, optimization, reliability, wave propagation, soil dynamics, experimental equipment, wind forces on structures, structural failures, modern construction practices.

CEGE 8401. Fundamentals of Finite Element Method. (; 3 cr. ; A-F or Audit; Every Spring)
Elements of calculus of variations; weak and strong formulations of linear continuum and structural problems. Isoparametric elements and numerical integration. Basic concepts of error analysis and convergence. Analysis of plates and shells. Introduction to mixed

methods and time dependent problems. prereq: 4411 or instr consent

CEGE 8402. Nonlinear Finite Element Analysis. (; 3 cr. ; A-F or Audit; Periodic Fall)
Large strains and work conjugate stresses. Equilibrium and principle of virtual work for nonlinear problems. Nonlinear elasticity and plasticity. Finite element discretization and nonlinear algebraic equations. Linearization and solution algorithms for nonlinear problems. Structural stability. prereq: 8401 or instr consent; offered alt yrs

CEGE 8411. Plate Structures. (; 3 cr. ; A-F or Audit; Periodic Fall)
Analysis of plate structures based on the small-deflection elastic Kirchhoff-Love theory. Classical and numerical analysis methods. Skew and orthotropic plate structures. Elements of large deflection theory and stability of plates. prereq: 5411 or instr consent; offered alt yrs

CEGE 8412. Shell Structures. (; 3 cr. ; A-F or Audit; Periodic Fall)
Static analysis of thin elastic shells based on Love's postulates. Membrane and bending theories. Thermal stresses in cylinders. Buckling of shells of revolution. Offered alternate years. prereq: CSE grad or instr consent

CEGE 8413. Fracture and Scaling. (3 cr. ; A-F or Audit; Periodic Spring)
Linear elastic fracture mechanics, cohesive fracture, scaling, strength statistics. prereq: 5411

CEGE 8421. Structural Dynamics. (; 3 cr. ; A-F or Audit; Every Fall)
Response of discrete/continuous systems to dynamic loading. Formulation/solution of problems of one or more degrees of freedom. Modal analysis. Numerical integration and transform techniques. Response of dynamic systems to base motion using response spectrum methods. prereq: [3401, AEM 2012] or instr consent; concurrent registration is required (or allowed) in 4411 recommended

CEGE 8422. Earthquake Engineering. (; 3 cr. ; A-F or Audit; Periodic Spring)
Introduction to earthquake engineering; response spectra; energy absorption capacity of structures; estimation of damping; earthquake resistant design; seismic design codes; base isolation; soil-structure interaction. Blast resistant design. Wind effects on structures. prereq: 8421 or instr consent

CEGE 8431. Structural Stability. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Classification of discrete/continuous conservative/nonconservative systems. Buckling analysis of, e.g., structural members, frameworks, and plates by classical/numerical methods. Offered alternate years. prereq: CSE grad student or instr consent

CEGE 8432. Analysis of Thin-Walled Members. (; 3 cr. ; A-F or Audit; Periodic Fall)
Analysis of thin-walled structural members based on Vlasov theory and its modifications. Members with open and closed cross sections. Second-order effects and buckling. Influence of inelastic material behavior on buckling. prereq: 5411 or instr consent; offered alt yrs

CEGE 8441. Ductile Behavior of Steel Structures. (; 3 cr. ; A-F or Audit; Fall Even Year)
Advanced topics in behavior of steel structures; Modeling techniques for material/geometric nonlinearity. Plastic analysis. Introduction to plasticity of continuum bodies. Computer methods. Seismic design, code provisions. prereq: 4411 or eqiv

CEGE 8442. Analysis of Structural Systems. (; 3 cr. ; A-F or Audit; Periodic Fall)
Advanced theory and computational techniques for analyzing complex structural building systems. Using comprehensive geometric and material nonlinear analysis for designing steel and composite structures. prereq: CEGE 5411 or equivalent

CEGE 8443. Fracture of Materials and Structures. (; 3 cr. ; A-F or Audit; Every Spring)
Foundations of engineering fracture mechanics. Analytical, computational, and experimental tools to analyze/design solid structures and materials containing cracks. Predicting structural performance, designing experiments. Metals, concretes, rocks, ceramics, advanced composites, biological structures, micro-devices. prereq: 4401 or instr consent

CEGE 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

CEGE 8451. Behavior of Reinforced Concrete Structures. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Advanced topics; experimental and theoretical background to design code provisions. Moment-curvature analysis of members. Shear; torsion; disturbed regions. Beam column joints; shear walls. Effects of earthquake loading. Limit analysis. prereq: 4412 or instr consent

CEGE 8461. Structural Reliability. (; 3 cr. ; A-F or Audit; Periodic Fall)
Structural design standards/methods. Uncertainties in structural design. Basic probabilistic concepts, statistical distributions. Resistance/load statistics. First-/second-order reliability methods, systems reliability. Development of probability-based design codes. Offered alternate years. prereq: [4412, 4413] or instr consent

CEGE 8490. Special Topics. (; 0.5-4 cr. [max 8 cr.] ; A-F or Audit; Periodic Fall & Spring)
Topics vary depending on faculty and student interests. prereq: instr consent

CEGE 8500. Seminar: Environmental. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Fall & Spring)
Broad coverage of topics in environmental engineering and science. Speakers consist primarily of graduate students in these areas, but presentations may also be given by University faculty and guest speakers. prereq: grad CE major or instr consent

CEGE 8501. Environmental Fluid Mechanics I. (; 4 cr. ; A-F or Audit; Every Fall)
Basic laws of mass, energy, and momentum transport in environmental fluid flow. Exact and approximate solutions for viscous flow. Irrotational flow; gravity waves. Similitude and inspectional analysis. Laminar boundary layers and slender flows. Application to engineering and environmental problems. prereq: 3502 or equiv or instr consent

CEGE 8502. Environmental Fluid Mechanics II. (; 4 cr. ; A-F or Audit; Every Fall & Spring)
Reynolds equations. Developed and developing turbulent boundary layers and slender flows, and their interaction with inviscid flow. Jets, plumes, wakes and shear layers. Statistical description of turbulence; data analysis. prereq: 8501 or instr consent

CEGE 8503. Environmental Mass Transport. (; 4 cr. ; A-F or Audit; Periodic Fall)
Principles of intraphase and interfacial chemical transport and fate in the environment, specifically the processes of diffusion, dispersion, and convection. Application to surface water and atmospheric mixing, dispersion in groundwater, and transport between these media. prereq: 3502, 3501 or equiv or instr consent

CEGE 8504. Theory of Unit Operations. (; 4 cr. ; A-F or Audit; Periodic Fall & Spring)
Theoretical basis, design, operation of chemical/physical processes used in treating/controlling water quality. Adsorption, ion exchange, sedimentation, thickening, filtration, gas transfer, coagulation, flocculation, membrane processes, disinfection. prereq: 5541

CEGE 8505. Biological Processes. (; 3 cr. ; A-F or Audit; Every Spring)
Theoretical principles underlying chemical and biological wastewater treatment processes, including aerobic and anaerobic treatment for organic carbon and nutrient removal. Mathematical models of microbial growth kinetics and mass transport in suspended growth and attached film applications are developed. prereq: 4502, 4501 or instr consent

CEGE 8506. Stochastic Hydrology. (; 4 cr. ; A-F or Audit; Periodic Fall)
Analysis and synthesis of hydrologic series and systems; derived distributions; uncertainty and risk analysis; flood frequency analysis; multivariate time series analysis; correlation and spectral analysis; series of long-range dependence; linear estimation; geostatistics; sampling networks; hydrologic forecasting. prereq: Stat 3021 or equiv or instr consent

CEGE 8507. Advanced Methods in Hydrology. (; 4 cr. ; A-F or Audit; Periodic Fall)
Notions of scale-invariance, scaling, and multiscaling in geophysical processes; methods of multiscale analysis; wavelet transforms; time-frequency-scale analysis and fractal analysis. Applications in atmospheric, hydrologic, and geomorphologic processes. prereq: 8506

CEGE 8508. Ecological Fluid Mechanics. (; 4 cr. ; A-F or Audit; Every Fall)

Fluid mechanics of microbiological processes in lakes, rivers, and wetlands. Small-scale fluid motion, nutrient uptake, growth kinetics, ecosystem metabolism, scaling, lab/field microstructure measurements. prereq: 3502 or equiv

CEGE 8511. Mechanics of Sediment Transport. (; 3 cr. ; A-F or Audit; Every Fall)
Particle motion in fluids. Criteria for incipient motion. Formulations for bedload and suspended load. Bedform mechanics and hydraulic resistance relations. Channel stability, aggradation and degradation, alluvial stream morphology. prereq: 3502 and 4501 or instr consent

CEGE 8521. The Atmospheric Boundary Layer. (; 4 cr. ; A-F or Audit; Periodic Summer)
Land-atmosphere interactions and turbulent transport in the atmospheric boundary layer (ABL), the lowest part of the atmosphere. ABL development and dynamics. Turbulence, surface energy balance, spectral analysis, similarity theory. Flow over homogeneous and heterogeneous surfaces. Atmospheric stability, measurement, simulation of turbulent fluxes. prereq: CSE or COAFES grad student or instr consent

CEGE 8541. Aquatic Chemistry. (; 3 cr. ; A-F or Audit; Periodic Spring)
Advanced course on water chemistry; physical chemical principles and geochemical processes controlling the chemical composition of natural waters, soil- and sediment-water interactions. Emphasizes behavior of inorganic contaminants in natural waters and engineered systems and dissolved natural organic matter. prereq: 4541 or instr consent

CEGE 8542. Chemistry of Organic Pollutants in Environmental Systems. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Structural characteristics and physico-chemical properties of organic contaminants in aquatic systems. Emphasizes PCBs, PAHs, dioxins, insecticides, herbicides, and chlorinated solvents. Factors affecting their transport/ transformation. Structure- and property-activity relationships, their use in predicting organic chemical behavior. prereq: CEGE 5541 or instr consent

CEGE 8551. Environmental Microbiology: Molecular Theory and Methods. (; 3-4 cr. ; A-F or Audit; Fall Even Year)
Introduction to microbial genetics and molecular phylogeny. Application of nucleic-acid techniques in environmental microbiology and microbial ecology.

CEGE 8561. Analysis and Modeling of Aquatic Environments I. (; 3 cr. ; A-F or Audit; Every Spring)
Introduction to hydrologic transport and water quality simulation in natural water systems. Deterministic, process-oriented water quality model development. Mixed cell models, advection, turbulent diffusion/dispersion. Chemical/biological kinetics in water quality models. Application of water quality models to management problems. prereq: One sem grad work or instr consent

CEGE 8562. Analysis and Modeling of Aquatic Environments II. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Models for transport/transformation of pollutants, nutrients, particulates, ecosystems, etc., from recently completed theses, articles, or research in progress. Students review assigned recent papers, make presentations, and analyze a topic of their choice. prereq: One sem grad work or instr consent

CEGE 8571. Hydraulic Measurements. (; 3 cr. ; A-F or Audit; Periodic Fall)
Lab and field methods and instruments for measuring hydraulic pressure, velocity, and discharge. prereq: 3502 or instr consent

CEGE 8572. Computational Environmental Fluid Dynamics. (; 4 cr. ; A-F or Audit; Periodic Spring)
Finite difference methods, their application to solution of one-/two-dimensional problems in environmental fluid dynamics. Stability, convergence, consistency, and accuracy of numerical schemes. Navier-Stokes equations, their physical meaning, and their numerical solution. Turbulence modeling: RANS and LES. prereq: grad student in CSE or COAFES or instr consent

CEGE 8581. Research and Professional Ethics in Water Resources and Environmental Science. (0.5 cr. ; S-N or Audit; Every Spring)
Ethics of water resources science and environmental engineering research/practice. Societal responsibility, plagiarism, recording-keeping, authorship, confidentiality, conflicts of interest, professional relationships, fraud, reporting misconduct. Meets during first eight weeks of spring semester. prereq: [Environmental engineering or water resource science] grad student or instr consent

CEGE 8601. Introduction to Stream Restoration. (; 3 cr. ; A-F or Audit; Periodic Fall)
Background material required to participate in a stream restoration project. How to assimilate geologic, hydrologic, and ecological data at watershed and reach scales to plan a restoration project and evaluate/critique existing stream restoration projects.

CEGE 8602. Stream Restoration Practice. (; 2 cr. ; S-N only; Periodic Fall)
Field experience, group design project. Students provide a stream restoration context for each other's elective coursework, complete critical assessments of stream restoration projects, and design a stream restoration site. prereq: CEGE 8601, or EEB 8601, or ESCI 8601

CEGE 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CEGE 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

CEGE 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Classical/Near Eastern Rel/Cul (CNRC)

CNRC 5016W. Biblical Law and Jewish Ethics. (3 cr. ; Student Option; Periodic Fall & Spring)
This course introduces students to the original meaning and significance of religious law and ethics within Judaism. Law is the single most important part of Jewish history and identity. At the same time, law is also the least understood part of Judaism and has often been the source of criticism and hatred. We shall therefore confront one of the most important parts of Jewish civilization and seek to understand it on its own terms. In demonstrating how law becomes a fundamental religious and ethical ideal, the course will focus on the biblical and Rabbinic periods but spans the entire history of Judaism. Consistent with the First Amendment, the approach taken is secular. There are no prerequisites: the course is open to all qualified students. The course begins with ideas of law in ancient Babylon and then studies the ongoing history of those ideas. The biblical idea that a covenant binds Israel to God, along with its implications for human worth - including the view of woman as person - will be examined. Comparative cultural issues include the reinterpretations of covenant within Christianity and Islam. The course investigates the rabbinic concept of oral law, the use of law to maintain the civil and religious stability of the Jewish people, and the kabbalistic transformation of law. The course concludes with contemporary Jewish thinkers who return to the Bible while seeking to establish a modern system of universal ethics. The premise of the course is the discipline of academic religious studies. The assumptions of the course are therefore academic and secular, as required by the First Amendment. All texts and all religious traditions will be examined analytically and critically. Students are expected to understand and master this approach, which includes questioning conventional cultural assumptions about the composition and authorship of the Bible. Willingness to ask such questions and openness to new ways of thinking are essential to success in the course.

CNRC 5051. Before Herodotus: History and Historiography of Mesopotamia and the Ancient Near East. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Seminar. Historical method/sources for Ancient Near Eastern history. Historical tradition and historiographic texts of Mesopotamia and neighboring regions of Ancient Near East/their

relationship to the works of classical historians such as Herodotus. Use of these sources in modern historiography of Ancient Near East. prereq: Previous coursework in Ancient Near Eastern history recommended

CNRC 5071. Greek and Hellenistic Religions. (; 3 cr. ; Student Option; Periodic Spring)
Greek religion from Bronze Age to Hellenistic times. Literature, art, archaeology. Homer/ Olympian deities. Ritual performance, prayer, sacrifice. Temple architecture. Death/afterlife. Mystery cults. Philosophical religion. Near Eastern salvation religions. Meets with 3071.

CNRC 5072. The Birth of Christianity. (AH; 3 cr. ; Student Option; Periodic Fall & Spring)
Early Jesus movement in cultural/historical setting. Origins in Judaism. Traditions about Jesus. Apostle Paul, controversies/interpreters. Authority, religious practice, structure. Emergence of canon. Contemporary methods of New Testament study. Biblical writings as history/narrative. CNES 3072/CNES 5072/ RELS 3072/RELS 5072 meet together.

CNRC 5115. Midrash: Jewish Biblical Interpretation. (; 3 cr. ; Student Option; Periodic Fall & Spring)
How did the Jews of the first seven centuries of the common era read and understand the Hebrew Bible? What were the problems they faced -- interpretive, historical, theological -- in trying to apply their holy scriptures? This course explores key issues that led to the development of a new form of Judaism in late antiquity, rabbinic Judaism, and its methods of scriptural interpretation. The course's study will focus on the forms and practices of rabbinic scriptural interpretation (midrash) as it developed in Roman Palestine and Sasanian Babylonia, focusing on key narrative and legal passages in the Five Books of Moses (Torah). A main focus of the course will be on the ways the rabbis adapted the Hebrew Bible to express their own core concerns.

CNRC 5121. Gender and Body in Early Christianity. (AH; 3 cr. ; Student Option; Fall Odd Year)
Ancient Christians, like any other social group in the ancient world, represented themselves through images, stories, and discourses using the cultural tools available to them in their own contexts. In this course, we will explore two key texts of early Christianity (1 Corinthians and the Gospel of Mark) with special attention to how representations of the body and gender served to communicate the nature of what it meant to be Christian for these authors. The study of ancient material offers a space to acquire the skills of critical analysis of body and gender dynamics so that we can better understand the roles that the body and gender play in shaping our self-identity, social interaction, and societal structures.

CNRC 5204. The Dead Sea Scrolls. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Introduction to Dead Sea Scrolls and Qumran. Contents of Dead Sea Scrolls, significance for development of Bible. Background of Judaism and Christianity. Archaeological site of Qumran. Open to graduate students across the college; knowledge of classical Hebrew will not be required. The course is open to upper level undergraduate students with permission of the instructor.

CNRC 5502W. Ancient Israel: From Conquest to Exile. (WI; 3 cr. ; Student Option; Periodic Spring)
Israel and Judah were not states of great importance in the ancient Near East. Their population and territory were small, and they could not resist conquest by larger, more powerful states like Assyria and Rome. Yet their ancient history matters greatly today, out of proportion to its insignificance during the periods in which it transpired. The historical experiences of the people of Israel and Judah were accorded religious meaning and literary articulation in the Hebrew Bible (the Old Testament), which became a foundational text for Judaism, Christianity, and Islam. Essential features of Western as well as Islamic civilization are predicated on some element of Israel?s ancient past, as mediated through the Bible; therefore it behooves us to understand that past. But the Bible is a religious work, not a transcript of events, and the history of ancient Israel is not derived merely from reading the biblical accounts of it. Archaeological excavations have revealed the physical remains of the cultures of Israel and neighboring lands, as well as bringing to light inscriptions, documents, and literary works produced by those cultures. These sources, which complement and sometimes contradict the accounts conveyed in the Bible, provide the basis for reconstructing a comprehensive history of ancient Israel. This course covers the history of Israel and Judah from the Late Bronze Age (c. 1550-1200 BCE), by the end of which Israel had emerged as a distinct ethnic entity, to the period of Roman rule (63 BCE-330 CE), which saw the final extinction of ancient Israel, represented by the kingdom of Judea, as a political entity. Knowledge of this history is based on archaeological, epigraphic, and literary sources, including the Hebrew Bible. N.B.: Students should be aware that the study of history, like all the human and natural sciences, is predicated on inquiry, not a priori judgments. Accordingly, the Bible is not privileged as an intrinsically true or authoritative record. No text is presumed inerrant, and all sources are subject to scrutiny, in the context of scholarly discourse. Biblical texts are treated just like all other texts, as the products of human beings embedded in a historical context, and as the subject of analysis and interpretation. Persons of all faiths and of no faith are equally welcome to participate in such scholarly discourse. However, students who feel that their own religious beliefs require an understanding of the Bible that is antithetical to the foregoing statements are cautioned that they may find themselves uncomfortable with this course.

CNRC 5713. Introduction to Ugaritic. (; 3 cr. ; Student Option; Periodic Fall)
Ugaritic alphabetic cuneiform script, morphology, and syntax. Reading of representative samples of Ugaritic literature. Attention to linguistic and cultural issues and links to biblical and other Ancient Near Eastern texts. prereq: Adv Hebrew, previous study of biblical texts or instr consent

CNRC 5787. Visual Cultures in Contact: Cross-Cultural Interaction in the Ancient and Early Medieval Worlds. (3 cr. ; Student Option; Fall Even Year)
Evaluate critical perspectives from variety of interdisciplinary conversations. Framework for studying cross-cultural interaction among ancient visual cultures that integrates practical, cognitive, object oriented approaches. Cross-continental movement/selective appropriation of objects/motifs.

CNRC 5993. Directed Studies. (1-4 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. Prereq-instr consent, dept consent, college consent.

CNRC 5994. Directed Research. (1-12 cr. ; Student Option; Every Fall & Spring)
Guided individual research. Prereq-instr consent, dept consent, college consent.

CNRC 5996. Directed Instruction. (1-12 cr. ; Student Option; Every Fall & Spring)
Guided individual research. Prereq-instr consent, dept consent, college consent.

CNRC 8190. Seminar: Issues in Ancient Art and Archaeology. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Selected issues, with special attention to current scholarly disputes. Topics specified in [Class Schedule].

CNRC 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Master's student, adviser and DGS consent

CNRC 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Doctoral student, adviser and DGS consent

CNRC 8513. Scripture and Interpretation. (3 cr. ; A-F or Audit; Fall Even, Spring Odd Year)
Ideas of divine revelation. Impact upon religion/ literature. How history of Bible's creation, transmission, interpretation helps us think critically about role of revelation in history of religious traditions. prereq: Grad student

CNRC 8530. Religions of the Ancient Mediterranean World. (; 3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Intensive study of particular aspects of religious practice in the ancient Mediterranean world, often from a comparative perspective. Focus on scrutiny of primary sources and discussion of contemporary trends in scholarship. Topics specified in the Class Schedule.

CNRC 8550. Gender and Body in Ancient Religion. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
This topics course will offer a theoretically sophisticated and in-depth examination of conceptualizations of gender and the body in ancient culture, specifically instantiated in religious writings, activity, and thought. Students will gain a thorough working

knowledge of current theoretical discussions of gender and the body, while at the same time exploring the role gender played in narratives, religious practice, and philosophical writings of the ancient world. Opportunities will be available to study various time frames (beginning of the first millennium BCE to 500 CE), specific local cultures (determined by geographical regions), and ethnic/religious groups (Israelites, Jews, Romans, Greeks, Christians, Egyptians, etc.). Students will be heavily involved in the weekly presentation of topics and discussion, and PhD students will be expected to produce research that will be headed toward use in their dissertations or a suitable for future publication. Topics specified in class schedule.

CNRC 8570. Readings in Religious Texts. (; 3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Close reading of selected literary or epigraphical texts of importance for the history of ancient Mediterranean religions, along with critical discussion of trends in recent scholarship. The texts may be read in the original languages (such as Greek, Latin, Hebrew, etc.) but may also be accessed in translation where appropriate.

CNRC 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
To be determined prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CNRC 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required (Plan A only)

CNRC 8794. Practicum for Future Faculty in Classics. (; 1 cr. ; S-N only; Every Spring)
Workshop in professional development. Developing the dissertation. Preparing a portfolio to document/reflect on teaching the ancient world and its languages. Readings, workshops, peer teaching, reflective writing. prereq: Doctoral [major or minor] in Classical/ Near Eastern studies

CNRC 8888. Thesis Credits: Doctoral. (1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

CNRC 8950. Topics in Classical & Near Eastern Studies. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Topics such as slavery, women in antiquity, pagans and Jews, the taboo, and modern study of myth.

Clinical Laboratory Science (CLS)

CLS 5090. Special Laboratory Methods. (; 1-2 cr. ; A-F or Audit; Every Fall & Spring)
Assignment on an individual basis to one of a variety of special areas of experience in the clinical lab. prereq: instr consent

CLS 5100. Virology, Mycology, and Parasitology for Medical Technologists. (; 2 cr. ; A-F or Audit; Every Spring)
Lab diagnosis of viral, fungal, and parasitic infections. Lecture. prereq: microbiology course with lab, biochem course

CLS 5120. Seminar: Clinical Laboratory Science. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Fall & Spring)
Current literature. Presentation/discussion of research. prereq: instr consent

CLS 5121. Journal Presentations. (; 1 cr. [max 2 cr.] ; S-N or Audit; Every Fall & Spring)
Critical analysis, evaluation, discussion of current journal articles in student's specialty area. prereq: 1st yr CLS grad student

CLS 5125. Practicum Teaching. (; 1-2 cr. ; A-F or Audit; Every Fall & Spring)
Supervised teaching experience, develop skills using instructional materials, tests, and measurements. prereq: instr consent

CLS 5129. Elements of Laboratory Administration. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Leadership styles, employee selection and evaluation, communications, motivation, morale, discipline, job descriptions, record keeping, budgets, cost accounting, purchasing, product evaluation, lab safety, labor relations, government regulations. prereq: instr consent

CLS 5130. Practicum in Laboratory Administration. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Supervised experience and assignment of specific problems related to lab service and management in health care institutions. prereq: instr consent

CLS 5140. Techniques for Teaching. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Developing objectives, classroom activities, and evaluation criteria for medical technology education. prereq: instr consent

CLS 5165. Advanced Clinical Immunohematology. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Observation, study, and practice in special problems, advanced techniques, and methodology. prereq: instr consent

CLS 5402. Molecular Diagnostics. (; 1 cr. ; A-F only; Every Fall)
Basic theory/application of molecular diagnostics in clinical lab. Lecture, lab. prereq: instr consent

CLS 5768. Advanced Hematology. (; 5-10 cr. [max 30 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Practical experience collecting bone marrow from patients. Diagnosing hematological diseases by evaluating and interpreting cells from clinical specimens of bone marrow, peripheral blood, and, if applicable, lymph nodes. prereq: instr consent

CLS 5864. Research Seminar. (; 1 cr. [max 10 cr.] ; S-N or Audit; Every Fall & Spring)
Departmental research seminar series. prereq: instr consent

CLS 5865. Departmental Seminar. (; 1 cr. [max 10 cr.] ; S-N or Audit; Every Fall & Spring)
Departmental clinical lab research seminar series. prereq: instr consent

CLS 8193. Advanced Topics in Clinical Chemistry. (; 2 cr. ; Student Option; Every Fall, Spring & Summer)
Includes use of molecular approaches to diagnosis and risk assessment of selected diseases. prereq: instr consent

CLS 8194. Research on Clinical Laboratory Problems. (; 1-3 cr. ; Student Option; Every Fall, Spring & Summer)
Individual research project in a selected area. prereq: instr consent

CLS 8293. Educational Administration in Medical Technology. (; 2 cr. ; Student Option; Every Fall, Spring & Summer)
Responsibilities of administration to students, faculty, and educational community. Curriculum planning, accreditation, staffing, student selection, finances. Sample administrative problems and decisions used as practice vehicles. prereq: instr consent

CLS 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

CLS 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only

Clinical Physiol, Movement Sci (CPMS)

CPMS 5101. Introduction to Clinical Physiology and Movement Science. (; 3 cr. [max 6 cr.] ; A-F or Audit; Periodic Fall)
Overview of clinical physiology and clinical movement science. For students in such diverse fields as bioengineering, kinesiology, neuroscience, physical therapy, physiology, psychology, public health, occupational therapy.

CPMS 5201. Colloquium in Clinical Physiology and Movement Science. (; 1 cr. [max 4 cr.] ; S-N or Audit; Every Fall & Spring)
Interdisciplinary course meets 1st and 3rd week of the month. Current research areas, scientific methods, and interpretation of results in the areas of clinical movement science and clinical physiology. prereq: Undergrad level in basic anatomy and physiology is highly recommended

CPMS 8201. Seminar in Clinical Physiology and Movement Science. (; 1 cr. [max 4 cr.] ; S-N or Audit; Every Spring)
Meets 1st and 3rd week of the month. Current research areas, scientific methods, and the interpretation of results in the areas of clinical movement science and clinical physiology.

Cognitive Science (CGSC)

CGSC 5051. Overview of Cognitive Psychology. (3 cr. ; A-F only; Every Fall)
This course provides a comprehensive introduction to the major tools, assumptions, and theories of cognitive psychology, exploring the nature of thought processes such as attention, memory, concept, reasoning, perception, emotion, and language. This course lays a foundation for understanding how the mind works and how the brain produces such a mind.

CGSC 8000. Seminar: Philosophy of the Cognitive Sciences. (; 3 cr. [max 6 cr.] ; Student Option; Spring Odd Year)
Philosophical framework for analyzing cognitive sciences. Recent developments in metaphysics and epistemology. Nature of scientific theories, methodologies of cognitive sciences, relations among cognitive sciences, relation of cognitive science to epistemology, and various philosophical problems. prereq: Grad cog sci minor or instr consent

CGSC 8001. Proseminar in Cognitive Science. (; 2 cr. ; S-N or Audit; Periodic Fall)
Survey of major topics, including theoretical assumptions, methods, and samples of current research. prereq: Grad cog sci minor or instr consent

CGSC 8041. Cognitive Neuroscience. (; 4 cr. ; A-F or Audit; Spring Even Year)
Relations between brain activity and cognitive function in mammals. Working memory, attention, decision processing, executive function, categorization, planning, sequence processing. Behavioral/physiological perspectives. Disruption of cognitive function following brain damage. Extracellular recording of single neuron activity in nonhuman primates. Functional neuroimaging/ magnetoencephalography in humans. prereq: instr consent

CGSC 8360. Seminar: Topics in Cognitive Science. (; 1-4 cr. [max 24 cr.] ; Student Option; Periodic Fall & Spring)
Lectures and in-depth discussion on a topic.

CGSC 8410. Perspectives in Learning, Perception, and Cognition. (; 2 cr. [max 24 cr.] ; S-N only; Every Fall & Spring)
Lectures/discussions in cognitive sciences by local/visiting faculty.

CGSC 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student, adviser consent, DGS consent

CGSC 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CGSC 8777. Thesis Credit: Masters. (1-10 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only] max crs 50; 10 completions allowed

CGSC 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer, 24 cr required

CGSC 8991. Independent Study. (; 1-4 cr. [max 15 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent study. prereq: instr consent

Col of Food, Agr & Nat Res Sci (CFAN)

CFAN 5480. Topics in CFANS. (; 1-4 cr. [max 8 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Lectures by visiting scholar(s) or regular faculty member. Topics specified in Class Schedule. prereq: Grad student

CFAN 5500. International Field Studies Seminar. (; 1-3 cr. [max 6 cr.] ; A-F or Audit; Every Fall & Spring)
Interface of agriculture with natural resource, environmental, economic, food safety, public policy, ethical issues transcending national borders. Seminars take place in various countries/regions. Active learning, lectures, discussion tutorials, field trips, reports, exams. prereq: instr consent

CFAN 5501. Costa Rica--Sustainable Development. (; 3 cr. ; A-F only; Every Spring)
Costa Rica's development strategy. Agriculture, tourism, energy, urbanization. Synergies/tension between economic, social, environmental impacts. How organizations maximize benefits associated with sustainable development. prereq: grad student, instr consent

CFAN 5518. Environmental Issues in New Zealand. (GP; 3 cr. ; A-F only; Every Spring)
This Global Seminar, Environmental Issues in New Zealand, is open to any undergraduate or graduate students regardless of major. Priority for enrollment is given to University of Minnesota students, but students from other institutions may attend if space is available. There are no course prerequisites and all instruction is in English. New Zealand is a modern country with friendly people and awesome scenery. Our daily news is filled with reports on climate change, water scarcity and pollution, soaring energy costs, and food shortages. Solutions must consider environmental, economic, and social implications of our management strategies. Frequently there are tradeoffs between benefits and costs. University students as future leaders of business, government, and social programs should understand how to analyze environmental issues. What are the issues? Who is affected? What alternatives exist to solve them? What are the environmental, economic, and social tradeoffs between these alternatives? What are reliable sources of information? How can each of us contribute to solutions? New Zealand has undergone significant changes in its plant and animal composition following the invasion of humans and the exotic species they introduced. Alarmed by these changes, New Zealanders recently have made significant strides in recognizing environmental issues and seeking sustainable solutions. They offer valuable lessons for U.S. students to bring home and apply to our own environmental issues.

CFAN 5520. Germany: Leading the Renewables Revolution. (; 1-3 cr. ; A-F only; Every Fall)
A bilateral agreement between Minnesota and Germany to pursue best practices in clean energy offers a unique opportunity for students to participate in an international delegation. Students meet government, business, academia and civil society leaders and see Germany's integrated approach to energy transition up close. Embedded fall semester with winter study abroad travel to Germany. CFAN 5520 is the graduate offering of this course. prereq: instructor consent

CFAN 8101. Professional Skills for Scientists. (2 cr. ; S-N only; Spring Odd Year)
Presentations, discussions, and exercises in leading people and in managing money, time, operations, and projects within the context of research and development in the food, agricultural, and natural resource sciences.

College of Liberal Arts (CLA)

CLA 8000. Topics in Graduate Studies. (; 1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall, Spring & Summer)
This is a topics course related to graduate students in CLA.

Communication Studies (COMM)

COMM 5110. Special Topics in Communication Theory. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Summer)
Advanced theoretical problems. See department office for current offering.

COMM 5211. Critical Media Studies: Theory and Methods. (; 3 cr. ; A-F only; Every Spring)
Survey of theories, research methods, and scholars dominating critical media studies since late 1920s. prereq: Graduate students or undergraduates who have completed COMM 3211 (Introduction to Media Studies) or its equivalent

COMM 5221. Media, Race, and Identity. (3 cr. ; Student Option; Periodic Fall)
Critical media studies perspective on cultural politics of race and ethnicity. Social construction of race, politics of racism, media representations of race. prereq: 3211 or instr consent

COMM 5231. Media Outlaws. (; 3 cr. ; Student Option; Fall Even Year)
People working outside of mainstream media institutions who find creative/provocative ways to use media as space for cultural, political, or economic critique/resistance.

COMM 5261. Political Economy of Media Culture. (; 3 cr. ; Student Option; Every Fall & Spring)
Organizational practices of media communicators. Media content as link between communicators and audiences. How viewers use/process media content. prereq: 3211 or instr consent

COMM 5411. Small Group Communication Research. (; 3 cr. ; A-F or Audit; Every Spring)
Survey of small group communication research; theory and practice. Group decision-making and leadership. prereq: 3411 or instr consent

COMM 5431. The Process of Persuasion. (; 3 cr. ; Student Option; Every Fall & Spring)
Communication campaigns (e.g., advertising, political) illustrating persuasive processes and theories. Research paper required. prereq: 3431

COMM 5441. Communication in Human Organizations. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Communication in organizational settings. Organizational structure and dynamics and their effect upon the communication process. Individual projects.

COMM 5451W. Intercultural Communication Processes. (WI; 3 cr. ; Student Option; Periodic Fall)
Theory and research on cultural differences in values, norms, behaviors, and perceptions that affect communication across cultures internationally and domestically.

COMM 5611. Survey of Rhetorical Theory. (3 cr. ; Student Option; Periodic Fall)
Rhetorical theory, from ancient to contemporary period. Application to public discourse.

COMM 5615W. Introduction to Rhetorical Criticism. (WI; 3 cr. ; Student Option; Every Spring)
Analysis of public discourse using various theoretical perspectives. prereq: 1101; 3601 recommended

COMM 5617. History and Criticism of U.S. Public Discourse: 1630-1865. (; 3 cr. ; Student Option; Periodic Fall)
How discourse has been used to establish or maintain power. Speeches and public debates used to examine American public address from 17th century (e.g., Puritan sermons) to the Civil War. prereq: Jr

COMM 5970. Directed Study. (1-3 cr. [max 18 cr.] ; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. Instructor and department consent is required.

COMM 5994. Communication Research Practicum. (; 1-3 cr. [max 9 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Students participate in research group. prereq: instr consent

COMM 8000. Communication Studies Research Colloquium. (1 cr. [max 4 cr.] ; S-N only; Every Fall & Spring)
The Friday Colloquium is a mix of research presentations by scholars in Communication Studies and related fields, and workshops on professional development. The Colloquium provides graduate students with a broader introduction to the field, cutting edge work, and opportunities for developing their interests and skills. The content and specific requirements of COMM 8xxx will vary by year, depending upon the faculty member who coordinates the colloquium series and the direction provided by the Director of Graduate Studies. In the fall of each year, the professional development portion of the Colloquium will focus on teaching. Professional development sessions in the spring may include: navigating the job market, publishing, networking, or alternative academic career paths, depending on the range of speakers and interests of the cohort.

COMM 8100. Communication Studies Research Colloquium. (; 0 cr. ; S-N only; Every Fall & Spring)
The Friday Colloquium is a mix of research presentations by scholars in Communication Studies and related fields, and workshops on professional development. The Colloquium provides graduate students with a broader introduction to the field, cutting edge work, and opportunities for developing their interests and skills. The content and specific requirements of COMM 8xxx will vary by year, depending upon the faculty member who coordinates the colloquium series and the direction provided by the Director of Graduate Studies. In the fall of each year, the professional development portion of the Colloquium will focus on teaching. Professional development sessions in the spring may include: navigating the job market, publishing, networking, or alternative academic career paths, depending on the range of speakers and interests of the cohort.

COMM 8101. Introduction to Graduate Communication Studies. (3 cr. ; A-F or Audit; Every Fall)
COMM 8101 is a required course that provides beginning graduate students with a foundation for understanding the discipline of communication studies from the perspective of a graduate student, scholar, and faculty citizen.

COMM 8110. Seminar: Communication Research Methods. (; 3 cr. [max 15 cr.] ; Student Option; Periodic Fall & Spring)
Evaluation of research methods in speech-communication. prereq: undergrad degree in spch-comm or equiv

COMM 8210. Seminar: Selected Topics in U.S. Electronic Media. (; 3 cr. [max 18 cr.] ; Student Option; Periodic Fall & Spring)
Literature survey; evaluating research on topics; conducting independent research project on a particular topic. prereq: 5210 or instr consent; offered when feasible

COMM 8211. Critical Communication Studies: History, Theory, Method. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Qualitative research methods for studying media institutions, texts, audiences, and contexts.

COMM 8231. Seminar: National and International Electronic Media Systems. (3 cr. ; Student Option; Periodic Fall)
Historical and contemporary aspects of national and international electronic media systems. Roles of national and international regulatory bodies. Approaches to programming and evidence of effectiveness. prereq: 4231 or instr consent

COMM 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

COMM 8402. Seminar: Interpersonal Communication. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Evaluate and develop new perspectives for analyzing, diagnosing, and managing interpersonal communication problems. prereq: 5402 or instr consent

COMM 8403. Seminar: Emotion and Communication. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Major theories of emotion and the role of emotion in communication.

COMM 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

COMM 8451. Seminar: Intercultural and Diversity Research. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Development of ideas/methods for research project, M.A. Plan B project, or Ph.D. dissertation. prereq: instr consent

COMM 8452. Seminar: Methods of Intercultural/Diversity Facilitation. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Theories of and techniques for managing effective intercultural communication and diversity. Intercultural training. prereq: 4451 or 5452 recommended

COMM 8502. Seminar: Communication Theory Construction. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Logic of communication theory development and modification from a social scientific perspective. Types of communication theories. prereq: 5421 or instr consent

COMM 8504. Seminar: Rhetorical Criticism. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Rhetorical criticism theories and methods. Rhetoric as applied to literary studies and the growth of hermeneutics as vantage points for reassessing rhetorical methods. prereq: 5615 or instr consent

COMM 8606. Seminar: Rhetorical Analysis of Campaigns and Movements. (; 3 cr. ; Student Option; Periodic Fall)
Literature and methodology in historical and contemporary rhetorical campaigns and movements.

COMM 8611. Seminar: Rhetoric. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
History/criticism of rhetorical theory. Research in rhetoric. prereq: 5611 or instr consent

COMM 8625. Seminar: Communication Ethics. (; 3 cr. ; A-F or Audit; Periodic Fall)
Independent research on communication ethics in interpersonal, group, organizational, intercultural, and media settings. Theories of ethics and methods of analysis. prereq: Ethics course or instr consent

COMM 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

COMM 8777. Thesis Credits: Master's. (; 1-18 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

COMM 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

COMM 8910. Advanced Topics in Communication Studies. (; 3 cr. [max 18 cr.] ; Student Option; Periodic Fall & Spring)
Literature survey; evaluating research on topics; conducting independent research project on a particular topic.

COMM 8994. Directed Research. (1-3 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
Supervised research project.

Compar Study in Discourse/Soc (CSDS)

CSDS 5302. Aesthetics and the Valuation of Art. (3 cr. ; Student Option; Periodic Fall & Spring)
Society, ideology, aesthetic value in light of recent critical theories of visual art, music, literature. Mediations of place, social class, gender, ideology on aesthetic judgment in post-renaissance Western culture.

CSDS 8901. Intro to the Profession: Critical Methods of Research, Pedagogy, and Creative Work in the Humanities. (; 3 cr. ; Student Option; Every Spring)
Prepare graduate majors for teaching. Issues of pedagogy. Preparing syllabi for specific courses that graduate instructors teach. Required for students planning to teach in Department of Cultural Studies and Comparative Literature. prereq: Grad CSDS major

CSDS 8910. Advanced Topics in Comparative Studies in Discourse and Society. (; 3 cr. [max 24 cr.] ; Student Option; Every Fall & Spring)
Themes in comparative, sociohistorical analysis of discursive practices. Individually or team taught. Topics vary by instructor and semester.

Comparative & Molecular Biosci (CMB)

CMB 5200. Statistical Genetics and Genomics. (; 4 cr. ; A-F or Audit; Fall Even Year)
Statistical issues in genomics. Gene detection, including statistical analysis/designs for linkage study and for mapping quantitative trait loci. Linkage analysis using pedigree data for codominant/dominant markers. Using radiation hybrid mapping and single cell typing. Design issues in linkage analysis, parentage testing, and marker polymorphism.

CMB 5201. Stopping the next pandemic: vaccines and drugs for battling viral infections. (; 2 cr. ; A-F only; Every Spring)
The COVID-19 pandemic underscores the importance of understanding viruses and developing vaccines and drugs to battle them. This course presents basic mechanisms of viruses including the COVID-19 virus, covers principles and applications of viral vaccines and antiviral drugs, and introduces methods for developing viral vaccines and antiviral drugs. This course also highlights scientific advances on viral vaccines and antiviral drugs. The overall goal of the course is to foster students? interest in virology, help students understand viruses in life situations, and prepare interested students for potential virology-related careers. Targeted students: graduate students, professional students and senior undergraduate students who are interested in clinical and basic medicine, veterinary medicine, microbiology, virology, biological scientific research, and vaccine and pharmaceutical industries.

CMB 5303. Comparative Models of Disease. (2 cr. ; A-F only; Every Spring)
Disease processes in organ systems. Examples of animal models. Comparative medicine. Clinical relevance of problem/ disease. Animal models used to study disease process/problem. Lectures.

CMB 5340. Structural Biology in Biomedical Research. (2 cr. ; A-F only; Every Spring)
Structural biology plays a central role in biomedical research, but it is a challenging field to learn. This course teaches basic structural biology and its applications to biomedical research in an accessible and practical fashion. We will cover the principles and procedures of structural biology as well as structural biology databases and software. Students will also learn how structural biology is used to solve scientific problems (e.g., elucidating molecular mechanisms and designing drugs and vaccines) and acquire skills that may facilitate their own research (e.g., reading structural biology literature and designing mutations). Student learning is achieved through classroom lectures, computer labs, written critique and oral presentation of research literature, and participation in discussion. The overall goal of this course is to help students understand structural biology and use it in their own research.

CMB 5571. Pathogenomics and Molecular Epidemiology - Learning to Fly. (3 cr. ; A-F only; Every Spring)
This course is designed provide an introduction to the use of molecular methods in our understanding of the pathogenesis, etiology, and transmission of infectious diseases that are important to both animals and public health. This is intended as a hands-on course for the student to learn techniques related to genome sequencing, pangenome analysis, phylogenetic analysis, and metagenomic analysis, and then apply these techniques towards their own research.

CMB 5594. Directed Research in Comparative and Molecular Biosciences. (; 1-4 cr. [max 8 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent study as determined by instructor. Usual activity includes conducting research in instructor's lab. prereq: Jr, instr consent

CMB 5910. Grantwriting: What Makes a Winning Proposal?. (2 cr. ; Student Option; Every Spring)
Components of a strong proposal. Grant submission process. What reviewers look for. How to locate grant announcements that match reserach interests.

CMB 5912. Creativity. (1 cr. ; Student Option; Every Spring)
Creativity will be explored and used to provide new perspectives on a variety of professional goals, activities and challenges. Lectures will be followed by a mixture of individual and group activities to provide a guided exploration of how these creative approaches can be applied to many situations. Students will learn skills to expand their vision, become more adept at problem solving, design more innovative research, inspire themselves and others and become more fascinating communicators.

CMB 5915. Essential Statistics for Life Sciences. (3 cr. ; A-F or Audit; Every Fall)
This course is a broad overview of the principles and methods of statistical analysis used in life sciences research, including biological, veterinary, and translational research, and provides the background a new researcher needs to understand and apply commonly used statistical methods and the preparation needed for more advanced coursework. Classes will include general instruction and background information, detailed examples of how to perform the analyses, with actual data sets, and discussion on how the topic has been applied in biological research, including reading and assessing papers in the field. Computing will be performed using the R software environment, though students may use alternate software with permission. Topics will include: ? Descriptive statistics and exploratory graphics ? Understanding statistical inference and interpreting P-values and confidence intervals. ? One and two sample inference, including t-tests, proportion tests, and non-

parametric alternatives ? Linear regression, including the effects of confounders ? ANOVA methods, including pairwise comparisons and multiple comparisons

CMB 8012. Basic Concepts in Skeletal Biology. (; 2 cr. ; A-F only; Every Spring)
Cells (osteoblasts, osteoclasts, chrondrocytes) that make up skeleton. Transcription/signaling networks regulating cell growth/differentiation. Mechanisms of bone remodeling. Regulation of bone by agents such as hormones. prereq: CMB grad student or instr consent

CMB 8100. Research Rotation in Comparative and Molecular Biosciences. (; 1 cr. [max 2 cr.] ; S-N only; Every Fall & Spring)
Current developments in faculty research. Topics specific to research adviser's area of interest. Eight weeks.

CMB 8134. Ethical Conduct of Animal Research. (; 3 cr. ; Student Option; Every Fall)
Ethical considerations in the use of animal subjects in agricultural, veterinary, and biomedical research. Federal, state, and University guidelines relating to proper conduct for acquisition and use of animals for laboratory, observational, epidemiological, and clinical research. Regulatory requirements. Bases for proper conduct. Societal impact on scientific investigations utilizing animal subjects.

CMB 8202. Mechanisms of Animal Health and Disease II. (3 cr. ; A-F only; Every Fall)
Multi-perspective approach to critically evaluating journal articles, as done for peer-reviewed journals. Aspects of host/pathogen interactions, including molecular/genetic mechanisms of host resistance/pathogenesis.

CMB 8208. Neuropsychopharmacology. (; 3 cr. ; A-F or Audit; Fall Even Year)
Relationships between drugs. Biochemical, behavioral, neurophysiological consequences. Functional biogenic amine, peptidergic, other pathways. Neuronal function/behavior. Feedback mechanisms, induction, inhibition. Stimulants, hallucinogens, depressants, opiates. Student presentations. prereq: graduate student and instr consent

CMB 8303. Comparative Models of Disease. (; 2 cr. ; A-F only; Every Spring)
Disease processes in organ systems. Examples of animal models. Comparative medicine. Clinical relevance of problem/ disease. Animal models used to study disease process/problem. Lectures. prereq: Enrollment in a biological sciences grad program or instr consent

CMB 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

CMB 8344. Mechanisms of Hormone Action. (; 2 cr. ; Student Option; Fall Even Year)
Mechanisms of hormone/cytokine action. Focuses on major signal transduction/ apoptosis. Topics incorporate pharmacology, biochemistry, and cell biology of hormone action in relevant physiological systems. Lectures on basic principles. Specialized lectures. Discussion of primary literature. prereq: Course in biochemistry or cell biology or instr consent

CMB 8361. Neuro-Immune Interactions. (; 3 cr. ; Student Option; Fall Odd Year)
Regulatory systems (neuroendocrine, cytokine, and autonomic nervous systems) linking brain and immune systems in brain-immune axis. Functional effects of bidirectional brain-immune regulation. Offered fall of even-numbered years. prereq: [MICB 5218 or equiv], [NSC 5561 or equiv]

CMB 8371. Mucosal Immunobiology. (; 3 cr. ; A-F or Audit; Periodic Fall)
Host immune processes at body surfaces. Innate/adaptive immunity at mucosal surfaces. Interactions/responses of various mucosal tissues to pathogens. Approaches to target protective vaccination to mucosal tissues. Lectures, journal. prereq: MICa 8001 or equiv or instr consent

CMB 8394. Research in Comparative Biomedical Sciences. (; 1-6 cr. [max 18 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed research determined by student's interests, in consultation with faculty mentor. prereq: Grad CMB major

CMB 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

CMB 8481. Advanced Neuropharmaceutics. (4 cr. ; A-F or Audit; Fall Even Year)
Delivery of compounds to central nervous system (CNS) to activate proteins in specific brain regions for therapeutic benefit. Pharmaceutical/pharmacological issues specific to direct drug delivery to CNS. prereq: instr consent

CMB 8550. Comparative and Molecular Biosciences Seminar. (; 1 cr. [max 8 cr.] ; S-N or Audit; Every Fall & Spring)
Student/faculty presentations of their own research or a directed topic. prereq: Biol sciences grad student

CMB 8560. Research and Literature Reports. (; 1 cr. [max 2 cr.] ; S-N or Audit; Every Fall & Spring)
Current developments in cellular and molecular mechanisms of animal health and disease.

CMB 8571. Pathogenomics and Molecular Epidemiology - Learning to Fly. (3 cr. ; A-F only; Every Spring)
This course is designed provide an introduction to the use of molecular methods in our understanding of the pathogenesis, etiology, and transmission of infectious diseases that are important to both animals and public health. This is intended as a hands-on course for the student to learn techniques related to genome sequencing, pangenome analysis, phylogenetic analysis, and metagenomic analysis, and then apply these techniques towards their own research.

CMB 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

CMB 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

CMB 8910. Statistical Principles of Research Design. (3 cr. ; A-F or Audit; Every Spring)
This course is a broad overview of the principles and techniques of research design and methods used in veterinary and translational research, and provides the background a new researcher needs to understand the literature and make good decisions about what is appropriate for their research. prereq: intro grad level stats course or it's equivalent

Comparative Literature (CL)

CL 5992. Directed Reading in Comparative Literature. (; 1-3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Guided individual reading and study. prereq: instr consent

Computer Engineering (CMPE)

CMPE 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

CMPE 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only

Computer Science (CSCI)

CSCI 5103. Operating Systems. (; 3 cr. ; Student Option; Every Fall)
Conceptual foundation of operating system designs and implementations. Relationships between operating system structures and machine architectures. UNIX implementation mechanisms as examples. prereq: 4061 or instr consent

CSCI 5105. Introduction to Distributed Systems. (; 3 cr. ; Student Option; Periodic Spring)
Distributed system design and implementation. Distributed communication and synchronization, data replication and consistency, distributed file systems, fault tolerance, and distributed scheduling. prereq: [5103 or equiv] or instr consent

CSCI 5106. Programming Languages. (; 3 cr. ; Student Option; Every Fall)
Design and implementation of high-level languages. Course has two parts: (1) language design principles, concepts, constructs; (2) language paradigms, applications. Note:

course does not teach how to program in specific languages. prereq: 4011 or instr consent

CSCI 5115. User Interface Design, Implementation and Evaluation. (; 3 cr. ; Student Option; Every Fall)
Theory, design, programming, and evaluation of interactive application interfaces. Human capabilities and limitations, interface design and engineering, prototyping and interface construction, interface evaluation, and topics such as data visualization and World Wide Web. Course is built around a group project. prereq: 4041 or instr consent

CSCI 5117. Developing the Interactive Web. (; 3 cr. ; Student Option; Spring Even Year)
Hands-on design experience using modern web development tools. Students work in teams to develop software programs using each of four toolkits. Analyze developments in forum posts and classroom discussions. prereq: 4131 or 5131 or instr consent; upper div or grad in CSci recommended

CSCI 5123. Recommender Systems. (3 cr. ; Student Option; Fall Odd Year)
An overview of recommender systems, including content-based and collaborative algorithms for recommendation, programming of recommender systems, and evaluation and metrics for recommender systems. prereq: Java programming and 2033 and 3081, or instructor consent.

CSCI 5125. Collaborative and Social Computing. (; 3 cr. ; Student Option; Spring Even Year)
Introduction to computer-supported cooperative work, social computing. Technology, research methods, theory, case studies of group computing systems. Readings, hands-on experience. prereq: 5115 or instr consent

CSCI 5127W. Embodied Computing: Design & Prototyping. (WI; 3 cr. ; Student Option; Fall Even Year)
In this course, you will learn and apply the principles of embodied computing to human-centered challenges. Through a semester-long team project, you will learn and demonstrate mastery of human-centered embodied computing through two phases: (1) investigating human needs and current embodied practices and (2) rapidly prototyping and iterating embodied computing solutions. One of the ways you will demonstrate this mastery is through the collaborative creation of a written document and project capstone video describing your process and prototype. prereq: CSci 4041, upper division or graduate student, or instructor permission; CSci 5115 or equivalent recommended.

CSCI 5143. Real-Time and Embedded Systems. (; 3 cr. ; A-F only; Periodic Spring)
Real-time systems that require timely response by computer to external stimulus. Embedded systems in which computer is part of machine. Increasing importance of these systems in commercial products. How to control robots and video game consoles. Lecture, informal lab. prereq: [4061 or instr consent], experience with C language

CSCI 5161. Introduction to Compilers. (3 cr. ; Student Option; Every Spring)
Techniques for translating modern programming languages to intermediate forms or machine-executable instructions/their organization into compiler. Lexical analysis, syntax analysis, semantic analysis, data flow analysis, code generation. Compiler project for prototypical language. prereq: [2021, 5106] or instr consent

CSCI 5204. Advanced Computer Architecture. (; 3 cr. ; Student Option; Every Fall)
Instruction set architecture, processor microarchitecture, memory, I/O systems. Interactions between computer software and hardware. Methodologies of computer design. prereq: 4203 or EE 4363

CSCI 5211. Data Communications and Computer Networks. (; 3 cr. ; Student Option; Every Fall)
Concepts, principles, protocols, and applications of computer networks. Layered network architectures, data link protocols, local area networks, network layer/routing protocols, transport, congestion/flow control, emerging high-speed networks, network programming interfaces, networked applications. Case studies using Ethernet, Token Ring, FDDI, TCP/IP, ATM, Email, HTTP, and WWW. prereq: [4061 or instr consent], basic knowledge of [computer architecture, operating systems, probability], grad student

CSCI 5221. Foundations of Advanced Networking. (; 3 cr. ; Student Option; Spring Even Year)
Design principles, protocol mechanisms. Network algorithmics, implementation techniques. Advanced network architectures, state-of-art/emerging networking technologies/ applications, network modeling. Simulation, experiments. prereq: 4211 or 5211 or equiv; intro course in computer networks recommended

CSCI 5271. Introduction to Computer Security. (; 3 cr. ; Student Option; Every Fall)
Concepts of computer, network, and information security. Risk analysis, authentication, access control, security evaluation, audit trails, cryptography, network/ database/application security, viruses, firewalls. prereq: 4061 or 5103 or equiv or instr consent

CSCI 5302. Analysis of Numerical Algorithms. (; 3 cr. ; Student Option; Every Spring)
Additional topics in numerical analysis. Interpolation, approximation, extrapolation, numerical integration/differentiation, numerical solutions of ordinary differential equations. Introduction to optimization techniques. prereq: 2031 or 2033 or instr consent

CSCI 5304. Computational Aspects of Matrix Theory. (; 3 cr. ; Student Option; Every Fall)
Perturbation theory for linear systems and eigenvalue problems. Direct/iterative solution of large linear systems. Matrix factorizations. Computation of eigenvalues/eigenvectors. Singular value decomposition. LAPACK/other software packages. Introduction to sparse matrix methods. prereq: 2031 or 2033 or instr consent

CSCI 5421. Advanced Algorithms and Data Structures. (; 3 cr. ; Student Option; Every Fall & Spring)
Fundamental paradigms of algorithm and data structure design. Divide-and-conquer, dynamic programming, greedy method, graph algorithms, amortization, priority queues and variants, search structures, disjoint-set structures. Theoretical underpinnings. Examples from various problem domains. prereq: 4041 or instr consent

CSCI 5451. Introduction to Parallel Computing: Architectures, Algorithms, and Programming. (; 3 cr. ; Student Option; Every Spring)
Parallel architectures design, embeddings, routing. Examples of parallel computers. Fundamental communication operations. Performance metrics. Parallel algorithms for sorting. Matrix problems, graph problems, dynamic load balancing, types of parallelisms. Parallel programming paradigms. Message passing programming in MPI. Shared-address space programming in openMP or threads. prereq: 4041 or instr consent

CSCI 5461. Functional Genomics, Systems Biology, and Bioinformatics. (; 3 cr. ; Student Option; Every Spring)
Computational methods for analyzing, integrating, and deriving predictions from genomic/proteomic data. Analyzing gene expression, proteomic data, and protein-protein interaction networks. Protein/gene function prediction, Integrating diverse data, visualizing genomic datasets. prereq: 3003 or 4041 or instr consent

CSCI 5465. Introduction to Computing for Biologists. (3 cr. ; Student Option; Fall Odd Year)
This course is designed for graduate students in biology or other related sciences that wish to learn fundamental computing skills that will enable them to develop their own computational approaches for meaningful interpretation of scientific data. Students will complete programming assignments in Python and R. No previous programming knowledge assumed. Prereq: Introductory biology course; non-CSE students only.

CSCI 5471. Modern Cryptography. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Introduction to cryptography. Theoretical foundations, practical applications. Threats, attacks, and countermeasures, including cryptosystems and cryptographic protocols. Secure systems/networks. History of cryptography, encryption (conventional, public key), digital signatures, hash functions, message authentication codes, identification, authentication, applications. prereq: [2011, 4041, [familiarity with number theory or finite fields]] or instr consent

CSCI 5481. Computational Techniques for Genomics. (; 3 cr. ; Student Option; Every Fall)
Techniques to analyze biological data generated by genome sequencing, proteomics,

cell-wide measurements of gene expression changes. Algorithms for single/multiple sequence alignments/assembly. Search algorithms for sequence databases, phylogenetic tree construction algorithms. Algorithms for gene/promoter and protein structure prediction. Data mining for micro array expression analysis. Reverse engineering of regulatory networks. prereq: 4041 or instr consent

CSCI 5511. Artificial Intelligence I. (3 cr. ; Student Option; Every Fall)
Introduction to AI. Problem solving, search, inference techniques. Logic/theorem proving. Knowledge representation, rules, frames, semantic networks. Planning/scheduling. Lisp programming language. prereq: [2041 or instr consent], grad student

CSCI 5512. Artificial Intelligence II. (; 3 cr. ; Student Option; Every Spring)
Uncertainty in artificial intelligence. Probability as a model of uncertainty, methods for reasoning/learning under uncertainty, utility theory, decision-theoretic methods. prereq: [STAT 3021, 4041] or instr consent

CSCI 5521. Machine Learning Fundamentals. (; 3 cr. ; Student Option; Periodic Fall)
Problems of pattern recognition, feature selection, measurement techniques. Statistical decision theory, nonstatistical techniques. Automatic feature selection/data clustering. Syntactic pattern recognition. Mathematical pattern recognition/artificial intelligence. Prereq: [2031 or 2033], STAT 3021, and knowledge of partial derivatives

CSCI 5523. Introduction to Data Mining. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Data pre-processing techniques, data types, similarity measures, data visualization/ exploration. Predictive models (e.g., decision trees, SVM, Bayes, K-nearest neighbors, bagging, boosting). Model evaluation techniques, Clustering (hierarchical, partitional, density-based), association analysis, anomaly detection. Case studies from areas such as earth science, the Web, network intrusion, and genomics. Hands-on projects. prereq: 4041 or equiv or instr consent

CSCI 5525. Machine Learning: Analysis and Methods. (; 3 cr. ; Student Option; Fall Even Year)
Models of learning. Supervised algorithms such as perceptrons, logistic regression, and large margin methods (SVMs, boosting). Hypothesis evaluation. Learning theory. Online algorithms such as winnow and weighted majority. Unsupervised algorithms, dimensionality reduction, spectral methods. Graphical models. prereq: Grad student or instr consent

CSCI 5527. Deep Learning: Models, Computation, and Applications. (3 cr. ; Student Option; Every Fall)
This course introduces the basic ingredients of deep learning, describes effective models and computational principles, and samples important applications. Topics include universal approximation theorems, basics of numerical optimization, auto-differentiation, convolution neural networks, recurrent neural networks, generative neural networks, representation learning, and deep reinforcement learning. Prerequisite: CSCI 5521 or equivalent Maturity in linear algebra, calculus, and basic probability is assumed. Familiarity with Python is necessary to complete the homework assignments and final project.

CSCI 5541. Natural Language Processing. (; 3 cr. ; Student Option; Periodic Spring)
Computers are poor conversationalists, despite decades of attempts to change that fact. This course will provide an overview of the computational techniques developed in the attempt to enable computers to interpret and respond appropriately to ideas expressed using natural languages (such as English or French) as opposed to formal languages (such as C++ or Python). Topics in this course will include parsing, semantic analysis, machine translation, dialogue systems, and statistical methods in speech recognition. Suggested prerequisite: CSCI 2041

CSCI 5551. Introduction to Intelligent Robotic Systems. (; 3 cr. ; Student Option; Periodic Fall)
Transformations, kinematics/inverse kinematics, dynamics, control. Sensing (robot vision, force control, tactile sensing), applications of sensor-based robot control, robot programming, mobile robotics, microrobotics. prereq: 2031 or 2033 or instr consent

CSCI 5552. Sensing and Estimation in Robotics. (; 3 cr. ; Student Option; Periodic Spring)
Bayesian estimation, maximum likelihood estimation, Kalman filtering, particle filtering. Sensor modeling and fusion. Mobile robot motion estimation (odometry, inertial,laser scan matching, vision-based) and path planning. Map representations, landmark-based localization, Markov localization, simultaneous localization/mapping (SLAM), multi-robot localization/mapping. prereq: [5551, Stat 3021] or instr consent

CSCI 5561. Computer Vision. (; 3 cr. ; Student Option; Every Spring)
Issues in perspective transformations, edge detection, image filtering, image segmentation, and feature tracking. Complex problems in shape recovery, stereo, active vision, autonomous navigation, shadows, and physics-based vision. Applications. prereq: CSci 5511, 5521, or instructor consent.

CSCI 5563. Multiview 3D Geometry in Computer Vision. (3 cr. ; A-F or Audit; Every Spring)
The 3D spatial relationship between cameras and scenes in computer vision. Application to tasks such as planning robots, reconstructing scenes from photos, and understanding human behaviors from body-worn cameras data. Multiview theory fundamentals, structure-from-motion, state-of-the-art approaches, and current research integration. Prereq: Students enrolling in this course must have completed CSCI 5561 or have instructor consent.

CSCI 5607. Fundamentals of Computer Graphics 1. (3 cr. ; Student Option; Every Fall)
Fundamental algorithms in computer graphics. Emphasizes programming projects in C/C++. Scan conversion, hidden surface removal, geometrical transformations, projection, illumination/shading, parametric cubic curves, texture mapping, antialising, ray tracing. Developing graphics software, graphics research. prereq: concurrent registration is required (or allowed) in 2033, concurrent registration is required (or allowed) in 3081

CSCI 5608. Fundamentals of Computer Graphics II. (3 cr. ; Student Option; Periodic Spring)
Advanced topics in image synthesis, modeling, rendering. Image processing, image warping, global illumination, non-photorealistic rendering, texture synthesis. Parametric cubic surfaces, subdivision surfaces, acceleration techniques, advanced texture mapping. Programming in C/C++. prereq: 5607 or instr consent

CSCI 5609. Visualization. (3 cr. ; Student Option; Fall Even Year)
Fundamental theory/practice in data visualization. Programming applications. Perceptual issues in effective data representation, multivariate visualization, information visualization, vector field/volume visualization. prereq: [1913, 4041] or equiv or instr consent

CSCI 5611. Animation & Planning in Games. (3 cr. ; Student Option; Fall Odd Year)
Theory behind algorithms used to bring virtual worlds to life. Computer animation topics. Real-time, interactive techniques used in modern games. Physically-based animation, motion planning, character animation, simulation in virtual worlds. prereq: 4041 or 4611 or instr consent

CSCI 5619. Virtual Reality and 3D Interaction. (3 cr. ; Student Option; Spring Odd Year)
Introduction to software, technology/ applications in virtual/augmented reality, 3D user interaction. Overview of current research. Hands-on projects. prereq: 4611 or 5607 or 5115 or equiv or instr consent

CSCI 5707. Principles of Database Systems. (; 3 cr. ; Student Option; Every Fall)
Concepts, database architecture, alternative conceptual data models, foundations of data manipulation/analysis, logical data models, database designs, models of database security/integrity, current trends. prereq: [4041 or instr consent], grad student

CSCI 5708. Architecture and Implementation of Database Management Systems. (; 3 cr. ; Student Option; Every Spring)
Techniques in commercial/research-oriented database systems. Catalogs. Physical storage techniques. Query processing/optimization. Transaction management. Mechanisms for concurrency control, disaster recovery, distribution, security, integrity, extended data types, triggers, and rules. prereq: 4707 or 5707 or instr consent

CSCI 5715. From GPS, Google Maps, and Uber to Spatial Data Science. (3 cr. ; Student Option; Spring Even Year)
Spatial databases and querying, spatial big data mining, spatial data-structures and algorithms, positioning, earth observation, cartography, and geo-visulization. Trends such as spatio-temporal, and geospatial cloud analytics, etc. prereq: Familiarity with Java, C++, or Python

CSCI 5751. Big Data Engineering and Architecture. (3 cr. ; Student Option; Every Fall)
Big data and data-intensive application management, design and processing concepts. Data modeling on different NoSQL databases: key/value, column-family, document, graph-based stores. Stream and real-time processing. Big data architectures. Distributed computing using Spark, Hadoop or other distributed systems. Big data projects. prereq: 4041, 5707, or instructor consent.

CSCI 5801. Software Engineering I. (3 cr. ; Student Option; Every Fall)
Advanced introduction to software engineering. Software life cycle, development models, software requirements analysis, software design, coding, maintenance. prereq: 2041 or instr consent

CSCI 5802. Software Engineering II. (; 3 cr. ; Student Option; Periodic Spring)
Introduction to software testing, software maturity models, cost specification models, bug estimation, software reliability models, software complexity, quality control, and experience report. Student groups specify, design, implement, and test partial software systems. Application of general software development methods and principles from 5801. prereq: 5801 or instr consent

CSCI 5980. Special Topics in Computer Science. (; 1-3 cr. [max 27 cr.] ; Student Option; Periodic Fall & Spring)
Lectures and informal discussions on current topics in computer science. prereq: instr consent; may be repeated for cr

CSCI 5991. Independent Study. (; 1-3 cr. [max 9 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent study arranged with CS faculty member. prereq: instr consent; may be repeated for cr

CSCI 5994. Directed Research. (; 1-3 cr. [max 9 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed research arranged with faculty member. prereq: instr consent; may be repeated for cr

CSCI 5996. Curricular Practical Training. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Industrial work assignment involving advanced computer technology. Reviewed by faculty member. Grade based on final report covering work assignment. prereq: [CSci or CompE] major, instr consent

CSCI 5997. Curricular Practical Training Extension. (1 cr. [max 3 cr.] ; S-N only; Every Fall, Spring & Summer)
Extension of an industrial work assignment involving advanced computer technology. Grade based on final report covering work assignment. prereq: [CSci or CompE] major, instr consent

CSCI 8001. Introduction to Research in Computer Science I. (; 1 cr. ; A-F only; Every Fall)
First of two-part sequence course. Students must take both parts to complete course and receive grade. Conducting literature review. Identifying research questions. Writing a research proposal. Research areas in CS. Practical research skills. Research ethics. Resources. prereq: 1st yr CS PhD student

CSCI 8002. Introduction to Research in Computer Science, II. (; 2 cr. ; A-F only; Every Spring)
Second of two-part sequence course. Students must take both parts to complete course and receive grade. Conducting literature review. Identifying research questions. Writing a research proposal. Research areas in CS. Practical research skills. Research ethics. Resources. prereq: 8001, 1st yr CS PhD student

CSCI 8101. Advanced Operating Systems. (; 3 cr. ; Student Option; Periodic Fall)
Successful research systems and existing theory of systems design. Goal is not merely to catalog systems or learn mathematics, but to develop a sense of elegance of design that leads to successful systems. prereq: 5103 or instr consent

CSCI 8102. Foundations of Distributed Computing. (; 3 cr. ; Student Option; Periodic Spring)
Fundamental principles underlying design of distributed and multiprocessor operating systems. Foundations of distributed computing systems; shared multiprocessor systems. prereq: 8101 or instr consent

CSCI 8115. Human-Computer Interaction and User Interface Technology. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Current research issues in human-computer interaction, user interface toolkits and frameworks, and related areas. Research techniques, model-based development, gesture-based interfaces, constraint-based programming, event processing models, innovative systems, HCI in multimedia systems. prereq: 5115 or instr consent

CSCI 8117. Understanding the Social Web. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Research on the social web. Read, present, and discuss papers, do homework using social web research techniques such as data analysis and simulation. Semester research project. prereq: CS grad or instr consent

CSCI 8161. Advanced Compiler Techniques. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Techniques for uniprocessors and parallel computers. Fundamental program analysis instruments such as data flow analysis and data dependence analysis. Variety of code generation and transformation techniques. prereq: 4061 or instr consent

CSCI 8205. Parallel Computer Organization. (; 3 cr. ; Student Option; Every Spring)
Design/implementation of multiprocessor systems. Parallel machine organization, system design. Differences between parallel, uniprocessor machines. Programming models. Synchronization/communication. Topologies, message routing strategies. Performance optimization techniques. Compiler, system software issues. prereq: 5204 or EE 5364 or instr consent

CSCI 8211. Advanced Computer Networks and Their Applications. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Current research issues in traffic and resource management, quality-of-service provisioning for integrated services networks (such as next-generation Internet and ATM networks) and multimedia networking. prereq: 5211 or instr consent

CSCI 8271. Security and Privacy in Computing. (; 3 cr. ; A-F or Audit; Periodic Fall)
Recent security/privacy issues in computer systems/networks. Threats, attacks, countermeasures. Security research, authentication, network security, wireless security, computer system security, anonymous system, pseudonym, access control, intrusion detection system, cryptographic protocols. How to pursue research in security and design secure systems. prereq: [5211, 5103] or instr consent; 5471 or EE 5248 or Math 5248 or equiv recommended

CSCI 8314. Sparse Matrix Computations. (; 3 cr. ; Student Option; Periodic Spring)
Sparsity and sparse matrices. Data structures for sparse matrices. Direct methods for sparse linear systems. Reordering techniques to reduce fill-in such as minimal degree ordering and nested dissection ordering. Iterative methods. Preconditioning algorithms. Algorithms for sparse eigenvalue problems and sparse least-squares. prereq: 5304 or numerical linear algebra course or instr consent

CSCI 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

CSCI 8363. Numerical Linear Algebra in Data Exploration. (; 3 cr. ; Student Option; Periodic Spring)
Computational methods in linear algebra, matrix decompositions for linear equations, least squares, eigenvalue problems, singular value decomposition, conditioning, stability in method for machine learning, large data collections. Principal directions, unsupervised clustering, latent semantic indexing, linear least squares fit. Markov chain models on hyperlink structure. prereq: 5304 or instr consent

CSCI 8442. Computational Geometry and Applications. (; 3 cr. ; Student Option; Periodic Spring)
Designing efficient algorithms and data structures for geometric problems. Models of computation, convex hulls, geometric duality, multidimensional search, Voronoi diagrams and

Delauney triangulations, linear programming in fixed dimensions, lower bound techniques. Applications, advanced topics. prereq: 5421 or instr consent

CSCI 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

CSCI 8523. AI for Earth: Monitoring Changes in the Environment via Deep Learning. (; 3 cr. ; Student Option; Spring Even Year)
Advances in machine learning in conjunction with massive amounts of data from Earth observing satellites offer huge potential for improving our understanding of how the Earth's environment and ecosystems have been changing and how they are being impacted by humans actions and changing climate. Deep learning approaches, that have had phenomenal success in the domain of computer vision and language/speech translation, hold promise in dealing with environmental problems. However, due to challenges that are unique to environmental applications, off-the-shelf deep learning techniques developed for related applications such as computer vision often have limited utility. This class will introduce to the students the promise and challenges in using deep learning techniques to analyze complex, multi-scale, spatio-temporal data for monitoring changes in the Earth and its environment on a global scale. Prerequisites: CSci 5523, CSci 5521, or equivalent

CSCI 8551. Intelligent Agents. (; 3 cr. ; Student Option; Periodic Fall)
Theories of intelligent agents. Agent architectures; knowledge representation, communication, cooperation, and negotiation among multiple agents; planning and learning; issues in designing agents with a physical body; dealing with sensors and actuators; world modeling. prereq: 5511 or instr consent

CSCI 8581. Big Data in Astrophysics. (4 cr. ; A-F only; Every Spring)
This course will introduce key concepts and techniques used to work with large datasets, in the context of the field of astrophysics. Prerequisites: MATH 2263 and MATH 2243, or equivalent; or instructor consent. Suggested: familiarity with astrophysics topics such as star formation and evolution, galaxies and clusters, composition and expansion of the universe, gravitational wave sources and waveforms, and high-energy astrophysics.

CSCI 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CSCI 8701. Overview of Database Research. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Research papers from journals and conferences on current topics in databases, such as database research methodologies, relational implementation techniques, active databases, storage systems, benchmarking, distributed and parallel databases, new data models, prototype systems, data mining, and future directions. prereq: 5708 or instr consent

CSCI 8715. Spatial Data Science Research. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Motivation, models of spatial information, querying spatial data, processing strategies for spatial queries, multi-dimensional storage/access methods, spatial graph datasets, spatial data mining, trends (e.g., spatio-temporal databases, mobile objects, raster databases), research literature, how to pursue research. prereq: 4707 or 5707 or 5715 or GIS 5571 or GIS 5573

CSCI 8725. Databases for Bioinformatics. (; 3 cr. ; Student Option; Periodic Spring)
DBMS support for biological databases, data models. Searching integrated public domain databases. Queries/analyses, DBMS extensions, emerging applications. prereq: 4707 or 5707 or instr consent

CSCI 8735. Advanced Database Systems. (; 3 cr. ; A-F or Audit; Periodic Fall)
Database systems for emerging applications, nontraditional query processors, multi-dimensional data indexing. Current research trends. prereq: 4707 or 5707 or 5708

CSCI 8760. Plan B Project. (; 3 cr. ; S-N or Audit; Every Fall & Spring)
Project arranged between student and faculty. prereq: CSci MS student, instr consent

CSCI 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

CSCI 8801. Advanced Software Engineering. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Software reusability, internet/intranet programming, software reengineering, and software safety. prereq: 5801 or instr consent

CSCI 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

CSCI 8970. Computer Science Colloquium. (; 1 cr. ; S-N or Audit; Every Fall & Spring)
Recent developments in computer science and related disciplines. Students must attend 13 of the 15 lectures.

CSCI 8980. Special Advanced Topics in Computer Science. (; 1-3 cr. [max 27 cr.] ; Student Option; Every Fall & Spring)
Lectures and informal discussions. prereq: instr consent

CSCI 8991. Independent Study. (; 1-3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Independent study with professor. prereq: instr consent

CSCI 8994. Directed Research in Computer Science. (; 1-3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Directed research with professor. prereq: instr consent

Conservation Sciences (CONS)

CONS 8001. Conservation Biology Seminar. (; 1 cr. [max 6 cr.] ; S-N or Audit; Every Fall & Spring)
Topics vary. prereq: instr consent

CONS 8004. Economic and Social Aspects of Conservation Biology. (; 3 cr. ; Student Option; Every Spring)
Economic/social aspects of conservation biology. Ecological economics, human dimension of conservation biology, values of conserving species/ecosystems. prereq: CBio student or instr consent

CONS 8093. Directed Study Experience. (; 1-5 cr. [max 6 cr.] ; S-N or Audit; Periodic Fall)
Directed Study Experience prereq: instr consent

CONS 8095. Contemporary Problems in Conservation Biology. (; 1 cr. ; S-N or Audit; Every Fall & Spring)
Comprehensive review of conservation biology issue. Written exam. prereq: 8004, FW 8452, instr consent

CONS 8103. Research in Support of Resource Management: a Dialog With Land Managers. (; 2 cr. ; S-N only; Fall Odd Year)
Effective communication between researchers and natural resource managers. Organized around research needs of land managers. Students select topics of interest from these needs and, as small teams, prepare short research proposals to address each topic.

CONS 8201. How to Excel in Graduate School. (; 2 cr. [max 8 cr.] ; S-N only; Every Fall)
Overview of history/philosophy of science as framework for writing thesis or dissertation. How to conduct research. Time management.

CONS 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

CONS 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

CONS 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CONS 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

CONS 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Doctoral thesis credit. prereq: Max 18 cr per semester or summer; 24 cr required; prior to passing written and oral prelims, must have: 1 yr coursework in program; approval on a degree program; 1-2 pg research proposal (approved by adviser) to DGS asst

Continuing Dental Education (CDED)

CDED 6101. Postgraduate Contemporary Esthetic Dentistry I: Level I--Lecture/ Laboratory Series. (; 5 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Dental materials, occlusion, dental photography, smile design, anterior ceramic restorations, posterior ceramic restorations. Color, bleaching, and endoesthetics. Anterior composite restorations. Posterior composite restorations, fiber-reinforced composite bridges, in-office indirect restorations, partial/ full denture esthetics, implant esthetics, perio esthetics, practice management for contemporary esthetic dentistry. Lectures, discussion, lab applications.

CDED 6202. Postgraduate Contemporary Esthetic Dentistry: Level II--Patient Series. (; 5 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Dental photography, anterior/posterior composite restorations, indirect anterior restorations, indirect posterior restorations. Lectures, case presentations. Clinical experience with multi-unit, complex restorative problems. prereq: 6101

CDED 7301. Postgraduate Contemporary Esthetic Dentistry: Level III--Occlusion and Function. (; 1-1.5 cr. ; S-N or Audit;)
How to provide occlusal stability through functional/anatomical harmony. Centric relation, vertical dimension, neutral zone, occlusal plane, anterior guidance. Occlusal records, articulators, occlusal equilibration, anterior previews, custom incisal guide tables. Lectures, lab, clinical experience.

CDED 7302. Postgraduate Contemporary Esthetic Dentistry: Level III--Orthodontic and Periodontal Esthetics. (; 1-1.5 cr. ; S-N or Audit;)
How periodontal/orthodontic therapies may be used to enhance esthetic outcome of restorative cases. How to use cephalometric analysis for evaluating facial esthetics. When to use limited orthodontic treatment before restorative treatment. How to eliminate uneven gingival contours, lengthen crowns, recontour interdental papilla, and optimize periodontal esthetics around dental implants. Lectures, workshop with removable appliances. Surgical demonstrations, discussions of cases from practice.

CDED 7303. Postgraduate Contemporary Esthetic Dentistry: Level III--Dental Implants. (; 2 cr. ; S-N or Audit;)
How to use dental implants as part of restorative treatment plan. Patient selection/ treatment planning, surgical phases of implant placement, restorative phases of implant placement, perioesthetics related to dental implants. Lectures, lab, clinical demonstrations, discussion of cases from practice.

CDED 7304. Postgraduate Contemporary Esthetic Dentistry: Level III--Removable Partial Dentures. (; 1 cr. ; S-N or Audit;)
Esthetic clasping, flexible partial denture designs, contemporary materials/techniques for removable partial dentures. Survey, design, and blockout for rotational paths of insertion. Swinglock saddlelock, and flexible partial denture designs. In-office reline techniques. Simplified remount casts for occlusal refinement. Lectures, lab, discussion of cases from practice.

CDED 7305. Postgraduate Contemporary Esthetic Dentistry: Level III--Endoesthetics. (; 1 cr. ; S-N or Audit;)
Restoring endodontically treated teeth. Concepts/techniques in endodontic therapy, reasons for endodontic failure, internal bleaching techniques, how to restore endodontically treated teeth. Internal bleaching techniques, tooth preparation, placement of fiber posts. Lectures, lab, patient demonstration, elective patient application, discussion of cases from practice.

CDED 7306. Postgraduate Contemporary Esthetic Dentistry: Level III--Diagnostic Box. (; 1 cr. ; S-N or Audit;)
Advanced techniques for photographic, cosmetic, and occlusal analysis. How to customize gender, age, and personality into case design. Emphasizes effective case presentation and staff involvement. Lecture, lab/clinical experience with diagnostic records, cosmetic previews.

CDED 7307. Postgraduate Contemporary Esthetic Dentistry: Level III--Technology in Restorative Dentistry. (; 1 cr. ; S-N or Audit;)
How to incorporate new technologies into practice. Composite curing technology, digital radiography, high tech software programs CAD/CAM technology digital cameras, diagnodent, intraoral cameras, other new high tech equipment. CEREC, digital radiography, digital cameras, diagnodent, high tech software systems. Small group interaction with faculty.

CDED 7401. Postgraduate Contemporary Esthetic Dentistry: Level III--Research Design. (; 1 cr. ; S-N or Audit;)
Analyzing research findings, writing a research proposal. How to critique dental literature, evaluate claims made by dental manufacturers. Methods of research design, data collection/ interpretation. Methods to pose a research question, prepare a research plan, and apply analytical skills to everyday practice.

CDED 7402. Postgraduate Contemporary Esthetic Dentistry: Level III--Independent Research Paper. (; 3-5 cr. ; S-N or Audit; Periodic Fall & Spring)
Independent research paper under supervision of faculty mentor. Selected topic must pose a research question, follow established research protocol, and advance knowledge in the field of contemporary restorative/esthetic dentistry. prereq: 7401

Coptic (COPT)

COPT 5001. Elementary Coptic. (; 3 cr. ; Student Option;)
Introduction to Coptic grammar and vocabulary, chiefly in the Sahidic dialect.

Ctr for Spirituality/Healing (CSPH)

CSPH 5000. Explorations in Integrative Therapies and Healing Practices. (; 1-4 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
Research and practice on therapies, delivery of complementary therapies, and regulatory issues. prereq: Jr or sr or grad student or instr consent

CSPH 5101. Introduction to Integrative Healing Practices. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
By the end of the course, students will demonstrate an understanding of the overall field of integrative healing practices, which includes both integrative and alternative (CAM) therapies. The course will cover theoretical framework, safety, efficacy, and evidence for various therapies and practices. The online version of this course is an approved 1Health Interprofessional Education (IPE) activity. prereq: Jr or sr or grad student; or instructor consent

CSPH 5102. Art of Healing: Self as Healer. (; 1 cr. ; Student Option; Every Fall & Spring)
The initiation of a healer in ancient cultures was a rigorous process that included a personal journey of inner development and transformation that paralleled the learning of the cognitive and physical healing techniques. This course will introduce the student to the concept of the individual transformational journey. The science of mind-body-spirit approaches will be explored through a variety of methods including lecture, scientific literature review, meditation, imagery, journal writing and social support through group interaction. The students will have an opportunity to explore various aspects of self-knowledge, self-awareness, transpersonal (non-local) experiences, and the paradoxical mysteries that will prepare them for their student and personal lives. prereq: Jr or sr or grad student or instr consent

CSPH 5111. Ways of Thinking about Health. (; 2 cr. ; S-N or Audit; Every Fall)
This course is your opportunity to examine, challenge and critically reflect upon your thinking about health. The class meets in a hybrid model that includes in-person, field-trip ?micro-immersion experience? to explore different understandings of health through visits to cultural communities. We include with field trips virtual experiential glimpses into

fundamentally different systems of knowledge often conflicting with the scientific/professional models emphasized in many professional fields on campus. Frameworks for critical thinking, critical self-reflection, cultural self-study, intellectual virtues and supplemental readings are offered to support your effort to step into culturally different knowledge systems and mental models of health and well-being. These frames and approaches offer you a mirror through which your own perspective, thinking and background assumptions of health become more visible and explicit. I ask you to challenge your own thinking and better recognize the culture you carry in your thinking as you attempt to inhabit different cognitive worlds. You will also apply this examination to the professional fields of your interest, sharing your insights with learners in other professions. In this way, we bring together interdisciplinary and intercultural learning. On the dates that we meet virtually, our goal is to create a space that encourages us to share with sincerity our thoughts and emerging insights with one another in Zoom conversations. The synchronous Zoom sessions allow you to benefit from each other? s personal and professional take on the immersion experiences as you develop your philosophy, narrative and understanding of health. prereq: jr, sr, grad, or instr consent

CSPH 5115. Cultural Awareness, Knowledge and Health. (3 cr. ; Student Option; Every Spring)
How knowledge can become resource for individual, family, community health. Interactive glimpse of wisdom of cultural communities. Develop capacity to see culture within professional education/practice. Cultural constructs underpinning medical system, role of culture in interaction between practitioner/ patient, role of reconnection to cultural heritage in healing. prereq: Jr or sr or grad student or instr consent

CSPH 5118. Whole Person, Whole Community: The Reciprocity of Wellbeing. (; 3 cr. ; Student Option No Audit; Every Fall & Spring)
This course explores the symbiotic and reciprocal relationship between individual and community health and wellbeing, as well as the many factors/forces which influence that relationship. Drawing upon recent studies in the area of reciprocal/symbiotic effects between individual wellbeing and community wellbeing, this course will include the following core topics: definitions of community and related dimensions of wellbeing, importance of Individual/Community reciprocity (Social Justice, Equity, Safety, and Trust), historical trauma and healing, and individual action and personal empowerment in community transformation. Utilizing elements of the Center for Spirituality & Healing's Wellbeing model and modes of contemplative practice, this course will ultimately assist learners through phases of individual reflection and mindfulness for the purpose of creating more open and reciprocal relationships with entities they describe as their communities. An extension of recent studies in the area of the reciprocal (or rippling) effect between individual wellbeing and community wellbeing this course will guide individuals in identifying the various communities in which they live or participate, the roles they "play" within those communities and why/ how this knowledge can help prepare them for action and leadership. Main themes of the course will include: - Mindfulness, Reflection and Healing: Historical Trauma and Marginalization. - Roles and Reciprocity: Justice, Equity, Security and Trust between individuals and their communities. - Transformation: Individual Action/Leadership as Bridge between Personal and Community Wellbeing.

CSPH 5121. Planetary Health & Global Climate Change: A Whole Systems Healing Approach. (; 2 cr. ; Student Option; Every Fall)
Our personal health, along with the health of the human social systems we inhabit, are inextricably entwined with the wellbeing of local and global environmental systems. Living systems (including social, biological, and environmental) are complex adaptive systems that are self-organizing and give rise to emergent properties within a wider ? ecosystemic? context. To effect beneficial and sustainable changes within such systems, leaders must apply (and embody) ecosystemic principles. This course will help students learn how to understand?and to effect sustainable change in?the complex systems in their lives: personal, social, and environmental. Students will explore and develop leadership strategies and skills, using complexity theory as a theoretical framework. We are facing a multifaceted global/planetary crisis. The evidence is clear that Global Climate Change is primarily driven by human behaviors. Drawing upon the new science of Complex Systems, it is also evident that human social systems (economic, political, and cultural) are impelling us towards a planetary ?bifurcation point.? Our only hope to avoid multiple systems collapse is to make deep changes in these systems. Rigid, top-down approaches based on linear and mechanistic paradigms are ill-suited to transformative leadership, which facilitates an open-ended process of organic change. This course helps students develop transformative leadership capacities that are applicable within all types of organizations, within a wide variety of roles and positions. prereq: Jr or sr or grad student, or instructor consent

CSPH 5201. Spirituality and Resilience. (; 2 cr. ; Student Option; Every Spring)
In-depth exploration of resilience, spirituality, and the link between them. Specific applications of resilience and health realization principles applied to students? personal and professional lives. Relevant literature, theory and research will be explored. This class examines natural resilience and our inner landscape. Discussions are reflective, instructive, and thought provoking. We explore life experiences, examine relevant resilience and spiritual literature, and discover how we operate from the inside out in ordinary life. We learn, live, and share basic principles behind resilience. The study is applicable in a wide variety of disciplines from helping professions, scientific endeavors, education, to business and more. These lessons are applicable in both personal and professional life. prereq: Jr or Sr or Grad, or instructor consent

CSPH 5212. Peacebuilding Through Mindfulness: Transformative Dialogue in the Global Community. (; 3 cr. ; Student Option; Every Spring & Summer)
This course is designed to provide a basic understanding of the core principles and practices of peacebuilding through restorative dialogue, using a mindfulness-based approach, in the context of multiple interpersonal, community, national, and international settings. prereq: Jr or Sr or Grad, or instructor consent.

CSPH 5215. Forgiveness and Healing: A Journey Toward Wholeness. (; 3 cr. ; Student Option; Every Fall)
This course will examine the impact of forgiveness on the process of interpersonal and intrapersonal healing, as well as healing of conflict and trauma at the intergroup level. Forgiveness and healing will be examined in the context of intense interpersonal and intrapersonal conflicts in multiple health care and social work settings, including in families, between physicians and nurses, between patients/clients and nurses/social workers, within communities, among friends, between co-workers, or within ourselves. Forgiveness will also be examined in the larger global context and how principles and practices of forgiveness are being applied in some of the most entrenched political and violent conflicts, such as in Northern Ireland, South Africa, Liberia, Rwanda, and Israel/Palestine. This course is designed to provide a basic understanding of the central elements of forgiveness and healing in the context of multiple micro and macro life settings. The concepts of forgiveness and healing will be examined from multiple spiritual and secular traditions. The underlying philosophical elements of forgiveness and healing will be critically assessed and beliefs and rituals from numerous indigenous and European traditions will be presented and examined. The focus will be upon gaining a more grounded understanding of the process of forgiveness and its potential impact upon emotional and relational healing. The concepts of forgiveness and healing will be addressed in a very broad and inclusive manner, with no assumptions made related to their specific cultural context or meaning. Empirical studies that have examined the impact of forgiveness upon emotional and physical healing will be reviewed. Concepts such as forgiveness and healing are inseparable from the concept of spirituality. For the purposes of the course, spirituality is not synonymous with the dogma and creeds of the major religious traditions in the world, even though religion for many may serve as a pathway to spirituality. Practices within the major religions of the world that foster forgiveness and healing, however, will be explored, along with practices within Native American, Canadian Aboriginal, Native Hawaiian, African, New Zealand Maori, and Eastern cultural traditions. prereq: Jr or sr or grad student or instr consent

CSPH 5225. Meditation: Integrating Body and Mind. (; 2 cr. ; Student Option; Every Fall)
The class approaches meditation as a physical, emotional, intellectual, and spiritual inquiry. Students read selections in a variety of relevant texts and develop the ability to enter a state of calm, meditative awareness. prereq: Jr or sr or grad student or instr consent

CSPH 5226. Advanced Meditation: Body, Brain, Mind, and Universe. (; 1 cr. ; Student Option; Periodic Fall, Spring & Summer)
Students will work to integrate meditation practice into daily life, cultivating awareness of the fundamental oneness of body, brain, mind, and universe. Attention will be given to mind-body synergy in health, the ?hard problem? of consciousness in neuroscience, and the emergence of compassion, wisdom, and healing in non-discursive awareness. prereq: CSPH 5225, jr or sr or grad student, or instr consent

CSPH 5303. Pain Management and Evidence Based Complementary Health Approaches. (; 3 cr. ; A-F only; Every Fall & Spring)
This course will cover the evidence regarding effectiveness and safety of CIH practices, and the relationship of CIH to contemporary views of pain, health, and healing. There is a growing evidence base to support some complementary and integrative healing (CIH) approaches for pain management including yoga, mindfulness meditation, chiropractic, and others. In the US, chronic pain impacts over one third of the population and affects more individuals than heart disease, diabetes, and cancer combined. While there is a wide range of conventional medical treatments available to manage pain, many are only marginally effective and are associated with troublesome side effects. Of growing concerns is the endemic problem of opioids associated with misuse, addiction, and fatal overdose. Pain sufferers and health providers need effective and safe options for pain management. Some complementary and integrative healing (CIH) approaches have a growing evidence base to support their use, particularly for pain management. This course will introduce students to the theories, mechanisms, use, effectiveness, and safety of commonly used complementary and integrative healing practices. The relationship of CIH approaches to contemporary views and research regarding pain, health and healing, and placebo effects will also be explored. Through reading, reflection, discussion, and critical appraisal, students will develop the necessary skills to synthesize different forms of information, including research, to reach evidence-informed and balanced conclusions regarding CIH for managing pain, restoring function, and enhancing overall health and wellbeing. CIH approaches covered will include: whole systems (Traditional Chinese Medicine, osteopathy, chiropractic, Ayurvedic Medicine, etc.); mind-body practices (contemplative and meditative practices; yoga, tai chi, Qigong, etc.); manipulative and body-based approaches (massage therapy, acupuncture, manipulation); and energy-based approaches (energy medicine, Reiki, therapeutic touch, healing touch). Upon completion of the course, students will have a foundational knowledge of CIH for pain management and the skills to critically appraise and determine the trustworthiness of different information sources. Prerequisite: Graduate or Professional program student.

CSPH 5305. Introduction to Integrative Mental Health. (; 2 cr. ; Student Option; Every Spring)
Prerequisite: Graduate or Professional student. This course focuses on introducing students to the concept of integrative mental health (IMH). Definitions of IMH, the history and background of the concept, and how it relates to psychiatric care and health care in general will be explored. Students will explore and practice risk-benefit profiles of different modalities in the context of evidence-based mental health care. An emphasis will be placed on the connection between physical and mental health and how that can be approached from an integrative perspective. Topics such as mindfulness and mental health, nutrition and mental health, herbs and supplements in psychiatric care, and the role of functional medicine in IMH will be covered, as well as how psychotherapy and psychotropic medications fit in the IMH framework. Students will review the current diagnostic system for mental health disorders and that can both help and hinder an integrative approach to mental health care. Integrative approaches for assessing mental health concerns will be reviewed, and how to use these approaches alongside a traditional medical approach for maximum benefit will be explored. Students will further review specific modalities for mental health and wellbeing that are less focused on specific systems and more focused on holism and the interplay of systems. Students will also identity and explore different ways of viewing mental health and wellbeing based on cultural and geographical issues, and how these may impact the approaches.

CSPH 5307. Integrative Nursing: Application across Settings and Populations. (; 1 cr. ; Student Option; Every Fall & Spring)
Prerequisites: registered nurse, graduate level registration only. Principles and application of integrative nursing will provide learners with skills that can be immediately applied to nursing practice, advanced nursing practice, and nurse leadership. Clinical case studies and interactive discussion will be used for students to learn how to practice integratively in their current healthcare role or to develop into a new role or paradigm. Case studies will be individualized to fit the needs of all learners for applicable skill building.

CSPH 5313. Acupressure. (; 1 cr. ; Student Option No Audit; Every Spring & Summer)
Open to health professional graduate students or practicing healthcare professionals. Undergraduate students with specific prior coursework may be admitted with instructor approval. By the end of the course students will be able to demonstrate an understanding of the basic principles and applications of Acupressure as a component within the theory of East Asian Medicine. Students will learn the location, indications for use and techniques of stimulation of acupressure points in sequences specific to common physical, mental, and emotional symptoms. Methods for both self-care and the care of others will be the primary focus of learning. Special focus will be given to the treatment of pain conditions, chronic health conditions, palliative care, oncology, women? s health care, and mental-emotional wellbeing. Current literature and research findings will also be discussed.

CSPH 5315. Traditional Tibetan Medicine: Ethics, Spirituality, and Healing. (; 2 cr. ; Student Option; Every Fall & Spring)
This course will introduce students to ethics, spirituality, and healing from the perspective of traditional Tibetan medicine. Traditional Tibetan doctors believe that illness results from imbalance and that treating illness requires correcting the underlying imbalance. Students will learn how to apply these principles personally, integrate them into clinical practice, and consult with a traditional Tibetan doctor. prereq: Jr or sr or grad student or instr consent

CSPH 5317. Yoga: Ethics, Spirituality, and Healing. (; 2 cr. ; Student Option; Every Fall, Spring & Summer)
This course will introduce students to ethics, spirituality, and healing from the perspective of Yoga, an ancient Indian discipline. Students will examine the claim that systematic Yoga practice leads to optimal health. Using critical thinking, students will evaluate philosophical knowledge, scientific evidence, and practical application, and propose research-based programs for integrating Yoga into personal and professional life. Prereq jr or sr or grad; or instructor consent

CSPH 5318. Tibetan Medicine, Ayurveda, and Yoga in India. (; 4 cr. [max 12 cr.] ; Student Option No Audit; Periodic Summer)
Tibetan Medicine, Ayurveda, and Yoga are interrelated, ancient, holistic, Tibetan and Indian traditions that integrate ethics, spirituality, and healing. While studying with expert practitioners in India, students will examine the claim that systematic practice of these traditions promotes optimal health. Using critical thinking, students will evaluate philosophical knowledge, cultural practices, and scientific evidence, and propose research-based programs for integrating these traditions into personal and professional life. prereq: CSPH 5315, jr or sr or grad, or instr consent

CSPH 5319. Yoga and Ayurveda in India. (4 cr. ; Student Option No Audit; Every Spring)
Yoga and Ayurveda are interrelated, ancient, holistic Indian traditions that integrate ethics, spirituality, and healing. While studying with expert practitioners at the University of Minnesota and in India, students will examine the claim that the systematic practice of these traditions promotes healing and optimal health. prereq: CSPH 4311 (and instructor approval), CSPH 5317 or CSPH 5318 or instructor consent.

CSPH 5331. Foundations of Shamanism and Shamanic Healing. (; 2 cr. ; S-N or Audit; Periodic Fall)

In this fundamentals course, students will learn essential elements of the non-biomedical shamanic ?life-way? at the foundation of all shamanism. Participants will study shamanic beliefs about the individual?s role in life, community, and the universe, and how these ideas are at the core of all shamanic healing practices. They will study cross-cultural healing beliefs and practices, the unique psychology necessary to understand them, and how these approaches may be used with contemporary healing practices and for personal growth. This course provides a core understanding of shamanic philosophies and ritual etiquette, properly preparing students to continue in deeper personal study and/or to more optimally participate in an experiential cultural immersion (e.g. via a Global Healing Traditions course.) prereq: Jr or sr or grad student, or instr consent

CSPH 5341. Overview of Indigenous Hawaiian Healing. (; 2 cr. ; Student Option; Every Fall)
This course focuses on an introduction to traditional Hawaiian healing including ho?olomilomi (massage), la?au lapa?au (herbal medicine), and ho?opoonopono (conflict resolution). Cultural traditions such as oral history and the hula are examined in the context of their contribution to overall wellbeing and sustainability. Hawaiian cultural values are compared and contrasted with western values. Students will have the opportunity to meet with Hawaiian healers, visit culturally relevant sites and reflect on ways that indigenous and conventional practices contribute to health, healing and wellbeing. Prereq: Graduate students in health sciences programs, or instructor consent.

CSPH 5343. Ayurveda Medicine: The Science of Self-healing. (; 2 cr. ; Student Option; Every Fall, Spring & Summer)
This course will introduce students to the basic principles of Ayurveda, the Science of self-healing. It will also cover evidence-based information available on Ayurvedic Medicine. Ayurveda emphasizes the balance of body, mind, and spirit to achieve the optimum health through natural means. Course content will include Ayurvedic constitutional types and practices including food, herbal medicine, detoxification, and massage. Students will examine how Ayurvedic principles and practices can be integrated into personal plans for health and well-being and how Ayurveda is being integrated into healthcare settings.

CSPH 5401. People, Plants, and Drugs: Introduction to Ethnopharmacology. (; 3 cr. ; Student Option; Every Spring)
Ethnopharmacology is the interdisciplinary science of medicinal plants or natural products utilized by humans. These people-plant (typically) relationships have historically and imminently have produced important medicines integral to modern medicine. Ethnopharmacology integrates aspects of botany, natural products chemistry, pharmacology, pharmacognosy, anthropology, medicine, psychology, and comparative religious study. The discipline researches human interactions with biologically active plants (and other living things) as medicines, poisons, and intoxicants with a primary focus on indigenous and non-?Western cultures. Ethnopharmacology seeks to document plants and animals used by various cultures, and describe their use and preparation. These plants and their preparations are then studied to identify, isolate, and characterize the active compounds responsible for the plants actions on people. This introductory ethnopharmacology course will cover both the ethnographic and scientific aspects critical to the process of drug discovery and the evolution of modern medicine. Students will compare cross-cultural perspectives on human interactions with drugs and examine the variety of human interaction with biologically active organisms in their environment. prereq: Jr or Sr or Grad, or instructor consent. Courses in Botany, Chemistry and Pharmacology are useful but not required.

CSPH 5421. Botanical Medicines in Integrative Healthcare. (; 3 cr. ; Student Option; Every Fall)
Botanical medicines have been used since ancient times in many cultures yet it is still not a significant part of what is considered ?traditional? medicine in our current healthcare model in the United States. Yet there is a growing interest among people in the U.S. looking for alternative treatments for a variety of common illnesses due to concerns of safety, efficacy, and a desire for more ?natural? products than more conventional pharmaceuticals. However, despite this growing interest, healthcare providers may have little to no knowledge regarding botanical medicines in regards to their therapeutic properties, efficacy (or lack thereof), and/or adverse effects. This is further compounded by a wealth of information on botanical medicines in the media and internet, much of which may be misleading and can lead to confusion regarding botanical medicines. The goal of this course is to learn basic properties and preparations of the most common botanical medicines in addition to their therapeutic effects for common disease states. Students will also learn about regulations, quality control, and safety concerns regarding use of botanical medicines. Included in this course is a discussion on the frequently overlooked botanical medicine we use everyday: our food! Relevant plant-based foods will be discussed periodically throughout the course to provide a practical application of the material learned in this course. prereq: Jr or sr or grad student, or instructor consent

CSPH 5423. Botanical Medicines: Foundations and Practical Applications. (; 1 cr. ; Student Option; Periodic Spring & Summer)
There is an accumulating body of scientific evidence supporting the use of some botanicals for preventive or therapeutic purposes. This experiential course offers health professional students and others an integrative and practical approach to medicinal plants that includes theoretical underpinnings and obtaining the skills to gather, process, and apply selected local plants and herbs. Methods are multi-sensory, following an eclectic tradition practiced by many modern herbalists. Review of empirical scientific evidence is included for key plants. Prereq: Jr or sr or grad in the health professions or instructor permission.

CSPH 5431. Functional Nutrition: An Expanded View of Nutrition, Chronic Disease, and Optimal Health. (; 2 cr. ; Student Option; Every Fall, Spring & Summer)
This course will present a novel approach to the principles of nutrition as they relate to optimal health and the prevention, control or intervention in a disease process. This is a model of nutrition application that complements and expands beyond normal growth and development, an approach that attempts to reduce chronic disease by looking for underlying factors or triggers of disease. This model of nutrition considers system dysfunction a pre-disease state and looks for ways to apply nutrition and restore function. The purpose of the course is to provide an overview of this novel application of nutrition. The course will emphasize the importance of nutrition as a component of self-care. prereq: [Jr or sr or grad student] in Health Sciences or instr consent

CSPH 5503. Aromatherapy Fundamentals. (; 1 cr. ; Student Option; Every Spring & Summer)
This course will provide an overview of essential oil therapy and current aromatherapy practices in clinical settings. Students will examine key safety and toxicity issues with the use of essential oils, and they will critique the scientific and historical evidence about the therapeutic qualities of six essential oils in common use by the public and in clinical settings. prereq: Jr or Sr or Grad, or Inst consent

CSPH 5521. Therapeutic Landscapes. (; 3 cr. ; Student Option; Periodic Fall)
This course will introduce students to the theoretical foundations of healing environments and their application based on the six dimensions of wellbeing. It is a unique course offered only through the Bakken Center for Spirituality & Healing? but carries a wide interdisciplinary application ? such as with the department of horticulture, landscape architecture, therapeutic recreation, botany, public health and other health science. During the past six decades, the field of therapeutic landscapes has grown extensively in multiple settings throughout North American, Europe, Asia, and Africa. The theory and practice focus upon the application of environments and landscapes to benefit the individual or group. Therapeutic Landscapes are a plant-dominated environment (indoor or outdoor) designed to provide numerous and varied therapeutic interactions and purposeful outcomes. It fosters wellbeing through designed and prescribed encounters with plants that stimulate the senses and engage the understanding of the people who visit it. This course is designed to provide a basic understanding of the central elements of therapeutic landscapes in the context of the latest scientific evidence using the Bakken Center for Spirituality & Healing model of wellbeing as a guide. Prereq jr or sr or grad student or instr consent

CSPH 5522. Therapeutic Horticulture. (; 3 cr. ; Student Option; Periodic Summer)
An introduction into the purposeful delivery of plants and plant related activities for therapeutic benefits. This course is designed to provide a basic understanding of the central elements of therapeutic horticulture in the context of multiple health care settings. Students will learn the evidence-based history, principles, precepts, and practical application of therapeutic horticulture. A variety of plant and plant related modalities from current research findings will be discussed related to various populations using therapeutic horticulture as a treatment intervention. Prereq junior, senior, or graduate student or instructor consent

CSPH 5535. Reiki Healing. (; 1 cr. ; S-N only; Periodic Fall, Spring & Summer)
Students will learn the history, principles, education, and practical application of Reiki energy healing. Alternative energy healing modalities and current research findings will be discussed. Following activation of the Reiki energy, participants will learn the hand positions used to perform a self, seated, and full session. A portion of each class meeting will be used to perform Reiki sessions and to discuss experiences. prereq: Jr or sr or grad student or instr consent

CSPH 5536. Advanced Reiki Healing: Level II. (; 1 cr. ; S-N only; Periodic Fall, Spring & Summer)
Students will learn advanced principles and application of Reiki energy healing. The four levels of healing will be further explored, with emphasis on healing at the spiritual level. Following activation of the Reiki energy, participants will learn the energy symbols that allow for energy transfer through space and time. Students will learn to use second level Reiki energy for both distance healing and the standard Reiki session. A portion of each class meeting will be used to provide Reiki sessions and to discuss findings. Current literature and research findings will also be discussed. prereq: CSPH 5535 or instr consent. Students must wait 4-6 months after taking CSPH 5535 before taking CSPH 5536.

CSPH 5541. Emotional Healing and Happiness: Eastern and Western Approaches to Transforming the Mind. (; 2 cr. ; Student Option; Every Fall)
This course will provide in-depth, experiential training in the cultivation of happiness, emotional health and healing for multi-disciplinary professions. Students will learn highly effective, ancient, and contemporary methods for the transformation of afflictive emotions, unhealthy patterns, and behaviors. Students will learn how to increase positive emotions and mind states including: compassion, joy, and equanimity. They will explore meditation and other integrative approaches that bring balance and wellbeing to the mind. Students will practice and explore the applications of these modalities. Students will learn how to creatively apply and integrate them into their lives, relationships, and work with a wide range of patient /client populations and settings. The class content draws on eastern and western approaches to emotional health and healing in a mindfulness-based, integrative model including: Buddhist and Transpersonal Psychology, meditation practices, spirituality, expressive, creative, & ritual arts. Case examples and neuroscience research on emotions will also be included in the course. Prereq: Jr, Sr or grad student, or instructor consent

CSPH 5555. Introduction to Body and Movement-based Therapies. (; 2 cr. ; Student Option; Every Spring)
This course will cover basic theories and approaches of selected Somatic Therapies and Somatic Psychotherapy (Dance/Movement and body-based therapies). It will include 1) western historic and theoretical perspectives on the use of movement, dance and somatic re-patterning for well-being, 2) introductions and demonstrations of specific somatic approaches, and 3) brief introduction of the application of these techniques to specific populations and settings. The experiential part of the course will include individual, partner and group exercises intended to embody and deepen the topics covered in the class. Prereq: jr or sr or grad student; or instructor consent

CSPH 5561. Overview of the Creative Arts in Health and Healing. (; 2 cr. ; Student Option; Every Fall)
In this course we will explore how professionals in music therapy, art therapy, dance and movement therapy, and poetry/spoken word therapy work in healthcare and community settings to promote healing and well-being. Artist-therapists representing each of these fields, and/or related fields in creative arts in healing, will present their work in synchronous sessions, and guide you in experiential exercises to give you firsthand experience of each modality. You will also read in depth about each of the healing arts modalities in our textbook and research articles, participate in online discussions, and document your experiences with the modalities through journaling and a final paper. prereq: Jr or sr or grad student

CSPH 5601. Music, Health and Healing. (; 2 cr. ; Student Option; Every Spring)
For centuries, people in virtually every known culture in the world have recognized the tremendous potential of music to promote health and healing. In this course, we will explore music's power to heal body, mind, and spirit through examining the main music healing disciplines used today: music therapy, music medicine, clinical musicianship, medical musicianship, music-thanatology, vibroacoustic harp therapy, sound healing, and community music. You will also learn some easy music healing techniques you can use for yourself. prereq: Jr or sr or grad student or instr consent

CSPH 5631. Healing Imagery I. (; 2 cr. ; Student Option; Every Spring & Summer)
In this course you will learn how imagery and imagery interventions are implemented for healing and to promote optimal health and wellbeing. You will experience a wide variety of imagery interventions in class and work on creating your own imagery intervention. The primary instructional strategies that will be utilized for this course include: experiential, online discussions, readings, lectures, and individual learning interventions. prereq: Jr or Sr or Grad, or instructor consent

CSPH 5641. Animals in Health Care: The Healing Dimensions of Human/Animal Relationships. (; 3 cr. ; Student Option; Periodic Spring)
This online course is designed to introduce students to the core principles of Animal-Assisted Interventions (AAI) in the context of multiple healthcare and social service related settings. Students will learn the history, identify safety guidelines, apply best practices to a variety of species, and evaluate peer-reviewed literature. prereq: jr or sr or grad student, or instructor consent

CSPH 5642. Nature Heals: An Introduction to Nature-Based Therapeutics. (; 3 cr. ; Student Option; Every Fall & Spring)
This graduate level course will cover the basic theories and approaches of Nature-Based Therapeutics including restorative environments, therapeutic horticulture, animal assisted interactions, therapeutic landscapes, forest bathing, green care farming, facilitated green exercise, wilderness therapy, and ecopsychology. The course includes: 1. historic and theoretical perspectives 2. research into specific techniques 3. application of techniques to specific population and setting prereq: Jr, Sr or Grad, or instructor consent

CSPH 5643. Horse as Teacher: Introduction to Equine-Assisted Services (EAS). (; 3 cr. ; Student Option; Periodic Fall & Spring)
This course is designed to introduce students to the field of Equine-Assisted Services (EAS) and to the range of therapeutic and learning opportunities found within equine interactions. The course presents historical and theoretical concepts which helped develop various types of EAS, and how the growth of EAS nationally and internationally has continued to mold the profession. Students will learn to describe safety guidelines, best practices as they are currently known, and precautions and contraindications in EAS sessions. During a one-day face-to-face class, students will observe demonstrations with horses and apply course concepts and topics during this intensive. Students will evaluate peer-reviewed literature in EAS research to identify the strengths and weaknesses of such published material. Students will synthesize reading, lecture and experiential learning to develop an EAS plan for an assigned target group population. prereq: jr or sr or grad or instr consent

CSPH 5701. Fundamentals of Health Coaching I. (; 4 cr. ; A-F only; Every Fall)
This course provides a foundation of Health Coaching theory and practice. We will explore basic tenets of the health coaching model (a 4-pillared construct), including deep listening, effective and empathic communication, and tools for self-development. We examine the core building blocks for optimal health from a holistic perspective. In Health Coaching, each person is recognized as an intrinsically

healthy, whole, and wise being, who is the ultimate expert in his or her healing journey. As a student and coach in training, your own self-development becomes an organic part of your professional evolution, and you will receive support in this. It is the role of the Health Coach to provide a safe environment and professional expertise to support this journey. In this course you will learn how to facilitate the client?s process by identifying and benchmarking stages and patterns of change, effectively interfacing with a wide range of interdisciplinary health care providers,and educating clients on a variety of self-care practices. Prereq admitted to Master of Arts in Integrative Health and Wellbeing Coaching; or, Integrative Therapies and Healing Practices Certificate-Health Coaching track; or, Doctor of Nursing Practice; or, non-degree seeking graduate students or students from other graduate degree programs may enroll with permission of the course instructors.

CSPH 5702. Fundamentals of Health Coaching II. (; 4 cr. ; A-F or Audit; Every Spring)
Basic tenets of health coaching model. Tools for self development, deep listening, and effective communication. Core building blocks for optimal health from a holistic perspective. Identifying/benchmarking stages/patterns of change, interfacing with interdisciplinary health care providers, locating resources to assist clients in decision making, and educating clients on self-care practices. prereq: CSPH 5701; admitted to Integrative Health and Wellbeing Coaching MA program; or, Integrative Therapies and Healing Practices Certificate-Health Coaching track; or, instr consent.

CSPH 5703. Advanced Health Coaching Practicum. (; 3 cr. ; A-F only; Every Fall)
This course is designed to provide additional case-based learning in Health Coaching as a means to deepen and mature the process skills that were introduced in Fundamentals of Health Coaching I and II. Increasing confidence in the application of theory and process from earlier courses will be emphasized. Additionally, students will have the opportunity to hone their abilities to identify and utilize broad-based resources in guiding and supporting individual clients. Students are given the opportunity to integrate and apply all previous areas of learning and to explore their resistance, learning edges, and competencies in a supportive supervisory environment. Students will be encouraged to deepen their own style of health coaching as well as their own growth processes. Ethical issues, professional boundaries, and awareness of additional community and professional resources will be introduced here and furthered in internships. Over the course of the semester, students will be coaching 3 community volunteer clients for 5 sessions each. One client for each student will be coached during the weekend classes. prereq: Admission to the Post-Baccalaureate Certificate in Integrative Therapies and Healing Practices--Health Coaching track; or, Masters of Arts in Integrative Health and Wellbeing Coaching. CSPH 5701, 5702, 5706, 5707.

CSPH 5704. Business of Health Coaching. (; 2 cr. ; A-F only; Every Fall)
This course is designed to enable and empower students to apply health coaching skills in structures such as a private coaching business or an existing organization through discussion, reflection and writing. We will explore legal, ethical, and financial issues through visioning, marketing, strategic planning, and energetic intending necessary to start and sustain a Health Coaching practice. prereq: Admission to the Post-Baccalaureate Certificate in Integrative Therapies and Healing Practices-Health Coaching track; or, Masters of Arts in Integrated Health and Wellbeing Coaching program or instructor permission; CSPH 5701, 5702, 5706, 5707

CSPH 5705. Health Coaching Professional Internship. (; 2 cr. ; S-N only; Every Spring)
This course will be for those students actively enrolled in the Health Coaching Track of the post-baccalaureate Certificate in Integrative Therapies and Healing Practices or in the MA program in Integrative Health and WellBeing Coaching through the Bakken Center for Spirituality and Healing. This internship will be 108 hours of health coaching practice in the field, with 12 hours of supervision. The internship experience offers students the creative opportunity to apply and integrate coaching skills and knowledge gained in the preceding semesters of the program. All encounters will require students to integrate previous experience and knowledge to recruit, schedule, coach and educate individual clients. All students will do 2 group educational sessions to promote health coaching in the organization. Prereq: CSPH 5101, 5701, 5702, 5703, 5706, 5707 (MA only); admitted to Integrative Health and Wellbeing Coaching MA; or, Integrative Therapies and Healing Practices Certificate-Health Coaching track.

CSPH 5706. Lifestyle Medicine. (; 2 cr. ; Student Option; Every Fall & Summer)
This course provides a foundation in the theory and clinical application of lifestyle medicine. Lifestyle medicine aims to address the behavioral and lifestyle bases of common illnesses through health promoting activities and reducing harmful behaviors. In this course, we will explore optimal nutrition, lifestyle, physical activity, and attitude. We will examine the emerging evidence base of lifestyle medicine and how it relates to health promotion and disease prevention. Participants will be introduced to common laboratory and imaging findings, and how they relate to optimal health. prereq: jr or sr or grad, or inst consent

CSPH 5707. Coaching People with Clinical Conditions. (; 2 cr. ; Student Option; Every Summer)
This course provides students with a basic awareness and expanded perception of prevalent clinical conditions, and supports the development of empathy related to these conditions. It continues to build coaching skills specific to coaching clients with clinical conditions. Also supports the development of professional oral and written communication skills. Prereq CSPH 5701, 5702 and 5706; Admitted to one of the following programs: Master of Arts in Integrative Health and Wellbeing Coaching, Integrative Therapies and Healing Practices Certificate-Health Coaching track, or instructor consent.

CSPH 5708. Mind-Body Science and the Art of Transformation. (; 1 cr. ; Student Option; Every Spring & Summer)
Modern technology has provided deeper insight into how our minds and bodies change based on our focus, intentions, cell environment, habits, stress, and behaviors. We will investigate these new perspectives and how to apply them through transformative practices to change our thoughts, beliefs, bodies, emotions, and paradigms to create sustainable shifts towards optimal health, wellness, and living. Prereq: Jr or Sr or Grad; or instructor consent

CSPH 5709. Health and Wellbeing Group Coaching. (; 2 cr. ; Student Option No Audit; Every Spring)
The Health and Wellbeing Group Coaching Practicum enables the student to learn and apply the theory and practice of group health and wellbeing coaching in a community site-based practicum setting, and to communicate their learning in a professional manner. Upon successful completion of this course, students will be able to: ? Explore and demonstrate how to apply the four pillars into the structure of group coaching. ? Identify and practice skills and tools of group facilitation and coaching. ? Demonstrate the art of managing group dynamics successfully. Prereq: - Admission to the Master of Arts in Integrative Health and Wellbeing Coaching program; or - Admission to or graduation from the Integrative Therapies and Healing Practice Certificate program Health Coaching track; or - Special permission by the Instructors - Satisfactory completion of each of the following courses with a 3.0 or better: CSPH 5701, CSPH 5702, CSPH 5703, CSPH 5705, CSPH 5706, CSPH 5707.

CSPH 5711. Optimal Healing Environments. (; 3 cr. ; Student Option; Every Fall)
This course focuses on the development and implementation of optimal healing environments (OHE) as a healthcare innovation. You will examine the evidence base supporting design, human and care processes and begin to explore how OHE are created. An emphasis will be placed on identifying models of optimal healing environments and leadership strategies that support the diffusion of innovation. prereq: Jr or sr or grad student or instr consent

CSPH 5712. Supervised Health Coaching Skills Advancement. (; 1 cr. [max 3 cr.] ; S-N only; Periodic Summer)
This course will provide a health-coaching student the opportunity to advance coaching skills/strategies through individual client practice with the supervision of an experienced health-coaching instructor. The student health coach will engage in recorded in-person and/or telephonic coaching sessions, and receive live feedback from the instructor. The student will assess their own integration of coaching skills through completion of self-skills assessment

(level appropriate) that includes self-reflection. A final skills assessment (level appropriate) will be completed utilizing the standardized tool developed for the UMN Health Coaching program (developed in alignment with guidelines the International Consortium for Health and Wellness Coaching). Prereq CSPH 5701, CSPH 5702; Admitted to Integrative Health and Wellbeing Coaching Master of Arts, Integrative Therapies and Healing Practices Certificate-Health Coaching Track; or instructor consent.

CSPH 5713. Health Coaching for Health Professionals. (; 2 cr. ; A-F only; Every Summer)
This course will explore the basic tenets of 4 Pillars of Health Coaching model--self-awareness, mindful presence, authentic communication, and safe/sacred space. Students will learn to identify/benchmark stages/patterns of change, respectfully collaborate with interdisciplinary health care providers and facilitate clients? ability to achieve sustainable lifestyle changes. Consistent, nonjudgmental application of a holistic perspective of optimal health and wellbeing in patient encounters will be discussed and demonstrated. Students will have the opportunity to see demonstrated and to practice applying tools and practices from motivational interviewing, appreciative inquiry, non-violent communication, and other authentic communication tools. Interprofessional dialogues and exercises will be guaranteed through targeted participation of second year Health Coaching students, who are not taking this course for credit but are volunteering to increase the interprofessional understanding of coaching and team work. This course is not considered preparatory for becoming a professional health coach and does not meet educational hour requirements toward eligibility for the National Board of Health and Wellness Coaching exam, or for Continuing Education hours for NBHWC recertification. Prereq: Admitted to the Doctor of Nursing Practice-Integrative Health and Healing specialty; Admitted to other Doctor of Nursing Practice specialties; Graduate or professional students in health sciences programs; Practicing health professionals; or instructor consent.

CSPH 5805. Wellbeing in the Workplace. (; 3 cr. ; Student Option No Audit; Every Fall)
Work and experiences in the workplace have a profound impact on many dimensions of individual and collective wellbeing, including a sense of purpose and meaning, financial and emotional security, quality of relationships and community, physical and emotional health, and the local and global environments. In this course, students will learn multi-disciplinary perspectives on key challenges in creating workplaces that contribute to greater wellbeing. Students will also reflect on their own personal experiences with wellbeing in their current and past work environments and examine strategies for enhancing wellbeing based on interdisciplinary theory and research. Specific topics include the importance of purpose and meaning at work, challenges in achieving work-life integration, the impact of technology on work expectations, and organizational change. This course is based on a whole-life, integrative model of wellbeing and draws from research and theory across the social, behavior, and health sciences. prereq: jr or sr or grad, or instructor consent

CSPH 5806. Wellbeing and Resiliency for Health Professionals. (; 1 cr. ; Student Option; Every Fall & Spring)
This course will teach health professional students and health professionals self-care strategies that will improve their individual wellbeing and reduce the stress and burnout often experienced in these professions. Improving individual wellbeing will also contribute to greater wellbeing in the teams and systems in which these professionals work prereq: jr or sr or grad, or instructor consent

CSPH 5807. Mindfulness in the Workplace: Pause, Practice, Perform. (; 2 cr. ; Student Option; Every Fall & Spring)
Mindfulness in the Workplace is an experiential course designed to teach core mindfulness skills while also exploring specific applications to the workplace setting. The course explores key mindfulness traits and how they relate to essential workplace skills, such as resilience, task execution, critical analysis, intra/interpersonal growth, leadership, and other related topics. In addition, the course explores how corporate culture can be a barrier or a catalyst for adoption of mindfulness principles. By exploring the above topics from the perspective of the workplace and academic literature, students will gain an understanding of how to apply evidence-informed techniques to help them on the job. prereq jr or sr or grad, or instructor consent

CSPH 5905. Food Matters: Cook Like Your Life Depends On It. (; 1 cr. ; Student Option; Every Fall & Spring)
Food Matters is an experiential-learning, applied nutrition & culinary skills course for health professional students. The course addresses the role of food in specific health conditions and its function in health promotion and disease prevention. The course guides future health professionals in the procurement, preparation, and consumption of sustainably raised whole foods for self care and how this translates to patient care. prereq: Graduate student in a health professions field, or instructor consent

CSPH 8100. Special Topics in Complementary Therapy and Healing Practices. (; 1-6 cr. [max 12 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Critiquing research on complementary therapies (e.g., design, outcome measures). Synthesizing research findings for a therapy. Hypothesizing future directions for research on complementary therapies.

CSPH 8191. Independent Study in Integrative Therapies and Healing Practices. (; 1-6 cr. [max 8 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Individual independent study with faculty guidance. Students write proposal, including outcome objectives/work plan. Faculty member directs work, evaluates project. prereq: instr consent

CSPH 8701. Integrative Health and Wellbeing Coaching MA Capstone Project. (; 2 cr. ; S-N only; Every Fall)
This is the culminating course of the Integrative Health and Wellbeing Coaching Master?s Program. The student uses coaching data collected during either CSPH 5703 Advanced Health Coaching Practicum, CSPH 5705 Health Coaching Professional Internship, or CSPH 5709 Group Health Coaching Course to write a publication-ready manuscript for a selected journal, and to orally present a research-informed retrospective Coaching Case Report. The purpose of this course is to enable students to develop and demonstrate master?s level skills in research, critical thinking, writing, and presentation. Students will deepen their understanding of the outcomes and impacts of health and well-being coaching for a client/group, the coach, and the profession. This Course is conducted primarily online with three synchronous meetings, three asynchronous Discussion Forums, and one on-site meeting at the end of the semester for oral presentation of the Coaching Case Report. In special circumstances, with advance instructor permission, a client from a private coaching practice may be used in lieu of a course client or group data. prereq: Admission to Master of Arts in Integrative Health and Wellbeing Coaching program, CSPH 5701, 5702, 5703, 5705, 5706, 5707, 5709.

Cultural Stdy/Comparative Lit (CSCL)

CSCL 5302. Aesthetics and the Valuation of Art. (3 cr. ; Student Option; Periodic Fall & Spring)
Society, ideology, and aesthetic value considered in light of recent critical theories of visual art, music, and literature. Meditations of place, social class, gender and ideology on aesthetic judgment in post-Renaissance Western culture.

CSCL 5303. Sound Studies. (; 3 cr. ; A-F or Audit; Fall Odd Year)
What is sound? Among the various ways of absorbing the world through the senses (looking, reading, watching, touching, tasting), what is unique to the actions of listening and hearing? And over the course of human history, how has sound been variously deployed, framed, and constructed? This course covers a diverse range of topics in the fast-developing interdisciplinary field of Sound Studies from the philosophy of sound to psychoanalytic theories of the voice, the gendered histories of telephones, accounts of radio and decolonization, film sound, sonic expressions of race, the politics of global popular music, mobile media technologies, and cutting-edge approaches to sound art.

CSCL 5305. Vision and Visuality: An Intellectual History. (; 3 cr. ; A-F only; Periodic Fall & Spring)
Central role of vision/visuality in modernity. Modern age as scopic regime. Ways that ideas/

ideologies of perception have shaped aesthetic experience within social existence.

CSCL 5331. Discourse of the Novel. (; 3 cr. ; Student Option; Periodic Fall)
Comparative study of the novel, 18th century to present. Its relations to ordinary language practices, emergent reading publics, technologies of cultural dissemination, problems of subjectivity, and its role in articulating international cultural relations.

CSCL 5401. Origins of Cultural Studies. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Intellectual map of the creation of cultural studies as a unique approach to studying social meanings. Key figures and concepts, including nineteenth- and early twentieth century precursors.

CSCL 5411. Avant-Garde Cinema. (; 4 cr. ; A-F or Audit; Every Fall)
In 1939, the art critic Clement Greenberg defined avant-garde art in opposition to the ?kitsch? of mass-produced culture. To what extent does this conception of the avant-garde apply to the cinema?an institution and art form that supposedly requires machines and industrial modes of production? This course introduces students to key works of avant-garde and experimental film made by artists working on the margins of commercial film and mainstream art institutions. From the first half of the twentieth century, we will consider influential films made under the banners of Futurism, Constructivism, Surrealism, and Dada, and discuss their complex relation to Hollywood commodities. In the postwar period, we will explore a range of increasingly global experimental film practices, from the queer underground cinema in Latin America to the use of film projection in avant-garde performance. We will examine these practices in light of larger debates about medium specificity as well as the aesthetics and politics of the personal vs. the structural. In the final unit, we will reflect on the way contemporary artists, scholars, and curators have assembled a tradition of avant-garde cinema in the age of new media, and contemplate new directions we want it to take.

CSCL 5555. Introduction to Semiotics. (; 3 cr. ; Student Option; Periodic Spring)
Problems of the nature of the sign; sign function; sign production; signifying systems as articulated in philosophy, linguistics, anthropology, psychoanalysis, and art theory. Application of semiotics to various signifying practices (literature, cinema, daily life).

CSCL 5666. Film Music: Theory, History, Practice. (4 cr. ; A-F only; Periodic Fall & Spring)
Role of music in American/European film from early 20th century silent cinema to near present. Narrative features, shorts, documentary, horror, thriller, science fiction, comedy, cartoon. Film music as social/cultural practice and as part of political economy within culture industry.

CSCL 5833. Marx, Freud, Nietzsche: Intellectual Foundations. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Three thinkers who defined modernity: Marx, Freud, and Nietzsche. Central tenets of their thought/terms associated with their theories. Their careers portrayed against the background of their times; their place in intellectual history.

CSCL 5910. Topics in Cultural Studies and Comparative Literature. (; 3-4 cr. [max 32 cr.] ; Student Option; Every Fall, Spring & Summer)
Topics specified in Class Schedule.

CSCL 5993. Directed Study. (1-3 cr. [max 9 cr.] ; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. Prereq-instr consent, dept consent, college consent.

CSCL 8001. Basic Research Seminar in Cultural Studies and Comparative Literature I. (3 cr. ; Student Option; Every Fall)
Key texts, positions, problematics in field of comparative critical theory. Historical precursors, influential contemporary debates, disciplinary genealogies.

CSCL 8002. Basic Research Seminar in Comparative Literature II. (3 cr. ; Student Option; Every Spring)
Key texts, positions, problematics in field of comparative critical theory. Special attention to historical precursors, influential contemporary debates, disciplinary genealogies.

CSCL 8333. FTE: Master's. (1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

CSCL 8362. Modernity and Its Others. (; 4 cr. ; Student Option; Periodic Fall & Spring)
Dialectical interrogation of Western and non-Western theories of modernity. Reckoning with differences and variations in its history, providing an account of the normative category of modernity (designated as European), and alternative articulations around the globe.

CSCL 8444. FTE: Doctoral. (1 cr. [max 8 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

CSCL 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Doctoral pre-thesis credits. Prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined credits.

CSCL 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD

CSCL 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

CSCL 8901. Intro to the Profession: Critical Methods of Research, Pedagogy, and Creative Work in the Humanities. (3 cr. ; Student Option; Every Spring)
Prepares graduate majors for teaching. Issues of pedagogy. Preparing syllabi for specific courses that graduate instructors teach. Required for students planning to teach in Department of Cultural Studies and Comparative Literature. Prereq: Grad comp lit major

CSCL 8902. Methodologies Colloquium. (1 cr. [max 2 cr.] ; S-N only; Every Fall & Spring)
Presentations by CSCL faculty. Methods in relation to the field as a whole. Library component. Meetings with research librarians. prereq: CL/CSDS/CSCL grad major or instr consent

CSCL 8910. Advanced Topics in Comparative Literature. (; 3-4 cr. [max 24 cr.] ; Student Option; Every Fall & Spring)
Practical applications of specific methodologies and theories to a determined area. Topics vary by instructor and semester.

CSCL 8920. Advanced Topics in Comparative Literature. (; 3 cr. [max 15 cr.] ; Student Option; Periodic Fall & Spring)
Practical applications of specific methodologies and theories to a determined area. Topics vary by instructor and semester.

CSCL 8992. Directed Reading in Comparative Literature. (; 1-4 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
prereq: instr consent

CSCL 8993. Directed Study. (1-4 cr. [max 48 cr.] ; Student Option; Every Fall & Spring)
Catalog Description: Directed Study in Cultural Studies and Comparative Literature prereq: instr consent

CSCL 8994. Directed Research. (; 1-4 cr. ; Student Option; Every Fall & Spring)
Directed Research in Cultural Studies and Comparative Literature prereq: instr consent

Curriculum and Instruction (CI)

CI 5008. Theory and Practice of Arts Teaching. (; 1-2 cr. [max 3 cr.] ; A-F or Audit; Every Fall & Spring)
Designed for students pursuing visual or performing arts education licensure, the course explores: 1) Arts concepts, skills, and processes appropriate for elementary school; 2) methods of teaching arts for social justice; and 3) an overview of children?s production of and responses to visual and performing art.

CI 5018. Teaching Dance. (; 1 cr. ; A-F only; Every Fall, Spring & Summer)
Teaching Dance considers the theoretical and curricular applications of dance pedagogy and assessment in PK?12 dance learning contexts. Students will connect theory to practice by developing curriculum and instructional material from the field of dance education and professional teaching standards in dance education. prereq: Education graduate student or instructor consent

CI 5049. Digital Media & Technology Integration: Arts Education Theory & Practice. (; 3 cr. ; A-F or Audit; Every Summer)
This course explores issues in the visual and performing arts regarding the current and potential use of technology and digital media in P-12 arts classrooms. Through readings, discussions, artistic production, academic writing, and collaboration, you will understand the use and integration of technology in P-12 arts classrooms as pedagogical tools; the function of scaffolding students? use of digital media as part of 21st century arts teaching and learning; various technological supports for student learning and artistic production; specific digital media theories, pedagogies, and content knowledge; the use of technology in designing, sharing, and conducting lessons; issues concerning the assessment and exhibition of student works; and practical issues of using technology for teaching in and through the arts.

CI 5050. Issues in Art Education. (; 1-4 cr. [max 8 cr.] ; Student Option; Every Fall & Summer)
Issues/trends, current practices, recent research.

CI 5065. Improving Arts Programs in the Schools. (; 3 cr. ; A-F or Audit; Every Fall)
This course provides students with an exploration of issues in visual and performing art instruction, including teaching methods and evaluation, philosophical frameworks of pedagogy, and institutional issues concerning arts programs in middle and high schools; social and cultural structures of schooling, practical issues, and teaching arts.

CI 5069. Curriculum Innovations in Arts Education. (; 3 cr. ; A-F or Audit; Every Fall)
This course provides students with an examination of traditions in American schooling related to visual and performing arts education curricula.

CI 5075. The Social, Historical and Cultural Foundations of Arts Education. (; 3 cr. ; A-F or Audit; Periodic Fall)
The Social, Historical and Cultural Foundations of Arts Education will examine the arts in public education since the 1800s.

CI 5078. Application of Aesthetic Theory in Education. (; 2 cr. ; A-F or Audit; Every Spring & Summer)
The course explores: ?contemporary theories of arts ?psychological and philosophical foundations ?an overview of children's production of and responses to visual and performing arts

CI 5096. Arts Education Experience. (; 1-6 cr. ; A-F or Audit; Every Fall)
In this course, students complete field experience observations in designated K-12 visual art or performing art, special education, and kindergarten classrooms.

CI 5097. Student Teaching in Arts Education. (; 8 cr. ; S-N or Audit; Every Spring & Summer)
Teacher candidates spend 16 weeks student teaching in visual art, dance, or theatre. Eight weeks occur in an elementary setting and eight weeks occur in a secondary setting including, but not limited to, middle school.

CI 5102. Culture, Schools, & Communities: Human Relations I. (3 cr. ; A-F only; Every Summer)
This course provides teacher candidates with the knowledge and skills to address social and cultural dimensions of education. Students explore a wide range of challenges and dilemmas facing contemporary educators in the U.S. and in other global locations. They examine original research and theory from the social sciences, and learn how research and theories have informed various educational policies and actual approaches to teaching. The course begins with a focused study of how U.S. educational history has been shaped by competing norms and purposes. It then moves into the role of philosophy in defining those purposes, and shaping actual approaches to teaching. The course then shifts to examine multiple dimensions of humanity including race, culture, gender, gender orientation, class, worldview, perception, and language in and out of school. These concepts lay the foundation for study of cultural transmission and acquisition, the learning preferences of diverse students, and ultimately, culturally relevant pedagogy, cultural competence, and cultural intelligence. Throughout the course, teacher candidates will consider their own positionality and what that means for their practice. Learning experiences are made up of class meetings involving speakers, simulations, and multi-media presentations; readings; small group discussions, activities, exercises and projects.

CI 5103. Culture, Schools, & Communities: Human Relations II. (1 cr. ; S-N only; Every Fall)
This course provides teacher candidates with the knowledge and skills to address social and cultural dimensions of education. The course then explores community partnerships that support student learning, and how teachers may navigate the social and political environment of schools and school districts to be effective advocates for their students. The course examines three themes that are interwoven throughout: professionalism, teacher leadership, and adaptive expertise. In sum, the course encourages teacher candidates to imagine both the realities and possibilities of schooling in the contemporary world. Learning experiences are made up of class meetings involving speakers, simulations, and multi?media presentations; readings; small group discussions, activities, exercises and projects. Prerequisites: Enrolled in initial teacher licensure program and successful completion of CI 5102.

CI 5106. Multicultural Teaching and Learning in Diverse College Contexts. (; 3 cr. ; A-F only; Every Fall)
Theory/pedagogy for culturally responsive teaching from perspectives of teachers/learners in postsecondary settings. Critical multicultural education, universal instructional design, integrated multicultural instructional design.

CI 5111. Introduction to Elementary School Teaching. (; 3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Curriculum organization, instruction, management, assessment, professional decision making. prereq: Foundations of ed major or elem ed initial lic

CI 5116. Action Research in Educational Settings. (; 3 cr. ; Student Option; Every Spring)
Action research as method of improving teaching/learning in educational settings. Experience doing research in classrooms. Relative strengths/challenges of different approaches to classroom research. Ethical issues.

CI 5121. Culture Power and Education. (3 cr. ; A-F only; Every Fall & Spring)
In this course we will explore the manifestations of culture and power in education. We will examine the ways in which culture is a mediating factor in the educational achievement of underrepresented students. We will explicate the relationship between home/community and school cultures; and illuminate the detrimental impact of subtractive schooling practices. We then explore the theories and research that have shown the importance of integrating students' interests, knowledges, and experiences-cultures-for increasing student engagement and achievement. Our examination of culturally relevant pedagogy we will move beyond an understanding of "culture" within education as the "celebration" of ethnic food, songs and customs. Instead, we shift toward a more complex understanding of "culture" that takes into account the influences of ethnic culture, youth culture, and popular culture.

CI 5122. Social Class, Education and Pedagogy. (3 cr. ; A-F only; Every Fall & Spring)
This course will immerse students in social, psychological, economic, and political aspects of social class and poverty, and the implications for education as a social institution and classroom pedagogy. Students will engage in inquiries around social class in the U.S.; working-class literature for adults and children; labor histories; and economic systems' and will learn to design social class-sensitive teaching practices guided by five principles for social class-sensitive change.

CI 5145. Critical Pedagogy. (; 3 cr. ; A-F or Audit; Every Spring)
Examination of critical pedagogy; critique of power relations regarding race, culture, class, gender, and age in various educational settings; consideration of improved practice in education for children, youth, and adults.

CI 5150. Curriculum Topics. (; 1-4 cr. [max 8 cr.] ; S-N only; Every Fall, Spring & Summer)
Special topics, current trends in curriculum. Subject integration, curriculum contexts, development, implementation, evaluation.

CI 5155. Contemporary Approaches to Curriculum: Instruction and Assessment. (; 3 cr. ; A-F or Audit; Every Fall, Spring & Summer)

Current research/issues that cross disciplinary boundaries in curriculum development, instructional practices, and assessment methods. Interrelations among curriculum, instruction, and assessment within framework of constructivist learning theory. Individual classroom practices/theories. prereq: Grad students only

CI 5156. Popular Culture, Teaching, and Learning. (; 3 cr. ; A-F only; Every Fall)
Approaches to the study of popular culture and education. Intersection between everyday life and broader historical contexts. Sporting events, toys, clothing, shopping malls, vampire mania, music festivals, video, and comics are the kinds of popular forms of culture we will engage as we develop teaching/learning strategies. prereq: Grad student or sr in a program that values teaching as a component of the discipline

CI 5163. Child and Adolescent Development for Teaching and Learning I. (1 cr. ; A-F only; Every Fall & Summer)
Attending to constant transitions/development in which children and adolescents negotiate their road to adulthood. How to foster learning/ positive development. prereq: Enrolled in teacher initial licensure program

CI 5164. Child and Adolescent Development for Teaching and Learning II. (2 cr. ; A-F only; Every Fall & Spring)
Transitions/development in which children/ adolescents negotiate road to adulthood. How to foster learning/positive development. prereq: Enrolled in teacher initial licensure program

CI 5177. Practical Research. (; 1-3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Preparation for identifying a research and development topic, reviewing the existing knowledge on the topic, planning and carrying out a project, further investigating the topic, and writing a report on the project. prereq: CI MEd student, or CI or EdPA Teacher Leadership MEd student

CI 5186. School-Related Projects. (; 1-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Research or evaluation project related to teaching, curriculum, or other aspect of schooling. Approved and supervised by faculty advisor. prereq: MEd student

CI 5190. Directed Individual Study in Curriculum and Instruction. (; 1-6 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Producing/evaluating curriculum materials. Literature review of issues/problems. Assessing curriculum processes. prereq: Grad student, instr consent

CI 5211. Elementary Education Content and Pedagogy I. (; 4 cr. ; A-F only; Every Fall, Spring & Summer)
Teacher Candidates will complete eight modules on elementary content/pedagogy instruction across disciplines. Introduce various concepts/practices that will be spiraled in each subject area.

CI 5212. Elementary Education Content and Pedagogy II. (3 cr. ; A-F only; Every Fall, Spring & Summer)
Teacher Candidates will complete five modules on elementary content/pedagogy instruction across disciplines. Builds on various concepts/ practices from introductory course. Introduces content that will be spiraled in each subject area.

CI 5213. Elementary Education Content and Pedagogy III. (3 cr. ; A-F only; Every Fall, Spring & Summer)
Teacher Candidates will complete six modules on elementary content/pedagogy instruction across disciplines. Builds on various concepts/ practices from two previous introductory courses. Introduces content that will be spiraled in each subject area.

CI 5214. Elementary Education Content and Pedagogy IV. (3 cr. ; A-F only; Every Fall, Spring & Summer)
Teacher Candidates will complete five modules on elementary content/pedagogy instruction across disciplines. Builds on various concepts/ practices from previous three courses. Introduces content that will be spiraled in each subject area.

CI 5215. Elementary Education Content and Pedagogy V. (2 cr. ; A-F only; Every Fall, Spring & Summer)
Teacher Candidates will complete five modules on elementary content/pedagogy instruction across disciplines. Builds on various concepts/ practices from introductory courses. Introduces content in each subject area. Serves as conclusion to elementary ed content/pedagogy courses.

CI 5283. Field Experience: Applying Instructional Methods in the Elementary Classroom. (; 3 cr. [max 6 cr.] ; S-N only; Every Fall & Spring)
Field-based experiences in elementary school settings. In-class discussions about application of classroom learning to school setting. Previously CI 5183. prereq: M.Ed./Elementary education initial licensure student, enrolled in elementary education methods course

CI 5285. Clinical Experience in Elementary School Teaching. (; 12 cr. [max 24 cr.] ; S-N only; Every Fall, Spring & Summer)
Students spend full days in elementary classroom, gradually assuming responsibility for teaching, and prepare portfolio based on criteria given. One seminar per week. prereq: M.Ed./Elementary education initial licensure students

CI 5286. Student Teaching Seminar: Elementary Education. (; 3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
Weekly seminar supplementing student teaching experience. Class discussions, sharing of artifacts from the classroom, reflections, and readings. prereq: M.Ed./ Elementary education initial licensure only

CI 5287. Capstone Project: Improvement of Teaching in Elementary and Pre-Kindergarten Schools. (3 cr. ; A-F only; Every Fall, Spring & Summer)
Elementary school classroom teaching project to improve specific teaching skills. Approved/ directed by adviser. prereq: M.Ed./elementary education initial licensure student

CI 5301. Foundations of Computer Applications for Business and Education. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Instructional uses of computers/representative business, education, marketing applications. Word processing, databases, spreadsheets, graphic design. Expectations are for demonstrations of skills on apps/understanding of concepts that go beyond basic.

CI 5307. Technology for Teaching and Learning. (1.5 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Diverse educational technology in K-12 classrooms. Effective use of technology. Computer technologies used to stimulate personal productivity/communication and to enhance teaching/learning processes. prereq: [MEd/initial licensure or CLA music ed major or preteaching major or instr consent], basic computer skills

CI 5321. Foundations of Distance Education. (; 3 cr. ; A-F or Audit; Every Summer)
History, philosophies, technologies, and best practices related to distance learning environments. Distance education theories. Issues in distance education.

CI 5323. Online Learning Communities. (; 3 cr. ; A-F or Audit; Every Spring)
Students design/research an online learning environment that promotes community. What community is, how it fosters learning in educational learning environments. Theories of distance learning instruction. Community models. technological tools to develop online communities.

CI 5325. Designing and Developing Online Distance Learning. (; 3 cr. ; A-F or Audit; Every Fall)
Students research, use, and evaluate technologies for distance learning and design their own learning environments. prereq: 5351 or 5362 recommended

CI 5330. Special Topics in Learning Technologies. (; 3 cr. [max 9 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Topics related to the field of learning technologies.

CI 5331. Introduction to Learning Technologies. (3 cr. ; A-F or Audit; Every Fall)
An exciting look at the field of learning technologies (LT), examining the numerous opportunities this area of study brings to individuals who decide to pursue a LT degree. Students engage in numerous real-world projects as they come to understand both the past and future of technology in education, business, and society as a whole.

CI 5336. Planning for Multimedia Design and Development. (3 cr. ; A-F or Audit; Every Spring)
Theory, research, practice in instructional design. Generic components of instructional design process. Applying principles to design/ development of computer-based instructional materials.

CI 5351. Technology Tools for Educators. (3 cr. ; A-F or Audit; Every Fall)

Develop skills in using technology applications to support teaching and learning. Internet applications, presentation software, Web 2.0 technologies, and Web site development.

CI 5361. Teaching and Learning with the Internet. (; 2-3 cr. ; Student Option; Every Spring)
Implications/challenges in using Internet-based technologies in classroom. Pedagogical models.

CI 5362. Foundations of Interactive Design for Web-based Learning. (3 cr. ; A-F or Audit; Every Fall)
Processes of designing/developing interactive learning media and online applications from ground up. Focuses on usability/aesthetics in online learning.

CI 5365. Contemporary Software Development Issues and Tools. (3 cr. ; A-F or Audit; Every Summer)
Software used in multimedia design/ development. Uses of the software, intricacies of interface, relevant programming principles. Introduction to developing multimedia applications. prereq: Familiar with standard computer/Internet operations

CI 5371. Learning Analytics: Theory and Practice. (; 3 cr. ; Student Option; Every Fall)
Learning analytics as a nascent field is broadly defined as the "measurement, collection, analysis and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs." This course aims to provide a general, non-technical survey of learning analytics, as well as its application in various educational contexts. In particular, we will discuss foundations of learning analytics, survey pertinent education theories, discuss new forms of assessment, explore popular data mining techniques, review learning analytical tools and case studies, and de- sign analytics for our own interested contexts. Given the breadth of this field, additional support is provided for deep dives in special interest areas. Overall, this course provides a comprehensive, theory-driven overview of learning analytics to orient students to this nascent field and prepare them for advanced research/practice in learning analytics.

CI 5392. Learning Technologies M.Ed. Capstone Project. (; 3 cr. ; A-F only; Every Spring)
In this course Learning Technologies M.Ed. students develop their final capstone project that signals the completion of their degree program. Students will identify a need or gap related to Learning Technologies in an area of interest to them and conduct preliminary research on that topic. Based on their research, students develop a proposal and turn the proposal into reality by building the project. Students will participate in a variety of discussions and scholarly readings, both instructor selected and those selected by students in support of their identified topics of research. A mini-cohort model of 2-4 students is used throughout the course for peer review and feedback. Peers become mini-experts in their partners' projects as they follow along in the design and development process and ask questions and offer feedback along with the instructor. Students will develop a completed project or prototype (e.g. course curriculum, training materials, website, software, mobile app, etc.) and a paper defending their project by discussing the research that informed their decisions, how those decisions were implemented, and how they expect the project to impact their work and/or field. The course culminates in a public presentation of their project via live or video conferencing with a Q&A session following. prereq: Learning Technologies M.Ed. students

CI 5404. Multicultural Literature for Children and Adolescents. (; 3 cr. ; A-F or Audit; Spring Odd Year)
Course explores multicultural literature for children and adolescents as a site where difference can be emphasized and appreciated rather than downplayed and muted. We study award-winning works of fiction and arrive at a definition of multicultural literature for the modern classroom.

CI 5413. Foundations of Reading. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Reading processes, development of readers. Assessment and tutoring of individual children in reading and other literacy practices. prereq: CI 3610 and concurrent registration with CI 5414

CI 5414. Field Experience: Working with Developing Readers. (2 cr. ; S-N only; Every Fall & Spring)
Field-based experiences. Students apply learning from their University course to working with developing readers. Instructor provides specific assignments.

CI 5417. Elementary literacy Instruction for ESL Students. (; 3 cr. ; A-F or Audit; Fall Odd Year)
Teaching reading/writing in elementary grades to students from diverse languages. Second-language literacy development. Phonemic awareness, phonics, fluency, vocabulary, comprehension. Ways to connect students? background knowledge to literacy curriculum. prereq: Bachelor's degree completed

CI 5419. The American Middle School. (; 3 cr. ; Student Option; Every Fall & Summer)
Focus on the uniqueness of the early adolescent and appropriate learning situations. For educators working with middle-level students.

CI 5421. Writing on Education: Pivotal Experiences of Teaching and Learning. (4 cr. ; Student Option; Every Fall & Spring)
Reflection and narrative play important roles in developing deep understanding of teaching and learning. In this course students will read and write texts about critical moments of education, and through this work develop reflective, analytic, and writing skills that will enable them to become more thoughtful and effective citizens in the world of education. Whether students hope to become teachers, youth workers, community organizers, curriculum designers or administrators in educational settings, this course invites students to consider how writers represent experiences of teaching and learning and how these reflective narratives can inform our own work and worlds. Students will explore the ways that writers of creative nonfiction use language to examine pivotal experiences of teaching and learning in diverse contexts, and add their own voices to this rich body of work by producing their own texts. Through study of writing, students will develop familiarity with writing choices and practice employing these techniques and processes in their own writing. Students will read personal essays written by writers in the US who reflect on their own experiences and interrogate how aspects of their identities (including race, ethnicity, gender, family history and language) inform pivotal experiences of teaching and learning. Students will compose texts that explore their own experiences within a constellation of formal and informal educational settings and the questions raised and arguments made through these representations. We will use a workshop-based format that supports transformational learning, helping writers see themselves and their worlds in new ways. Course reading will introduce a range of issues raised by experiences in and outside of the classroom.

CI 5422. Teaching Writing in Schools. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Theory/practice of teaching writing in schools. How race, gender, and social class impact teaching/learning.

CI 5425. Reading Instruction in the Elementary Grades. (; 3 cr. ; A-F only; Every Fall & Spring)
Curricular/methodological issues in teaching of reading. Reading/orthographic processes, strategy instruction for word recognition/ comprehension, authentic assessment strategies, and teaching diverse students. prereq: [Elementary or early childhood] licensure student

CI 5426. Language Arts Instruction in the Elementary Grades. (; 3 cr. ; A-F only; Every Fall & Spring)
Curricular/methodological issues of language arts. Oral language development, response to literature, writing processes, authentic assessment strategies. Teaching diverse students. prereq: Elementary or early childhood licensure student

CI 5431. Introduction to Instructional Leadership in K-12 Reading. (; 3 cr. ; A-F or Audit; Every Summer)
K-12 curriculum in reading, major theories/ research that motivate curriculum. Major instructional principles, alignments needed, resources available. prereq: Minnesota license valid for classroom teaching in pre-kindergarten, [adult basic education or grades kindergarten through 6 or 1 through 6 or 5 through 8 or 9 through 12 or kindergarten through 12]

CI 5432. Instructional Leadership in Reading in Kindergarten and the Elementary Grades. (; 3 cr. ; A-F or Audit; Every Fall)

Research-based reading instruction for elementary grades. How to help other teachers improve practice. Characteristics of effective schools within context of improving students. reading achievement. prereq: 5431

CI 5433. Instructional Leadership in Reading for the Middle and Secondary Grades. (; 3 cr. ; A-F or Audit; Every Spring)
Curriculum/instruction for middle/secondary school students. prereq: 5432

CI 5434. Professional Development and Evolving Practice in K-12 Reading. (; 3 cr. ; A-F or Audit; Every Summer)
Developing e-portfolio to assess competence in standards for teaching K-12 reading. Evolving teaching practices. Applications of current technologies. prereq: 5433

CI 5435. Instructional Leadership in Preventing Reading Difficulties. (; 3 cr. ; A-F or Audit; Every Fall)
Research-based reading interventions for struggling readers. How to help other teachers improve their practice. Theory/research behind preventing reading difficulties. Principles/ techniques for assessing reading difficulties and students? progress. prereq: 5434

CI 5441. Teaching Literature in the Secondary School. (; 2-3 cr. ; A-F or Audit; Periodic Fall & Spring)
Current theories. Analyzing literature. Response to literature. Adolescent literature/ reading interests. Devising response activities/ units. Multicultural literature. Relating media and literature. Linking writing to understanding literature. Designing curriculum. Evaluating/ assessing students. Growth in literary response.

CI 5442. Adolescent Literature, Youth Activism and Climate Change Literacy. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
This course explores how contemporary adolescent literature engages with the developmental and identity challenges faced by a generation whose lives are framed by anthropogenic climate change, biodiversity loss, mass migrations, and other forms of slow violence inherent in the unsustainable carbon-intensive civilization. Given that climate change is primarily a challenge to our story systems and that adolescents constitute the most invested audience for sustainability education, adolescent literature has become a site of rebellion against the unjust and ecocidal status quo; a site where adolescents can articulate, debate, and creatively respond to visions of sustainable futures. In this course we will study award-winning works of fiction and nonfiction across genres to understand how adolescent literature inspires activist positions vis a vis petronormative ideologies of power that are devastating the planet. Our focus on the intersection of storytelling, activism, and climate change literacy will help us grasp the key role adolescent literature plays in empowering today?s youths to become agents of change. We will discuss how adolescent literature can stoke young people? s transformative anger, inspire them to address the climate crisis, and stand up for their right to have a future. We will consider how educators can support this fight through activism and engaged discussions of adolescent literature. We will read award-winning picturebooks, novels, and graphic novels that challenge us to reinvent ourselves as a biocentric global civilization. The goal is to transform you into an informed advocate of adolescent literature as a tool for developing climate change literacy and empowering your students to imagine post-carbon futures.

CI 5451. Teaching Reading in Middle and Secondary Grades. (; 3 cr. ; A-F or Audit; Every Fall)
Methods of accommodating to students' abilities and facilitating reading in regular content classes.

CI 5452. Reading in the Content Areas for Initial Licensure Candidates. (; 1-2 cr. ; A-F only; Periodic Fall & Spring)
Web-based course. Fostering students' reading related to learning from text. prereq: Concurrent enrollment in licensure area methods course(s), enrolled in Initial Licensure Program, Internet access, basic understanding of [computer use, Web browsers, email, word processing software]

CI 5461. Teaching Composition in the Secondary School. (3 cr. ; A-F or Audit; Periodic Spring)
Theories of composition instruction. Teaching composing within social contexts. Informal writing. Linking reading/writing. Describing/ evaluating student writing. Using/modeling conference strategies. Computer-mediated software. Grammar and writing. Editing instruction. Writing assessment. Uses of portfolios.

CI 5463. Minnesota Writing Project Annual Invitational Summer Institute. (; 3 cr. ; A-F only; Every Summer)
Workshop. Participants reflect on their own literacy processes, participate in a writing group, discuss current reading texts, and demonstrate best practices in classroom. prereq: Licensed teacher or administrator or [space available, faculty letter of recommendation]

CI 5464. The Politics of Literacy and Race in Schools. (3 cr. ; A-F or Audit; Every Fall)
Literacy and race in schools examined, especially how power plays out, and what are the possibilities for creating radical democratic forms of life. Conceptions of language, literacy, whiteness, and racial identities are explored. Topics include educators? talk and silence about race, Ebonics, and youth?s racial identities in global times.

CI 5465. Writing and Social Justice: A Minnesota Writing Project Open Institute. (3 cr. ; Student Option; Every Summer)
This course focuses on practices within literacy instruction as related to the current educational landscape and a theme of social justice. In this course, participants will focus on three areas: writing, teaching, and learning. Participants will reflect on their own writing processes as they write, share, and participate in a community of writers. Writing groups will meet several times during the course. Participants will also consider the theory and practice of writing instruction that helps students achieve their potential as writers and change agents. In addition, participants will investigate a literacy issue relevant to the course theme, social justice, and will present it as a research project or lesson. This course is offered for practicing teachers at all levels and across disciplines.

CI 5471. Clinical Experience in Teaching Secondary English. (3 cr. ; A-F only; Every Fall)
Initial licensure candidates in English Education will observe the teaching and learning experience in a school and classroom context; implement approaches, assessments, and philosophies learned about in corresponding methods courses; reflect upon the complexities of classroom life in a seminar format; and co-plan and co-teach a five-day unit. prereq: Must register same semester as CI 5441 and CI 5451.

CI 5472. Teaching Critical Media Analysis in Schools. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
"Critical" media literacy means that we focus on, among other things, analyzing the intersection between media and issues of identity -- like gender, race, class and sexuality. We also focus on how to teach critical media analysis to students and others.

CI 5474. New Literacies Frameworks and Instruction: Digital Texts and Digital Reading. (3 cr. ; A-F only; Every Fall)
Read digital texts against backdrop of traditional print-based notions of reading, literacy, school curricula/instruction. Assists education professionals in making school/ district-wide decisions based on sound research on digital reading/new literacies.

CI 5475. Teaching Digital Writing. (; 3 cr. ; A-F or Audit; Every Fall)
Blogs, wikis, online discussion. Database searches. Integration of images, audio, video, text. Digital note-taking, mapping, storytelling. Online discussions, collaborative writing. Audio production. Formatting/design techniques. Online evaluation. E-portfolios.

CI 5481. Developments in Teaching English and Speech. (; 3 cr. ; A-F or Audit; Every Spring)
Current theories of English/speech curriculum. Teaching oral language. Organizing curriculum. Linking components of English/speech curriculum. Reflecting on pre-student-teaching experience.

CI 5483. Critical Literacy, Storytelling, and Creative Drama. (3 cr. ; Student Option; Every Summer)
This course examines and embodies how storytelling and creative drama can be used as tools to help develop students? critical literacy and to assist them in becoming more fluent readers and writers. Critical literacy is the focus; theater and storytelling are the vehicles. Key topics to be covered include: 1) A historical background on fairy and folk tales,

legends, fables, myths, and the different oral traditions; 2) Tools for developing a critical view of diverse tales; 3) Practical instruction on how to use storytelling and story genres in the classroom to develop critical literacy; 4) Assessing storytelling work in the classroom. Students will meet in the first week at the University to learn tools of the Neighborhood Bridges program and in the second week will practice and observe each other?s teaching with local school classrooms. In the past we have worked with 4th graders and 6th graders, though we will also discuss how course content applies to high school students. The class meets for two intensive weeks in person, however, we additionally assign pre-readings and post-class reflections and papers.

CI 5484. Improving Secondary English Language Arts Instruction: Part I. (; 1.5 cr. ; A-F only; Every Fall)
This online course is designed for secondary literacy teachers, including those in communication arts and literature. The purpose of this course is for secondary English Language Arts (ELA) teachers to examine their practice in a collaborative community and to improve teacher effectiveness through ongoing feedback from the instructor and other participants. The course will provide support through small group discussions and peer and instructor response. Key topics to be covered include: 1) frameworks for understanding teacher growth in ELA contexts; 2) developing an ELA classroom ecology; and 3) supporting and assessing student learning in the ELA Common Core Standards. This 1.5-credit course was designed in a sequence with CI 5485: Improving Secondary English Language Arts Instruction: Part II.

CI 5485. Improving Secondary English Language Arts Instruction: Part II. (; 1.5 cr. ; A-F only; Every Spring)
This online course is designed for secondary literacy teachers, including those in communication arts and literature. The purpose of this course is for secondary English Language Arts (ELA) teachers to examine their practice in a collaborative community and to improve teacher effectiveness through ongoing feedback from the instructor and other participants. The course will provide support through small group discussions and peer and instructor response. This 1.5-credit course was designed in a sequence with CI 5484: Improving Secondary English Language Arts Instruction: Part I. This second course in the sequence will focus on teacher-driven professional inquiry that participants began developing in CI 5484. prereq: Successful completion of CI 5484.

CI 5496. Directed Experiences in Teaching English. (4-8 cr. ; S-N or Audit; Every Fall & Spring)
Student teaching/clinical experience for English Education (Comm Arts & Lit) initial licensure and middle level endorsement students. Credits vary depending on length of field experience and should be determined with your academic adviser. prereq: MEd/initial licensure students in English ed only

CI 5502. Science Instruction in the Elementary Grades. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Methods/materials for teaching science/health at elementary school level. prereq: Early Childhood or Elementary Education ILP

CI 5511. Introduction to Secondary Science: Laboratory-based Instruction. (; 4 cr. ; A-F only; Every Fall, Spring & Summer)
Inquiry about teaching/learning, observing/analyzing instruction, reflecting on own/each other's science teaching. How to use various instructional techniques/methods.

CI 5512. Secondary Science Methods: Understanding the Nature of Science. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Inquiry about teaching/learning, observing/analyzing instruction, reflecting on own/each other's science teaching. How to use various instructional techniques/reflect upon teaching. Develops understanding of research-based instructional methods in secondary science classrooms.

CI 5513. Secondary Science Methods: Equity in Science Teaching. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Inquiry about teaching/learning, observing/analyzing instruction, reflecting on own/each other's science teaching. How to use various instructional techniques/reflect upon teaching. Develops understanding of equitable science teaching practices/safe student-centered classroom culture.

CI 5514. Secondary Science Methods: The Science Learning Environment. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Inquiry about teaching/learning, observing/analyzing instruction, reflecting on science teaching. How to use various instructional techniques, reflect upon professional growth using evidence from teaching. Identify goals/instruction plans for professional practice.

CI 5515. Secondary Science Methods: Developing Adaptive Expertise. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Inquiry about teaching/learning, observing/analyzing instruction, reflecting on science teaching. How to use various instructional techniques, reflect upon professional growth using evidence from teaching. Identify goals/instruction plans for professional practice.

CI 5530. Secondary Science Methods I. (; 3 cr. ; A-F only; Every Summer)
Lab-based science teaching in secondary school setting. Research-based teaching strategies are modeled that address national-/state-level standards. How to use various inquiry-based instructional techniques/methods.

CI 5531. Secondary Science Methods II. (; 3 cr. ; A-F or Audit; Every Fall)
Methods of planning/teaching science to middle school students. prereq: Initial licensure student in science ed and CI 5530 Secondary Science Methods 1

CI 5532. Secondary Science Methods III. (; 3 cr. ; A-F or Audit; Every Spring)
Methods of planning/teaching science for secondary school students. prereq: Admission to initial licensure program in science and CI 5531 Secondary Science Methods II

CI 5533. Current Developments in Science Teaching. (; 3 cr. ; A-F or Audit; Every Summer)
Using curriculum standards to design science courses. prereq: MEd, initial licensure, grad student, or instr consent

CI 5535. Foundations of Science Education. (; 3 cr. ; A-F or Audit; Every Spring)
Analysis of present science teaching practices in light of historical and philosophical foundations of science education. prereq: M.Ed., grad student, or instr consent

CI 5536. Equity, Policy, and Assessment in Science Education. (; 3 cr. ; A-F only; Every Fall)
Nature of equity, diversity, and policy matters that influence schools/teachers involved in science teaching and scientific literacy. Classroom presentations, discussions, readings in current research. prereq: Med, or grad student, or instr consent

CI 5540. Special Topics: Science Education. (; 1-4 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Detailed examination and practice of the teaching of one area of science (e.g. geology, health, physical science) or one method of instruction (e.g. laboratories, demonstrations, Internet, simulations).

CI 5541. Teaching History and Nature of Science. (3 cr. ; A-F or Audit; Every Fall)
Understanding nature of science(NOS). Integrate/reflect on NOS in secondary science classroom. Historical cases/integrating NOS with science content/scientific inquiry. prereq: MEd ILP or professional studies student in science education or instr consent

CI 5551. Reflecting on Science Classroom Practices I. (1.5 cr. ; A-F only; Every Fall)
Students reflect on their instruction and student learning during first years of teaching. Monthly meetings, observations, online discussion. Classroom management, planning, inquiry-based teaching, assessment, equity in the classroom.

CI 5552. Reflecting on Science Classroom Practices II. (1.5 cr. ; A-F only; Every Spring)
Students reflect on their instruction and student learning during first years of teaching. Monthly meetings, observations, online discussion. Classroom management, planning, inquiry-based teaching, assessment, equity in the classroom.

CI 5596. Clinical Experience in Middle School Science. (; 4 cr. ; A-F or Audit; Every Fall)
Supervised clinical experience in middle school science teaching.

CI 5597. Clinical Experience in Secondary School Science Teaching. (; 4-8 cr. ; S-N or Audit; Every Spring)
Supervised clinical experience in secondary school science teaching. prereq: initial licensure or instr consent

CI 5608. CARLA Summer Institute Seminar. (; 1-4 cr. [max 16 cr.] ; Student Option No Audit; Every Summer)
The Center for Advanced Research on Language Acquisition (CARLA) offers a series of intensive summer institutes to provide timely professional development for foreign language and ESL educators throughout the country. The special topics offered under CI 5608 are designed to provide language teachers with the latest research-based information and best practices skill development as the field of language instruction evolves. Each institute is highly interactive and includes discussion, theory-building, hands-on activities, and plenty of networking opportunities with colleagues from around the world.

CI 5611. Principles of Linguistics. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Introduction to linguistics for ESL teachers. Linguistic terminology/analysis. Theories/ research about first/other language learning. Analyze educational implications of language use, learning, policy.

CI 5612. ESL Methods for Multilingual Development. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Introduction to methods of developing reading, writing, speaking, listening skills among English learners in K-12. Reflect on beliefs/ideas, cultivate orientation towards reflective teaching/ life-long learning.

CI 5613. Testing and Assessment for English Learners. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Develop awareness of/familiarity with policies, procedures, practices in use in attempting to determine academic readiness of students learning English as secondary language in American public schools.

CI 5614. Curriculum and Materials Development for English Learners. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Explore role ESL teachers play in curriculum/ materials development. Historical overview of curriculum development in second language education, factors that influence curriculum development, range of models for curriculum development tailored to English learners.

CI 5615. Academic English for English Learners: Planning, Assessment, Instruction. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Prepares ESL teacher candidates to develop academic English skills of English learners of various proficiencies through bilingual teaching strategies. Prepares students to offer leadership with colleagues from content areas to integrate language/content. Includes focused study of advanced-level syntactic structures/ completion of edTPA.

CI 5617. Academic Language and English Learners I. (; 1 cr. ; A-F only; Every Summer)
Working with English learners and other linguistically diverse students across content areas to develop academic language proficiency. prereq: Enrolled in teacher initial licensure program

CI 5618. Academic Language and English Learners II. (; 1 cr. ; A-F only; Every Spring)
Working with English learners and linguistically diverse students across all content areas to develop academic language proficiency. prereq: Enrolled in teacher initial licensure program

CI 5619. Teaching World Languages and Cultures in Elementary Settings. (; 2 cr. [max 3 cr.] ; Student Option; Every Summer)
Methods/materials for elementary world language instruction; development of oral communication/literacy in world languages; world language program design; global awareness/cross-cultural experience; children's language; children's literature, games, and songs; planning/development of units and lessons.

CI 5620. Introduction to Second Language Acquisition for Language Teachers. (; 3 cr. [max 6 cr.] ; Student Option; Every Summer)
Current research and theory in the area of second language acquisition (SLA). Topics include the similarities and differences across first and second language acquisition; the role of individual differences in language learning (including age, first language, aptitude among others). Implications for sociolinguistic diversity in the United States.

CI 5621. Culture as the Core in the Second Language Classroom. (2 cr. ; Student Option No Audit; Every Summer)
How language teachers foster development of intercultural communicative competence through a pedagogical approach that addresses the nature of culture and culture learning, and the interrelatedness of language and culture learning.

CI 5622. Exploring Learner Language: Puzzles and Tools for the Classroom. (; 2 cr. ; Student Option No Audit; Every Summer)
The focus of this institute is on the growth and development of learners? language, and how that growth may be enhanced by ongoing pedagogical innovation. The institute uses Exploratory Practice to promote a culture of instructor initiative in identifying and seeking to solve puzzles related to learner language development in the classroom. Participants begin with an introduction to Exploratory Practice as a framework for instructors to use in identifying and wrestling with their own puzzles about learners? language and its development in their classrooms. Participants then work together to reflect on videos of learner language as it is produced by different kinds of learners. They review theories of second language acquisition, and apply their insights to their own classrooms by learning how to set up engaging puzzle-solving activities that stimulate growth in learner language. Finally, participants learn how to design pre- and post-course measures that demonstrate the impact of their innovations in instruction on the growth of specific features and dimensions of learner language in their own classrooms.

CI 5624. Content-based Language Instruction and Curriculum Development. (; 2 cr. ; Student Option No Audit; Every Summer)
Intensive professional development to help foreign language teachers learn to implement the CBI curricular approach in the language classroom. Introduces all phases of CBI curricular development and provides resources necessary to ensure successful implementation.

CI 5625. Assessing Language Learners? Communication Skills via Authentic Communicative Performance Tasks. (; 2 cr. ; Student Option No Audit; Every Summer)
This institute opens with a discussion of the phrase ?performance towards proficiency? to highlight how classroom performance influences proficiency in real world contexts. Working together, participants will create a list of characteristics of classroom activities and tasks that build learners? proficiency in the target language and will use the list to identify the purpose, effectiveness, and practicality of a variety of model activities and tasks. With this background, participants will design receptive and productive communicative tasks for beginning, intermediate, and advanced levels of proficiency. The institute will then focus on the evaluation of the learners? performance on these tasks. Using the performance descriptors identified by the American Council on the Teaching of Foreign Languages (ACTFL), the Common European Framework of Reference (CEFR), and the World-Class Instructional Design and Assessment (WIDA), participants will identify the domains (vocabulary, language control, text type, etc.) to evaluate learner performance on various tasks. With model rubric scales, they will evaluate examples of learner performances on various tasks, comparing their individual ratings to underline the importance of establishing inter-rater reliability. Participants will then create rubrics for the tasks they designed earlier in the institute. The role and choice of formative assessments used in daily lessons to monitor learner progress towards achievement of the communication goals of an instructional unit will also be considered. As a capstone to the week, participants will apply their learning about task design and evaluation in the development of a standards-based Integrated Performance Assessment (IPA) to share with colleagues within this institute and also with a broader audience via the CARLA Assessment website.

CI 5627. Creativity in the Second Language Classroom. (2 cr. ; Student Option; Every Summer)
This institute will examine the connection between multilingualism and creativity, and explore strategies to increase engagement in the classroom. This institute is designed for foreign language, ESL, and immersion teachers who want to promote creativity in their classroom while simultaneously improving learner?s target language proficiency.

CI 5628. Analyzing Learner Language in Second Language Acquisition. (3 cr. ; Student Option No Audit; Every Fall & Spring)
Review broad findings in second language acquisition (SLA) research. Cognitive/social process of becoming multilingual. How to carry out classroom-based research projects focused

on learner language development. prereq: 5646, 5649 [or other course on the grammar of a language]

CI 5629. Teaching Language through the Lens of Social Justice. (; 2 cr. ; Student Option; Every Summer)
Teaching for and about social justice positively influences all students, yet social justice education can be challenging to integrate into the language classroom. In the first part of this institute, participants will examine the principles of social justice education and identify ways that these principles can support standards, objectives, and targeted skills in contemporary world language education. This discussion and reflection will help teachers to identify their own interests and strengths in becoming language educators for social justice. In the second part of the institute, the participants will build on this foundation to adapt, develop, and create learning opportunities for their foreign language students. A collaborative, creative set of experiences will help participants go from big ideas to activities and assessments for their classroom, all while teaching for and about social justice.

CI 5631. Second Language Curriculum Development and Assessment. (; 1-3 cr. [max 6 cr.] ; A-F or Audit; Every Fall & Summer)
Instruction/assessment of ESL and World Languages in the modalities of speaking, listening, reading, and writing. Backwards design, proficiency-oriented approach, use of content-based instruction. Planning for the integration of instruction and assessment. prereq: SLE initial licensure only

CI 5632. Literacy and Language Development in Second Language Classrooms. (; 3 cr. ; A-F or Audit; Every Fall)
Processes/instructional approaches in developing second language proficiency in the modalities of reading, writing, speaking, and listening and communicative modes (interpretive, presentational, interpersonal); development of literacy in a second language; planning L2 literacy instruction based on research on L1 and L2 literacy development; integration of instruction/assessment in language teaching. prereq: SLE initial licensure only

CI 5634. Content-Based Instruction in Second Language Settings. (; 3 cr. ; A-F or Audit; Every Spring)
Building on foundation from other courses in the sequence. Instruction/assessment of ESL and World Languages at the secondary level. Prepares students to connect language teaching with other content areas, analyze/address the academic language needs of English learners, and advocate for second language programs and students. prereq: SLE initial licensure only

CI 5635. Culture and Diversity in Second Language Classrooms. (; 3 cr. ; Student Option; Every Spring)
Teaching culture as content and including students' home cultures in the curriculum and diverse student needs. Needs of students of various educational, social, and cultural backgrounds/ways to develop academic success through instruction in learning strategies and other approaches to differentiation. prereq: Initial licensure program only

CI 5636. Problems of Practice in Second Language Education: Seminar for Early Career Language Teachers Part 1. (1.5 cr. ; A-F only; Fall Odd Year)
This course provides recently licensed practicing teachers an opportunity to continue to develop their skills as reflective practitioners within the context of World Languages and ESL with a focus on their own teaching practices and student learning. Participants engage in online discussions, read, reflect, and create professional growth plans.

CI 5637. Problems of Practice in Second Language Education: Seminar for Early Career Language Teachers Part 2. (1.5 cr. ; A-F only; Spring Even Year)
In this course, recently licensed practicing teachers continue to develop their skills as reflective practitioners within the context of World Languages and ESL with a focus on their own teaching practices and student learning. Participants engage in online discussions, read, reflect, and implement and report on professional growth plans. Prerequisite: Completion of CI 5636 or instructor consent.

CI 5638. Critical Approaches to Heritage Language Education. (2 cr. ; Student Option; Every Summer)
Teaching heritage learners is not the same as teaching learners of a foreign language. Heritage languages are languages other than English that are spoken in homes, communities, and extended families. Although many of our students come from vibrant multilingual contexts, unless bilingual options are available, youth seldom have access to expanding their home/community languages (and literacy in them) in schools, which are predominantly English environments. When students are given the opportunity to use, learn, and expand on their heritage languages, they are able to tap into an abundance of resources and knowledge. Participants in this workshop will examine social justice topics, community-based learning for growing heritage language (literacy), and authentic assessments for heritage language development. Participants will collaborate; connect experiences of heritage teachers and learners to research on multilingual development; and learn how to bring communities, classrooms, and digital storytelling together to create powerful heritage language learning environments.

CI 5641. Language, Culture, and Education. (; 3 cr. ; A-F or Audit; Periodic Spring & Summer)
Applies current sociolinguistic and discourse theory/research to study of relationships between language and culture in educational settings: language curriculum and instruction; classroom language use; borders between school and home/community language use; and educational policies on literacy/second-language instruction.

CI 5642. Assessing English Learners. (; 3 cr. ; A-F or Audit; Spring Odd Year)
Current practices concerning language and academic content assessment of English learners (ELs) at the school site, state, and national level; factors affecting academic learning needs of ELs/where assessment fits into that picture.

CI 5645. Teaching English Learners in English-medium classrooms. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
The course is designed to give teaching licensure candidates grounding in theory and practice for teaching linguistically and culturally diverse students. This course provides an overview of the benefits and challenges of working with English learners (ELs) and linguistically and culturally diverse students in a variety of settings. Central topics include instructional practices and strategies for teaching English learners; second language literacy and biliteracy development; language learning and bilingualism; and culturally responsive pedagogy. The course is designed to help teacher candidates to develop an understanding of the language-specific challenges that accompany subject matter learning and to demonstrate the ability to apply a range of instructional strategies to help English learners succeed academically. prereq: Early Childhood or Elementary Education ILP or Special Education Major or Special Education M.Ed./M.A candidates

CI 5646. English Grammar for ESL Teachers. (; 3 cr. ; Student Option; Every Fall)
English syntax from pedagogical perspective. Grammatical structures that challenge ESL learners. Analyzing learner errors. Issues/activities related to teaching grammar in ESL contexts. prereq: LING 5001 or instr consent

CI 5648. Advanced Practices in Teaching Academic Language. (; 3 cr. ; A-F only; Every Spring)
Prepares K-12 teachers for student development of academic language proficiency. Read/discuss current research. Implement innovative teaching practices. prereq: Grad student, instr consent

CI 5649. Language Analysis for ESL Teaching in Higher Ed. (3 cr. [max 4 cr.] ; Student Option No Audit; Every Spring)
Overview of complex aspects of English grammar not covered in 5646. Academic uses of passives, indirect objects, conditionals, relative clauses, complementation, reported speech, deixis/reference, articles, prepositions, phrasal verbs, pragmatics. prereq: 5646

CI 5651. Foundations of Second Languages and Cultures Education. (; 3 cr. ; A-F or Audit; Every Fall)
Historical overview of second language teaching/learning in U.S. introduction to second language acquisition. Second language instructional concepts across elementary, secondary/university options for foreign language, bilingual education, immersion language programs, and English as a second

language programs. Theoretical frameworks for language instruction are tied to practice.

CI 5653. Methods in Teaching English as a Second Language (ESL) in Higher Education. (3 cr. ; Student Option No Audit; Every Fall & Spring)
Theory/practice teaching academic English as second or foreign language in contexts of higher education. History of field/varied methods in language teaching. Current best practices in teaching academic English pronunciation, listening, speaking, reading, writing skills. prereq: An intro to linguistics course

CI 5654. Practicum in Language Teaching: ESL and World Languages. (1-6 cr. ; S-N only; Every Spring)
Practical, hands-on training in teaching of English as Second Language. Applying theoretical/descriptive material studied in prior course work. Discuss readings/research articles on SLA, applying theoretical/practical principles to specific critical classroom incidents.

CI 5656. Teaching Literacy in Second Language Classrooms. (; 3 cr. ; Student Option No Audit; Every Fall)
Reading comprehension/composing processes in a second language; relationship between first and second literacy development; relationship between reading and writing; relationship of culture to reading comprehension and writing; politics of literacy; assessment of second language literacy; using technology to enhance literacy instruction.

CI 5657. Teaching Speaking and Listening in Second Language Classrooms. (; 3 cr. ; A-F or Audit; Spring Even Year)
Theories/methods in teaching language as communication in oral/aural modes; planning student interaction; classroom organization for oral language learning/acquisition; using technology to enhance interaction; assessment of listening comprehension and oral communication.

CI 5658. Language Testing and Assessment. (; 3 cr. ; A-F or Audit; Spring Odd Year)
For language teachers. Aligning language classroom instruction/assessment; language testing/assessment; classroom-based and large-scale proficiency testing/assessment; assessing proficiency in speaking, listening, reading, writing and communicative modes (interpretive, presentational, interpersonal); creation of formative/summative assessments; critique of contemporary assessment instruments.

CI 5660. Special Topics in the Teaching of Second Languages and Cultures. (; 1-4 cr. [max 12 cr.] ; Student Option; Every Spring & Summer)
Topics related specifically to the needs of the in-service teacher. Topics, location, credits, and duration are flexible.

CI 5662. Second Language Curriculum Design. (; 3 cr. ; A-F or Audit; Every Spring)
Historical overview of curriculum development in second language education; contexts that influence curriculum development; models for curriculum development in second language settings; politics of curricular reform; national/state standards and implications for curriculum development; effects of technology on second language curriculum.

CI 5667. Foreign Language Literacies: Using Target Language Texts to Improve Communication. (2 cr. ; Student Option; Every Summer)
Preparing students to participate in multilingual and multicultural communities entails shifting the way we approach language instruction. How do we move beyond teaching students to order coffee or talk about weekend activities, and instead encourage them to think critically and reflectively about language, culture, and communication? To answer this question, this institute focuses on how to develop students? foreign language literacies?or the ability to interpret and create different kinds of discourse?through engagement with target language texts such as movies, infographics, poetry, music videos, magazine articles, podcasts, and the like. Using conceptual and pedagogical understandings gained during the institute, participants will examine and assess target language texts for use in their classrooms and create text-based instructional materials that develop students? communicative abilities, critical thinking, intercultural competence, and language awareness.

CI 5668. Transforming the Teaching of Language Online (TTLO). (; 3 cr. ; Student Option; Every Summer)
Transforming the Teaching of Language Online (TTLO) is for experienced classroom language teachers who want to transition to teaching their language class online. Offered completely online, TTLO will give teachers the first-hand experience of being an online learner while focusing on the important elements of a successful online language class such as online course design guidelines, best practices for online teaching, comparing online to traditional language teaching, and incorporating appropriate technology tools for communicative-based online activities. In addition to delving into these aspects of online teaching, participants will see them in action by taking part in model online language activities as language learners. By the end of the program, participants will have a portfolio of activities ready to be incorporated in an online language course.

CI 5670. Foundations of Dual Language and Immersion Education. (; 3 cr. ; Student Option; Every Fall)
Research foundations and program principles for dual language/immersion. Second language acquisition; critical features of program design/implementation; benefits/challenges of dual language/immersion; program assessment; advocacy. Theory/research for dual language/immersion tied to practical application. prereq: Enrollment in certificate program in dual language/immersion educ or instr consent

CI 5671. Curriculum Development and Assessment in Dual Language/Immersion Classrooms. (; 3 cr. ; Student Option; Fall Odd Year)
Content-based language instruction and curriculum development for dual language, bilingual, and immersion contexts; balancing content/language goals/objectives in curriculum and instruction; integration of language, literacy content, and culture in curriculum; standards-based instruction; backwards design; assessment that aligns with content-based curriculum and instruction. prereq: instr consent

CI 5672. Language-Focused Instructional Practices and Strategies for Dual Language/Immersion Classrooms. (; 3 cr. ; Student Option; Every Spring)
Counterbalancing content with integrated focus on language and literacy development for dual language, bilingual, and immersion classrooms. Materials development; proactive/reactive instructional techniques; noticing and awareness-raising strategies; structuring student language production; differentiating for content, ability, and language. prereq: instr consent

CI 5676. Biliteracy Development in Dual Language/Immersion Classrooms. (; 3 cr. ; Student Option; Periodic Fall & Spring)
This course aims to provide dual language, bilingual and language immersion educators with an understanding of the complex phenomena of literacy and biliteracy and with a range of instructional strategies for fostering literacy and biliteracy development in dual language/immersion classrooms.

CI 5693. Directed Study in Second Language Education. (; 1-4 cr. ; Student Option; Every Fall, Spring & Summer)
Individual or group work on curricular, instructional, or assessment problems. prereq: instr consent

CI 5696. Initial Licensure Field experience: Teaching ESL and World Languages. (; 2-6 cr. ; Student Option; Every Fall, Spring & Summer)
Teaching and learning experiences in Second Language Education across the scope of the license (Elementary, Middle & High School). Requires students to work in a public school setting. prereq: adviser approval; credits cannot be counted on a graduate degree program.

CI 5697. Additional Licensure Field experience: Teaching ESL and World Languages. (; 2-6 cr. ; Student Option; Every Fall, Spring & Summer)
Teaching and learning experiences in Second Language Education as needed to complete the scope of the license (Elementary, Middle or High School). Requires students to work in a public school setting. prereq: Adviser approval; credits cannot be counted on a graduate degree program.

CI 5698. Student Teaching in Second Languages and Cultures. (; 2-6 cr. [max 14 cr.] ; Student Option; Every Fall, Spring & Summer)
Student teaching/Practicum for initial and additional licensure in Second Language Education. Requires students to work in a

public school setting. prereq: Adviser approval; credits cannot be counted on a graduate degree program.

CI 5699. Clinical Experiences in Second Languages. (; 3-12 cr. [max 16 cr.] ; A-F or Audit; Every Fall & Spring)
Teaching and learning experiences in elementary and secondary second language instructional settings. Includes a seminar held concurrently to support the student teaching experience. prereq: SLC initial licensure program only

CI 5702. Social Studies Instruction in the Elementary Grades. (; 3 cr. ; A-F only; Every Fall & Spring)
Content/organization of elementary social studies programs. Programs of understanding. Improving learning situation. prereq: Early Childhood or Elementary Education ILP

CI 5741. Introduction to Social Studies Education. (; 3 cr. ; A-F only; Every Summer)
Broad issues and themes related to social studies education, including societal context, rationale, and scope and sequence. Analysis and evaluation of selected teaching strategies, methods, and resources.

CI 5742. Advanced Methods of Teaching the Social Studies. (; 3 cr. ; A-F only; Every Fall)
Focus on developing a repertoire of instructional methods that support authentic pedagogy and assessment. Enhancing reading comprehension and writing skills in the social studies. prereq: Secondary social studies initial licensure student

CI 5743. The Social Sciences and the Social Studies. (; 3 cr. ; A-F only; Every Fall)
Development of instructional strategies and contexts for exploring the social sciences as disciplines at the secondary level; central concepts and generalizations; tools of inquiry; competing structures and theories; and the relative impact of multicultural and gender-fair perspectives on the nature of history and the social sciences. prereq: Secondary social studies initial licensure student

CI 5744. Seminar: Reflecting on Professional Development in Social Studies Education. (; 3 cr. ; A-F only; Every Spring)
Reflecting on teaching experience, examining social/cultural context of teaching/learning, developing a professional identity. Refining teaching and teacher research skills. prereq: Secondary social studies initial licensure student

CI 5745. Engaging Youth With Social Studies Texts. (; 3 cr. ; A-F only; Every Spring)
Ways to engage students (grades 5-12) in social studies (textbooks, literature, speeches, editorials, political cartoons, tables, graphs, maps, film.). Developing middle/high school students' disciplinary literacy.

CI 5746. Global and Multicultural Education in the Secondary Classroom. (; 3 cr. ; A-F only; Every Spring)
Issues, classroom practices, and controversies surrounding global/multicultural perspective-taking in social studies education. Strategies for helping secondary social studies students develop global/multicultural worldviews.

CI 5762. Developing Civic Discourse in the Social Studies. (; 3 cr. ; A-F or Audit; Periodic Spring & Summer)
Philosophies, strategies, and research on developing civic discourse in secondary social studies classroom. Selecting issues. Democratic classroom climate. Relating to social/cultural contexts.

CI 5782. Clinical Experiences in Teaching Social Studies. (; 1-8 cr. [max 16 cr.] ; S-N or Audit; Every Fall & Spring)
Student teaching experiences for students preparing to become secondary social studies teachers. Teacher candidates work closely with social studies teachers in grades 5-12 to plan and implement engaging and meaningful learning experiences for middle and high school students. prereq: MEd/initial licensure student

CI 5822. Mathematics Instruction in the Elementary Grades. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Principles of learning mathematics in elementary grades. Objectives, content, philosophy, instructional materials, methods of instruction/evaluation. prereq: Early Childhood or Elementary Education ILP

CI 5980. Clinical Experiences for K-12 Teaching. (; 1-4 cr. ; Student Option; Every Fall, Spring & Summer)
Practical teaching/learning experiences in school setting. Includes co-teaching during student teaching and coaching/assessment by a university supervisor.

CI 5981. Introduction to Equity-Based Pedagogy. (; 1 cr. ; A-F only; Every Fall, Spring & Summer)
Introduces aspects of inequities in U.S. society/school. Examines how social class/poverty permeated education as social institution/classroom pedagogy. Covers five principles for social class-sensitive change/intersections between social class/other markers of difference.

CI 5982. Enacting Equity-Based Pedagogy. (2 cr. ; A-F only; Every Fall, Spring & Summer)
Extended study of inequities. Examines working-class literature for adults/children. Labor histories, economic systems, hierarchies of class, race, gender, sexuality, language in schools/communities.

CI 5983. Equity-Based Pedagogy/Advocacy. (1 cr. ; A-F only; Every Fall, Spring & Summer)
Extends study of inequities in society. Five principles for social class-sensitive change. Intersections between social class/other markers of difference such as race, gender, sexuality, language.

CI 5984. Planning Design and Management. (; 1 cr. ; A-F only; Every Fall, Spring & Summer)
Foundational understanding of being teacher, developing culturally responsive classroom, designing learning experiences. Conceptualization of teacher nationally/locally, language in classroom. Foundational concepts/tools used when facilitating learning.

CI 5985. Academic Language and English Learners in the Content Areas. (; 1 cr. ; A-F only; Every Fall, Spring & Summer)
Prepares teacher candidates to work effectively with English learners/other linguistically diverse students across all content areas. Develop students' academic language proficiency as needed for school success.

CI 5986. Foundations of Special Education. (; 1 cr. ; A-F only; Every Fall, Spring & Summer)
Skills to promote learning/success for all students, including those at risk for school failure/with special needs. Introduces research/issues emphasizing collaborative problem solving approach that facilitates effective family-professional partnerships/educational programming for individuals with disabilities.

CI 5987. Child and Adolescent Development for Teaching, Learning, and Assessment. (1 cr. ; A-F only; Every Fall, Spring & Summer)
Cognitive, social, emotional development of childhood/adolescence. Ecological influences in development. Theories of learning/cognition, cognitive/social development, motivation, individual/group differences, testing/assessment, teaching methodologies, pragmatic issues.

CI 5988. Clinical Experience: Improvement of Teaching. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Capstone project. Link theory/practice, integrate coursework with experiences in classroom.

CI 8075. Seminar: Art Education. (; 2 cr. ; A-F or Audit; Periodic Fall & Spring)
Reports, evaluation of problems, and review of recent literature. prereq: Educ grad student or instr consent

CI 8079. Arts Based Research in Education. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Conceptualizing an aesthetic-based research agenda, in such a way as to help students identify research questions and choose appropriate arts based methodologies for conducting qualitative research. prereq: Educ grad student or instr consent

CI 8085. Narrative Inquiry in Education. (3 cr. ; Student Option; Spring Even Year)
Through readings and activities focused on published studies and articles, students explore theory/application of two narrative research forms, narrative analysis--in which stories of informants are collected and analyzed, and narrative construction--in which researchers compose qualitative data collected in research settings into the form of stories.

CI 8095. Problems: Art Education. (; 1-12 cr. ; Student Option; Every Fall, Spring & Summer)
Independent research under faculty guidance; may include advanced studio practice and educational issues requiring a research methodology. prereq: Grad art educ major or instr consent

CI 8111. Representations of Knowledge in Curriculum and Culture. (; 1-3 cr. ; Student Option; Periodic Fall)
Overview of research and theory on sociology of knowledge and education. Conceptions of knowledge in curriculum; connections between cultural conditions and curriculum design and implementation; influence of national political agendas, population, the mass media, and textbooks on curriculum in diverse educational settings. prereq: CI grad student or instr consent

CI 8115. Curriculum and Achievement Outcomes in a Diverse Society. (; 3 cr. ; A-F or Audit; Periodic Fall)
Analysis of American public school experiences for students of African-American, Hispanic, Asian, and American Indian background; social, political, regional, and educational variables that influence student outcomes; perspectives concerning ethnic student achievement; factors influencing school achievement, and prospects for change. prereq: Doctoral student

CI 8121. Curriculum Change: Perspectives, Processes, and Participants. (; 3 cr. ; Student Option; Periodic Fall)
Examination of curriculum within educational organizations; educational organization as mediator and transmitter of societal/cultural perspectives; implications of organizational context for curriculum change, change processes, and change participants. prereq: CI grad student or instr consent

CI 8127. Curriculum Theory and Research: Alternative Paradigms and Research Methods. (; 3 cr. ; Student Option; Periodic Fall)
Traditions of inquiry, exemplary studies, and associated research methods; survey and assessment of topics and methods as applied to curriculum questions; and relationships between theory and research. prereq: CI grad student or instr consent

CI 8131. Curriculum and Instruction Core: Critical Examination of Curriculum in Context. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Central concepts, ideas, and debates in professional field of curriculum. Curriculum in general education. prereq: CI PhD or MA student or instr consent

CI 8132. Curriculum and Instruction Core: Teaching Theory and Research. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Overview of research on teaching: historical perspective, modern research/findings, implications for practice/research. prereq: CI PhD or MA student or instr consent

CI 8133. Research Methods in Curriculum and Instruction. (; 3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Survey of educational research methods, comparison of underlying assumptions/ procedures. prereq: CI PhD or MA student or instr consent

CI 8134. Foundations of Research in Curriculum and Instruction I. (3 cr. ; A-F or Audit; Every Spring)
This Foundations of Research course is the first of a two-course sequence required for PhD students in Curriculum and Instruction. The course is designed to ground students in qualitative and quantitative paradigms and epistemology and prepare students for specialized methodology courses that focus on specific research approaches in education.

CI 8135. Foundations of Research in Curriculum and Instruction II. (3 cr. ; A-F or Audit; Every Spring)
This Foundations of Research course is the second of a two-course sequence required for PhD students in Curriculum and Instruction. The course is designed to ground students in qualitative and quantitative paradigms and epistemology and prepare students for specialized methodology courses that focus on specific research approaches in education.

CI 8145. Using Mixed Methods in Educational Research. (3 cr. ; A-F or Audit; Every Fall & Spring)
Conceptual issues surrounding design/use of mixed methods in addressing problems/ research questions in education. Critique of select mixed design exemplars published in respected research publications/practical application of analyses of data using mixed inquiry methods. prereq: [8133, 8148, OLPD 8812] or equiv, [CI PhD student or instr consent], additional quantitative/qualitative methodology courses recommended

CI 8146. Critical Ethnography in Education. (; 3 cr. ; A-F or Audit; Spring Odd Year)
Theoretical/methodological foundations. Possibilities and problematics for understanding inequality/disparities in education. Research design, data collection, analysis, writing. prereq: MA or PhD student or Inst consent

CI 8147. Critical Discourse Analysis in Educational Research. (; 3 cr. ; A-F or Audit; Fall Odd Year)
Students apply CDA methods to analysis of written, visual, and spoken texts in social settings such as schools, families, and communities. prereq: [MA or PhD] student

CI 8148. Conducting Qualitative Studies in Educational Contexts. (; 3 cr. ; Student Option; Fall Odd Year)
Qualitative research methods. Ethnography, sociolinguistics, symbolic interactionism. Observation. prereq: CI or OLPD PhD student

CI 8149. Qualitative Research: Coding, Analysis, Interpretation, and Writing. (; 3 cr. ; A-F or Audit; Periodic Fall)
How to code/analyze field notes. Individual/ group interviews, multimedia using NUDIST NVivo software. Students interpret analyzed material and complete an article length document that includes a review of related research/methodology. prereq: [8133, 8148, grad student, completion of a qualitative research study] or instr consent

CI 8150. Research Topics in Curriculum & Instruction. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Spring & Summer)
Special topics, current research trends in curriculum and instruction. Research review, subject integration, curriculum contexts, development, implementation, data collection, analysis, evaluation.

CI 8151. Paradigms and Practices in Teacher Preparation. (; 3 cr. ; A-F or Audit; Fall Even Year)
Theory-practice gap in professional education. Conceptions of teacher learning. Pedagogies for teaching "practice" and program design. Research methodologies. prereq: Grad student

CI 8152. Teacher Learning and Professional Development. (; 3 cr. ; A-F or Audit; Fall Odd Year)
Theoretical/empirical work on teacher learning, professional communities, teacher inquiry, perspectives on outcomes of professional development, and policy recommendations for supporting teacher learning. Research methodologies. prereq: Grad student

CI 8153. Research Approaches to Classroom Discourse. (3 cr. ; A-F or Audit; Fall Even Year)
This course introduces students to major traditions in analysis of classroom discourse, anthropological linguistics, conversational analysis, sociocultural, critical discourse and multimodal discourse analysis and their use in conjunction with other qualitative approaches to classroom research. Analysis of genre, gesture, and verbal performance are also addressed.

CI 8154. Culturally Relevant Pedagogy. (; 3 cr. ; A-F or Audit; Fall Even Year)
Research on relationship between home and school cultures. Education of students of color. Culture, including experiences/practices of students? homes. Cultural approaches for improving teaching, transforming society.

CI 8155. Immigrant Families and U.S. Schools. (; 3 cr. ; A-F or Audit; Fall Odd Year)
Educational experiences of post-1965 immigrants in U.S. schools. Research/debates surrounding immigration, assimilation, and acculturation. Issues confronted by immigrant families/youth. Immigrant experiences that change and respond to external forces in U.S. society.

CI 8156. Asian American Education. (; 3 cr. ; A-F or Audit; Spring Even Year)
Issues/concerns facing Asian American students in U.S. schools. Focuses on Twin Cities context of Hmong American children/ families.

CI 8159. Culture and Teaching Colloquium. (; 3 cr. [max 6 cr.] ; A-F or Audit; Every Fall)
Doctoral seminar. Interdisciplinary perspectives on theme central to cultural study of teaching. Theme varies year to year.

CI 8161. Research Experience I: Study Design and Planning. (; 3 cr. ; Student Option No Audit; Every Fall)
Students identify research topic, conduct literature review, refine research questions, design study, obtain IRB approval as needed, and begin data collection. Readings, seminar discussions, peer critique of work. prereq: [8134, 8135, 6-12 cr. of research methodology, CI PhD student] or instr consent

CI 8162. Research Experience II: Data Analysis and Manuscript Preparation. (; 3 cr. ; Student Option No Audit; Every Spring)
Students complete data collection/analysis, prepare research manuscript. Seminar discussions, critical examination of their own and peers? work. prereq: 8161

CI 8165. Queer and Feminist Theories: Collective Memory Research Methods. (3 cr. ; A-F only; Spring Even Year)
Seminar for advanced graduate students to work with queer and feminist theories in what is broadly constructed as educational research. We consider post-modern theoretical work that recognizes the "rational"? being and the mind/ body dichotomy as constructions which re-produce existing structures. Collective memory writing is explored as a research method.

CI 8181. Seminar in Teaching in Colleges of Education. (; 3 cr. ; Student Option; Periodic Fall)
Goals, instructional strategies, evaluation procedures, and professional considerations. prereq: CI PhD student or instr consent

CI 8195. Problems: Improvement of Instruction. (; 1-6 cr. ; Student Option; Every Fall & Summer)
Independent research in curriculum and instruction. prereq: instr consent

CI 8196. Practicum in Teaching in Colleges of Education. (; 1 cr. ; S-N only; Periodic Fall & Spring)
Practicum experience for graduate students to learn how to teach a college level course through a supervised, mentored experience. Supervised teaching occurs in an education course at the University or other institution.

CI 8197. Problems: Curriculum Studies. (; 1-4 cr. [max 8 cr.] ; A-F or Audit; Every Fall)
Directs students to completing Plan B paper for M.A. degree. prereq: MA student

CI 8198. Problems: Teacher Education. (; 1-6 cr. [max 12 cr.] ; Student Option; Every Spring)
Independent research. prereq: instr consent

CI 8201. Critical Theories of Growth and Change in Elementary Education. (3 cr. ; Student Option; Every Fall & Spring)
This course provides students with the opportunity to 1) trace, historically, how growth and change has been theorized in elementary schooling with particular focus on how the role of the teacher and the curriculum have been constructed; 2) analyze a "contingent, recursive" conception of growth and change called for by socio-cultural theorist, Nancy Lesko, and further developed by scholars of elementary education; and 3) re-imagine conceptions of growth and change in elementary schooling using other theoretical perspectives (e.g., feminist, culturally relevant, queer, social class-sensitive).

CI 8202. Elementary Education Colloquium. (3 cr. ; Student Option; Fall Even, Spring Odd Year)
In this course, students will consider how elementary education has been and continues to be imagined as a scholarly field of study, with particular focus on how the field is seen as a fluid intellectual space in which scholars study broad philosophical, political, and social ideas, issues, and concerns as they take concrete (lived) shape in the schooling, cultures, and pedagogies of elementary schooling.

CI 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Master's student, adviser approval, DGS approval

CI 8350. Special Topics in Learning Technologies. (; 2-3 cr. [max 6 cr.] ; Student Option; Periodic Fall)
Topics in learning technologies. Topics and credits are flexible.

CI 8361. Advanced Courseware and Design: Issues. (; 3 cr. ; A-F or Audit;)
Examination and critique of existing research. Students identify a research topic, write a literature review, plan a study, and present a research proposal.

CI 8371. Applied Social Network Analysis in Education. (; 3 cr. ; Student Option; Spring & Summer Odd Year)
This course examines the application of Social Network Analysis in various educational settings. As a methodology, Social Network Analysis (SNA) is concerned with social affiliations and interactions in social structures of all kinds. SNA has garnered significant interests in educational research and has been applied to investigating a myriad of educational phenomena such as student friendship, school choice, and classroom discourse. This course is organized into four major components including: (1) foundations of social network perspectives in education; (2) techniques for collecting social network data in educational settings; (3) techniques for analyzing and visualizing social networks; and (4) practical guidelines on conducting SNA research in educational contexts, with considerations to education theories, ethics, and real-world implications.

CI 8391. Learning Technologies Seminar. (; 1-3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
This seminar course offers an advanced exploration and critique of contemporary research in the field of learning technologies; topics, location, credits, and duration are highly flexible.

CI 8395. Directed Study: Learning Technologies. (; 1-6 cr. [max 12 cr.] ; A-F only; Every Fall, Spring & Summer)
Students work with faculty member on a directed project or study focused on exploring literature, organizing and engaging in research, designing and developing projects, etc. prereq: instr consent

CI 8400. Special Topics in Children's and Young Adult Literature. (; 1-6 cr. ; Student Option; Periodic Fall)
Overview of research and issues. Study of original manuscripts and artwork for children's books; research in child and young adult response to literature. Topics vary by offering. prereq: grad course in children's or young adult lit

CI 8410. Special Topics in Reading Research and Instruction. (; 1-6 cr. ; Student Option; Periodic Spring)
Research at all levels. Topics vary. May include research designs, trends, and specific studies. prereq: [MA or PhD] student

CI 8412. Research in Reading. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Theory of and research on writing process. Applications to developing writing curriculum/ instruction. prereq: [MA or PhD] student

CI 8416. Speculative Fiction, Radical Imagination, and Social Change. (3 cr. ; Student Option; Spring Odd Year)
Speculative fiction is a blanket term for fantasy, science fiction, horror, and other nonmimetic genres predicated on challenging consensus reality and its societal norms. The most dynamic and diverse field of modern storytelling, speculative fiction serves as a catalyst, in and beyond the classroom, for radical imagination: one that contests the oppressive socio-economic system by reimagining race, gender, class, and other real-world issues. This seminar examines the cultural work performed by speculative fiction addressed to children and young adults. Engaging with stories that suggest alternatives to how we live now, students develop mental habits of global citizens who value diversity and strive for social transformation. Works of speculative fiction for the young reader are discussed as particle accelerators for ideas of change and as sites of resistance against exclusion and systemic inequalities. The focus is on speculative fiction by indigenous, minority, and postcolonial authors. Exploring the ways in which these works interrogate dominant notions of reality and structures of meaning helps students appreciate speculative fiction as a tool for imagining radical social change.

CI 8421. Research in Composition. (; 3 cr. ; Student Option; Periodic Spring)
Research designs: experimental, case study, descriptive, qualitative, ethnographic. Writing in social contexts. Teaching/evaluating writing. Rhetorical, linguistic, and discourse analysis of texts. Validity/reliability in coding/rating. Portfolio/large-scale writing assessments. prereq: [MA or PhD] student

CI 8431. Literacy Seminar: Literacy in a Post-Truth Era. (3 cr. ; A-F or Audit; Every Fall)
This doctoral seminar explores the Post-Truth Era in education and society. Using literacy frameworks to understand, critique, and reframe ideologies, the course examines issues related to constructions and distortions of "truth." Students are introduced to critical literacy, sociocultural theory, racial literacy, digital and critical media literacy, and climate change literacy to analyze languge, texts, and power.

CI 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)

TBD prereq: Doctoral student, adviser approval, DGS approval

CI 8461. Sociocultural Theory, Education, and Literacy. (; 3 cr. ; Student Option; Spring Odd Year)
Sociocultural theories, from 1960s to present. Vygotskian/neo-Vygotskian. Genre/activity dialogic. New literacy studies. Critical sociocultural. Multimodality. Empirical studies informed by theoretical perspectives.

CI 8470. Special Topics on Literacy. (; 1-6 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Current theories/research on literacy and literacy development. Alternative methods of conducting literacy research. Implications for literacy instruction. prereq: [MA or PhD] student

CI 8492. Readings in English Education and Reading. (; 1-3 cr. [max 10 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent study course. prereq: instr consent

CI 8495. Problems: Teaching English and Reading. (; 1-6 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Individual research. prereq: instr consent

CI 8511. Seminar: Research in Science Education. (; 1 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Students and faculty present research projects for comment and critique. Special topics may also be considered. prereq: CI grad student or instr consent

CI 8541. History and Philosophy of Engineering and Engineering Education. (; 3 cr. ; A-F only; Every Fall)
History and philosophy of engineering/ engineering education. Critical reflection/ analysis of philosophical, epistemological, historical arguments. prereq: PhD or MA student or instr consent

CI 8542. Modeling and Model-Based Reasoning in STEM Education. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Models/modeling perspectives for engineering, mathematics, and science education. Theorists/researchers that shaped STEM model-based reasoning. Discussions, individual/group presentations, small-group activities. prereq: STEM Education PhD or MA student or instr consent

CI 8570. Advanced Topics in Science Education. (; 1-4 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
Examination/critique of current research topics, methods, and issues. prereq: instr consent

CI 8571. Equity, Policy, and Social Justice in Science Education. (3 cr. ; Student Option No Audit; Every Fall)
Interactions of issues of diversity, equity, policy, and social justice as related to science education. Diverse perspectives on purposes/ scope of science education. Consequences for diversity, equity, access, social justice, empowerment, and educational policy. prereq: Science ed or STEM grad student or instr consent

CI 8572. Learning Theory and Classical Research in STEM Education. (; 3 cr. ; A-F only; Fall Odd, Spring Even Year)
STEM education research. Theorists/classical research. Mathematics, science, engineering education. prereq: Grad math educ major

CI 8573. Nature of Inquiry in STEM Education. (; 3 cr. ; A-F only; Every Fall & Spring)
STEM Education. Mathematics, science, engineering. Teaching/ learning/teacher education through evaluation of national teaching standards, current research, current cognitive theories of learning. prereq: MA or PhD student or instr consent

CI 8574. History and Philosophy of Science in Education. (3 cr. ; A-F only; Fall Odd Year)
This course introduces students in STEM education the historical and philosophical theories, ideas, principles, and events in science and how they inform science education at the K-12 level. Students learn contributions of philosophers in understanding what is science and how history of science and scientific events have influenced the growth of science. Nature of Science, historical contributions of women in science, and sociological nature of science inform larger discussions that take place in this class.

CI 8575. Becoming a Science/Math/STEM Teacher Educator for K?12 Teachers. (3 cr. ; A-F only; Spring Even Year)
The purpose of this course is to examine science, math, and STEM teacher preparation of K?12 teachers in elementary and secondary schools. We will explore what influences science, math, and/or STEM teacher preparation, from local, state, and national policies, standards and reforms. We will explore some of the ways that beginning teachers are evaluated and therefore deemed ?ready to teach?. We will compare and contrast different pathways of becoming a teacher. And we will analyze closely the lived experience of pre?service and beginning teachers and how this might influence our own teaching philosophies.

CI 8594. Conducting Research in Science Education. (; 3 cr. ; Student Option; Periodic Fall)
Application of research methodology to a specific science education issue. prereq: sci educ research course

CI 8595. Problems: Science Education. (; 1-6 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Independent research. prereq: CI grad student or instr consent

CI 8645. Indigenous Language Revitalization and Activist Research Methods. (3 cr. ; A-F only; Fall Even Year)
This course is a hands-on look at activist research methods situated in the context of Indigenous Language Revitalization. That is, what happens when a community problem is the organizing force in research? Students will be expected to both engage in language learning, research, designing a research project, and connecting this to critical thinking as applied to culture, language and indigenous language revitalization.

CI 8650. Seminar: Special Topics in Second Languages and Cultures Research. (; 1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Summer)
Research topics vary. prereq: CI grad student or instr consent

CI 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CI 8671. Sociolinguistic Research Approaches to Education. (3 cr. [max 6 cr.] ; A-F only; Spring Odd Year)
This course provides students with an overview of current research approaches, theories, and methods in linguistic anthropology and interactional sociolinguistics with a focus on educational contexts and linguistic diversity. Course activities include reviewing and critiquing current research and theory in the field and working on small projects.

CI 8689. Language and Education Policy. (3 cr. [max 6 cr.] ; A-F or Audit; Every Spring)
Students will gain a solid understanding of language policy theory, language policy research methods, and key empirical findings. They will acquire skills to critically analyze and evaluate language policy, and gain experience and academic practice in doing so.

CI 8691. Readings in Second Languages and Cultures Education. (; 1-3 cr. ; Student Option; Every Fall & Spring)
Independent reading. prereq: instr consent

CI 8695. Problems: Second Languages and Cultures Education. (; 1-6 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Independent research. prereq: instr consent

CI 8741. History and Theory of Social Studies Education. (; 3 cr. [max 6 cr.] ; A-F or Audit; Every Spring)
History/theory of social studies education in United States. Organization, subject matter, methods of instruction.

CI 8742. Seminar: Research in Social Studies Education. (; 3 cr. ; A-F or Audit; Every Spring)
Critical review and analysis of seminal research studies; criteria for appraising research findings; educational implications. prereq: CI grad student or instr consent

CI 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD

CI 8795. Problems: Social Studies Education. (; 1-6 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent research. prereq: CI grad student or instr consent

CI 8796. Research Internship in Social Studies Education. (; 1-6 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Internship with social studies education faculty member; experience in collecting and analyzing data; drafting and presenting reports; writing for publication. prereq: CI grad student

CI 8888. Thesis Credits: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Thesis credits: Doctoral prereq: Max 18 cr per semester or summer; 24 cr required

CI 8900. Family, Youth, and Community Colloquium. (; 1-4 cr. ; S-N only; Periodic Fall & Spring)
Theories, philosophies, practices, pedagogies, epistemologies, and public policies not dealt with in regular courses. Content varies by offering. prereq: [MA or PhD] student

CI 8913. Interpretive Research. (; 3 cr. ; A-F only; Every Fall)
Hermeneutic, ethnomethodological, and phenomenological research methodologies. Ethics, evaluation, and usefulness of interpretive research. Practice in conducting interpretive research.

CI 8914. Critical Science Research. (; 3 cr. ; A-F only; Every Spring)
Origins, influences, characteristics, and central concepts. Distinction between critical science and other action research. Requisite skills/ knowledge for conducting critical science research, using that knowledge in a project.

CI 8994. Directed Research in Family, Youth, and Community. (; 1-6 cr. ; A-F only; Every Fall, Spring & Summer)
tbd prereq: Family, Youth, and Community student doing Plan B research

Dakota (DAKO)

DAKO 5126. Advanced Dakota Language I. (; 3 cr. [max 12 cr.] ; A-F or Audit; Every Fall)
Focuses on immersion method.

DAKO 5129. Advanced Dakota Language II. (; 3 cr. [max 12 cr.] ; A-F or Audit; Every Spring)
Focuses on immersion method.

DAKO 5226. Dakota Mastery I. (3 cr. [max 6 cr.] ; Student Option; Every Fall)
This content-based Dakota language class will focus on Dakota culture and history. Students will learn through both oral and written texts. Both traditional and contemporary stories will be discussed and utilized to give students a better view of Dakota ontology and epistemology. The effects of colonization and the need for decolonization will be also be discussed through the lens of Dakota stories and culture.

DAKO 5229. Dakota Mastery II. (3 cr. [max 6 cr.] ; Student Option; Every Spring)
This content-based Dakota language class will focus on Dakota culture and history. Students will learn through both oral and written texts. Both traditional and contemporary stories will be discussed and utilized to give students a better view of Dakota ontology and epistemology. The effects of colonization and the need for decolonization will be also be discussed through the lens of Dakota stories and culture.

Dance (DNCE)

DNCE 5010. Modern/Contemporary Dance Technique 7. (; 2 cr. [max 4 cr.] ; Student Option; Every Fall)
Seventh course in ten-section sequence of modern dance technique. Continuation of technical development. Performance range/ style. Students study with various guest artists. prereq: dept consent, audition

DNCE 5020. Modern/Contemporary Dance Technique 8. (; 2 cr. [max 4 cr.] ; Student Option; Every Spring)
Eighth course in ten-section sequence of modern dance technique. Performance range/ style. Students study with various guest artists. prereq: 5010, dept consent, audition

DNCE 5030. Modern/Contemporary Dance Technique 9. (2 cr. [max 6 cr.] ; A-F or Audit; Every Fall)
Ninth course in ten-section sequence of modern dance technique. It focuses on pre-professional technique training for students prepared for that level of technical achievement and readying themselves for a potential career as contemporary dance professionals. All Dance Program Modern Dance Technique courses examine the practical application and understanding of principles of space, time, and energy focusing on alignment, weight, momentum, power for the body's core, joint and skeletal articulation, clarity of focus and intent, flexibility, strength, stamina and energy flow and lines through the use of breath appropriate to the technical level of the course. The course also explores a range of performance strategies that students may encounter for future performance experiences within the dance program and beyond.

DNCE 5040. Modern/Contemporary Dance Technique 10. (2 cr. [max 6 cr.] ; Student Option; Every Spring)
Tenth course in ten-section sequence of modern dance technique. It focuses on pre-professional technique training for students prepared for that level of technical achievement and readying themselves for a potential career as contemporary dance professionals. All dance program modern dance technique courses examine the practical application and understanding of principles of space, time, and energy focusing on alignment, weight, momentum, power for the body's core, joint and skeletal articulation, clarity of focus and intent, flexibility, strength, stamina and energy flow and lines through the use of breath appropriate to the technical level of the course. The course also explores a range of performance strategies that students may encounter for future performance experiences within the dance program and beyond.

DNCE 5110. Ballet Technique 7. (; 1 cr. [max 2 cr.] ; Student Option; Every Fall)
Continuation of ballet technique. Musicality, performance, stylistic differences. Practical work conducted within context of choreographic/aesthetic development of ballet. prereq: dept consent, audition

DNCE 5120. Ballet Technique 8. (; 1 cr. [max 2 cr.] ; Student Option; Every Spring)
Continuation of 5110. Musicality, performance, stylistic differences. Practical work conducted within context of choreographic/aesthetic development of ballet. prereq: 5110, dept consent, audition

DNCE 5334. Introduction to Dance/ Movement Therapy. (2 cr. ; Student Option; Every Spring)
Historical/theoretical perspectives on use of movement/dance in relationship to psychology/healing. D/MT pioneers/techniques. Applications of D/MT with various populations/ settings. Experiential course. prereq: dept consent

DNCE 5443. Theorizing Dancing Bodies. (; 3 cr. ; Student Option; Every Fall)
Major developments in Western philosophic thought on dance and dance theory, from its beginnings to present. prereq: instr consent

DNCE 5493. Choreographing Social Justice: Staging "Equitable" Choreographies. (; 3 cr. ; A-F only; Every Spring)
Possibilities and implications of artistic work. Metaphoric bodily practices and intersections of performance and social justice practices. Theories and histories of intersections within communities of color across global North and South. Group project. prereq: 4443 recommended

DNCE 5500. Topics in Dance. (; 1-3 cr. [max 30 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Topics specified in Class Schedule.

DNCE 5601. Dance Composition 5. (; 1-2 cr. ; Student Option; Every Spring)
Final part of six-semester sequence in dance composition. Exploration of movement through independently scheduled rehearsals. Choreographic concepts. Tools in dance creation, development/refinement of movement, structure of group choreography. prereq: 4601, 4602, dept consent

DNCE 5700. Performance. (; 1-2 cr. [max 8 cr.] ; Student Option; Every Fall & Spring)
Technique, improvisation, choreography, music, design, and technical production as they relate to dance performance. prereq: concurrent registration is required (or allowed) in technique course, dept consent, audition based Students cast in more than one choreographic piece should register for section 002 for 2 credits

DNCE 5858. Dance Pedagogy. (; 3-4 cr. ; Student Option; Every Fall)
Teaching dance provides the foundational pedagogy and methods for artful and responsible teaching and learning in dance. Students will examine key dance education theories and quality teaching practices, and then apply the theories by developing and teaching dance lessons. The course introduces tools that assist in the planning, teaching, assessing, and sharing of dance experiences

with children, adolescent, and adult learners in a variety of settings. Specific learning opportunities include: readings, investigation and discussion of dance pedagogy; the creation of lesson plans; teaching labs (in-class and off-site supervised practice teaching); and clinical observations where students can observe the theory in practice.

DNCE 5993. Directed Studies. (1-4 cr. [max 10 cr.] ; Student Option; Every Fall & Spring)
Guided individual study. Prereq-instr consent, dept consent, college consent.

Data Science (DSCI)

DSCI 5994. Directed Research. (1-3 cr. [max 9 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed Research

DSCI 8760. Data Science M.S. Plan B Project. (3 cr. [max 6 cr.] ; S-N only; Every Fall, Spring & Summer)
Project arranged between student and faculty.

DSCI 8970. Data Science M.S. Colloquium. (1 cr. ; S-N or Audit; Every Fall)
Recent developments in Data Science and related disciplines. Students must attend 13 of the 15 lectures.

DSCI 8991. Independent Study. (1-3 cr. [max 6 cr.] ; Student Option; Every Fall)
Independent study with professor. prereq: instr consent

Dental Hygiene (DH)

DH 5201. Management Internship. (; 5 cr. ; S-N only; Every Fall, Spring & Summer)
Supervised experience in oral health care industry. Experience in corporations, health care management organizations, long-term care facilities, publishing firms, or professional organizations. An internship is required (minimum 14 weeks). prereq: Dental hygiene grad student

DH 5203. Capstone Project. (3 cr. ; S-N only; Every Fall, Spring & Summer)
Formulation of extensive business plan/project related to area of interest based on coursework taken or internship experience. prereq: Dental hygiene grad student

DH 5401. Research Methods in Health Sciences. (3 cr. ; A-F only; Every Summer)
Developing skills in scientific method. Analyzing research findings. Types of research, problem selection, hypothesis writing, research planning/design, data collection/measuring techniques, analysis/interpretation of data. Ethics. prereq: Dental hygiene grad student

DH 5403. The Discipline of Dental Hygiene. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Dental hygiene practice grounded in science and guided by research evidence. Etiology, prevention, and treatment of dental caries, periodontal diseases, oral cancer, and other conditions. Advances in technology. prereq: Dental hygiene grad student

DH 5405. Curriculum and Course Development. (; 2 cr. [max 4 cr.] ; A-F only; Every Fall)
Curriculum/course development/management, competency-based education/outcomes assessment. Role of accreditation in dental hygiene education. Students develop competency-based dental hygiene curriculum/course. prereq: Dental Hygiene grad student

DH 5407. Instructional Strategies for Effective Teaching. (; 2 cr. ; A-F only; Every Fall)
Application of principles of learning. Learning/teaching styles, student-centered teaching, instructional strategies. Microteaching selected strategies. prereq: Dental hygiene grad student

DH 5409. Dental Hygiene Clinic Administration. (; 2 cr. ; A-F only; Every Spring)
Theory/practice of dental hygiene preclinic/clinic instruction. Administration of clinic. Developing protocols, calibrating faculty, monitoring student progress. Central Regional Dental Testing Service exam, clinic evaluation mechanisms, quality assurance. prereq: Dental hygiene grad student

DH 5411. Administrative Leadership and Professional Development. (2 cr. ; A-F only; Every Spring)
Application of leadership theory. Models of administrative roles in education, health care, research, and corporate health care settings. Education/organization culture, strategic planning, human resource management/budgeting. Professional development/advancement. prereq: Dental hygiene grad student

DH 5413. Dental Hygiene Supervised Clinic Student Teaching. (; 4 cr. ; A-F only; Every Fall, Spring & Summer)
Observation/participation in supervised clinical teaching experiences in dental hygiene education. Psychomotor skill acquisition. Process of care. Feedback. Question asking. Evaluation of clinical skills. Ethical/legal issues.

DH 5415. Dental Hygiene Supervised Didactic Course Student Teaching. (2 cr. [max 4 cr.] ; A-F only; Every Fall, Spring & Summer)
Observation/participation in supervised teaching experience in dental hygiene education under faculty mentorship.

DH 5421. Oral Health Care Policy and Funding Strategies. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
An introduction to oral health care policy, advocacy and program funding through grant writing. Evaluate current health care policy, propose improved health care delivery systems, and grant writing fundamentals for evidence-based program implementation. prereq: Enrolled in Dental Hygiene grad program

DH 5425. Oral Health Educator Clinical Teaching. (; 3 cr. ; A-F only; Every Fall)
Application of the principles of clinical instruction in a dental setting. Emphasis is placed on the various roles of the clinical instructor, effective strategies to foster critical thinking, provide effective feedback and assessment, and ethical/legal issues. Strategies to address challenges and practical teaching tips in the clinical environment.

DH 5426. Oral Health Educator Didactic Teaching. (; 3 cr. ; A-F only; Every Fall)
The overall goal of the course is to prepare individuals for effective teaching in the classroom setting. Learning theory will lay the foundation for the course design process and provide a framework for the application of competency-based education in dental school curricula. Participants will learn a step-by-step approach to integrated course design culminating in the development of a course syllabus for a predoctoral dental course.

DH 7000. Thesis/Capstone Independent Study. (; 0-1 cr. [max 3 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Students currently working on thesis or capstone paper. prereq: Dental hygiene grad student

DH 8777. Thesis Credits: Master's. (1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

Dental Therapy (DT)

DT 5005. Dental Therapy Capstone Project I. (1 cr. [max 2 cr.] ; S-N only; Every Fall)
The main purpose of the Capstone courses is to provide a culminating, integrative scholarly experience for students enrolled in the Dual Degree BSDH/MDT program. As such, in addition to utilizing knowledge gained throughout the 8-semester program, the course draws specifically on students? prior training in Research and Dental Public Health. The course allows students to pursue an independent, project-based topic from one of their interests in the field of oral health. The course is intended to be an intensive, active-learning project, requiring significant effort in the planning and implementation, as well as preparation of a substantial final written product and oral presentation. A Capstone is a systematic investigation of a subject including library and/or original research. Projects are intended to assimilate knowledge gained in courses in order to create a comprehensive, original project. While Capstone projects provide invaluable preparation for professional careers, students report that the primary rewards are intrinsic: the opportunity to follow one?s curiosity, to take ownership of a project and see it through to a successful conclusion, the intellectual and creative pleasure of independent learning, and the mentorship by one?s advisor. Because the written portion of the project is generally quite long, it is essential to devote substantial time to the research and writing of the paper. However, learning to be concise is a valuable skill to master.

DT 5105. Dental Therapy Capstone Project II. (1 cr. ; A-F only; Every Spring)
The main purpose of the Capstone courses is to provide a culminating, integrative

scholarly experience for students enrolled in the Dual Degree BSDH/MDT program. As such, in addition to utilizing knowledge gained throughout the 8-semester program, the course draws specifically on students? prior training in Research and Dental Public Health. The course allows students to pursue an independent, project-based topic from one of their in the field of oral health. The course is intended to be an intensive, active-learning project, requiring significant effort in the planning and implementation, as well as preparation of a substantial final written product and oral presentation. A Capstone is a systematic investigation of a subject including library and/or original research. Projects are intended to assimilate knowledge gained in courses in order to create a comprehensive, original project. While Capstone projects provide invaluable preparation for professional careers, students report that the primary rewards are intrinsic: the opportunity to follow one?s curiosity, to take ownership of a project and see it through to a successful conclusion, the intellectual and creative pleasure of independent learning, and the mentorship by one?s advisor. Because the written portion of the project is generally quite long, it is essential to devote substantial time to the research and writing of the paper. However, learning to be concise is a valuable skill to master.

DT 5135. Preclinical Pediatric Dentistry. (2 cr. ; A-F only; Every Spring)
Childhood development and care of children. Restorative dentistry for children/adolescents. Behavior management techniques. Issues that arise in dental health care setting. Lab. Prereq-DT grad program.

DT 5140. Preventive Pediatric Dental Clinic. (1 cr. ; A-F only; Every Fall)
Oral health promotion of pediatric patients. Brushing techniques, fluoride application, dietary analysis/counseling. Students interact with parents of pediatric patients.

DT 5141. Clinical Pediatric Dentistry III. (; 2 cr. ; A-F only; Every Spring)
Early childhood development, dental care for children. prereq: Must be in the dental therapy program, passed basic foundation competencies

DT 5162. Principles of Exodontia and Minor Oral Surgery. (1 cr. ; A-F only; Every Fall & Spring)
Develop knowledge/skill for exodontia/minor oral surgery.

DT 5205. MDT Clinical Correlations. (; 1 cr. ; S-N only; Periodic Summer)
Provide MDT students with clinically-based educational opportunities during the mandated clinic closure due to the COVID-19 pandemic.

DT 5241. Oral Radiology Clinic II. (; 1 cr. ; A-F only; Every Fall)
Clinical instruction in oral radiography. Intraoral/extraoral radiographic procedures, evaluations. prereq: Must be in dental therapy masters program

DT 5320. Comprehensive Care Clinic. (; 4 cr. ; S-N only; Every Spring)
Assessment, treatment, and management of patients. Concepts/principles of evidence-based dentistry as applied to clinical practice.

DT 5321. Treatment Planning for the Dental Therapist. (1 cr. ; S-N only; Every Fall, Spring & Summer)
Formal lecture presentations regarding fundamentals of assessment/treatment planning of dental cases. Prepare student to understand University of Minnesota School of Dentistry protocol in development of optimal, alternative, emergency treatment plans.

DT 5348. Dental Service-Learning. (; 1 cr. ; S-N only; Every Fall)
This course is designed to enable students to experience providing oral health care to patient populations who do not have regular access to such care. Clinical experiences in restorative dentistry, emergency dental care, and oral and maxillofacial surgery will be provided under the supervision of University of Minnesota School of Dentistry Faculty.

DT 5349. Dental Service-Learning. (; 1 cr. ; S-N only; Every Spring)
This course is designed to enable students to experience providing oral health care to patient populations who do not have regular access to such care. Clinical experiences in restorative dentistry, emergency dental care, and oral and maxillofacial surgery will be provided under the supervision of University of Minnesota School of Dentistry Faculty.

DT 5360. Outreach Experiences DT Fall. (1 cr. ; S-N only; Every Fall)
Students work in clinics outside of U of M with underserved patients.

DT 5361. Outreach Experiences DT Spring. (2 cr. ; S-N only; Every Spring)
Experiences that reinforce principles of delivering dental health care/services to patients, including underserved patient populations, in contemporary off-site clinical settings.

DT 5410. Biomaterials Science. (1 cr. ; A-F only; Every Spring)
Application of scientific principles to selection/ utilization of dental materials. Prereq-2nd yr DT student.

DT 5429. Introduction to Psychomotor Skill Development. (1 cr. ; S-N only; Every Fall)
Virtual reality based training for psychomotor skills required in prosthodontic/operative courses. Eye-hand/mirror skills, ergonomics used while preparing teeth for restoration. Prereq-In dental therapy program.

DT 5430. Oral Anatomy. (; 2 cr. ; A-F only; Every Fall)
Morphological characteristics of human dentition, associated contiguous structures. Foundational knowledge applied to situations encountered in general dental clinical practice. prereq: Accepted into dental therapy masters program

DT 5431. Oral Anatomy Laboratory. (; 3 cr. ; A-F only; Every Fall)
Manual dexterity skills, anatomy of human dentition. prereq: Accepted into masters in dental therapy program

DT 5432. Operative Dentistry I. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
How to treat dental caries. Therapeutic treatment of underlying pathology. Surgical treatment of early caries lesion.

DT 5433. Operative Dentistry I Pre-Clinic Laboratory. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
How to treat dental caries. Therapeutic treatment of underlying pathology. Surgical treatment of early caries lesion. Hands-on projects working with models simulating teeth and surrounding structures. prereq: 2nd yr masters in dental therapy student

DT 5434. Operative Dentistry II Lecture. (; 2 cr. ; A-F only; Every Summer)
How to surgically manage more advanced caries lesions. Transition from pre-clinic lab to clinic setting. prereq: Enrolled in master's in dental therapy program

DT 5435. Operative Dentistry II for the Dental Therapist, Lab. (3 cr. ; A-F only; Every Fall, Spring & Summer)
More advanced caries lesions: diagnosis, structural preparation, decay removal and restoration.

DT 5443. Operative Clinic III. (4 cr. ; A-F only; Every Spring)
How to place restorations. Students place single-tooth restorations on patients.

DT 5465. Essentials of Clinical Care for the Dental Therapist IV. (10 cr. [max 12 cr.] ; S-N only; Every Fall)
This course will continue to prepare MDT dental therapy students in the dental therapy clinically related scope of patient care under the direction and supervision of experienced clinical faculty. This course will monitor and grade progression in clinics each semester. Evaluation will be based on feedback from dental therapy faculty, group leaders, and the Competency Review Board.

DT 5471. Prosthodontic Topics for Dental Therapy. (2 cr. ; A-F only; Every Summer)
Lectures, lab projects of selected prosthodontic techniques to enable the dental therapist to provide/cement quality pre-fabricated metal or resin provisional crowns and other prosthodontic procedures in the scope of DT practice.

DT 5960. Essentials of Clinical Care II for the Dental Therapist. (5-10 cr. [max 20 cr.] ; S-N only; Every Summer)
Students provide comprehensive care under direction of clinical faculty. May include periodontics, operative, pediatric care, and health promotion. Limited care may be given on rotations to oral surgery clinics.

DT 6164. Principles of Exodontia and Minor Oral Surgery for the ADT student. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall, Spring & Summer)
This course develops knowledge and skill in the advanced dental therapy (ADT) student in exodontia and minor oral surgery.

DT 6212. Grant Writing for Community-based Oral Health Programs. (; 1 cr. ; A-F only; Every Spring)

The purpose of this course is to provide an introduction to grant writing for oral health care professionals. Topics will include grant sourcing, matching goals and objectives to funding sources, creating evidence-based programs, developing an evaluation plan, writing a compelling proposal, and planning for funding sustainability. The effect of the economic environment and social responsibility of non-profit corporations will be discussed.

DT 6213. Community-based Dental Practice Elective. (; 1-3 cr. [max 6 cr.] ; A-F only; Every Spring)
The purpose of this elective course is to equip dual licensed dental hygienist/dental therapists to create a non-profit organization in which to provide community-based dental services to a diverse patient base.

DT 6321. Treatment Planning. (2 cr. ; A-F only; Every Fall)
Fundamentals of assessment/dental treatment planning using University of Minnesota School of Dentistry protocol in developing optimal, alternative, emergency treatment plans. Case-based treatment planning/small group seminars utilizied.

DT 6340. Advanced Dental Therapy Prep Clinic. (10 cr. ; A-F only; Every Fall)
Preparation for licensed dental therapists to be eligible for advanced dental therapy certification. Course has four requirements: completion of designated clinic hours, self-assessment records, faculty assessment records, final interview that can be completed with patients from student's place of employment.

DT 6341. Advanced Dental Therapy Prep Lecture. (2 cr. ; A-F only; Every Fall)
Preparation for licensed dental therapists to become eligible for advanced dental therapy certification. Topics range from essential basic sciences to specific clinical procedures. prereq: Must be a licensed dental therapist who was originally trained at the University of Minnesota, School of Dentistry.

Dentistry (DENT)

DENT 6113. Oral Radiology Clinic III. (; 2 cr. ; A-F or Audit; Every Fall, Spring & Summer)
This course consists of radiographing dental school patients, radiographic interpretations, panoramic and extraoral technique seminars and quality assurance procedures.

DENT 6225. Advanced Oral and Maxillofacial Surgery Elective. (; 1-5 cr. ; S-N or Audit; Every Fall)
Diagnosis/treatment of dentoalveolar pathology. 25-125 contact hours.

DENT 6230. Oral and Maxillofacial Surgery Externship Elective. (; 0 cr. ; S-N or Audit; Periodic Fall & Spring)
Students gain additional surgical experiences and determine if career in oral/maxillofacial surgery is desirable. prereq: Interview with externship dir, letter stating student registered in good standing at ADA-accredited dental school; experience in dentoalveolar surgery procedures preferred

DENT 6231. Hospital Dentistry Clinic Rotation. (; 0 cr. ; S-N or Audit; Every Fall)
Managing hospitalized patients, operating room protocol, patient admission and discharge, and ambulatory patients.

DENT 6232. Hospital Dentistry Clinic Rotation. (; 1 cr. ; S-N or Audit; Every Fall & Spring)
Managing hospitalized patients, operating room protocol, admission/discharge of patients, ambulatory patients.

DENT 6319. Surgical and Clinical Oral and Maxillofacial Pathology. (; 1-10 cr. ; S-N or Audit; Periodic Fall & Spring)
This elective involves spending time with Division of Oral and Maxillofacial Pathology faculty while they diagnose surgical pathology cases and see clinical oral pathology referral patients.

DENT 6470. Health Ecology Elective. (; 1-10 cr. ; Student Option; Every Fall & Spring)
Highly motivated students earn academic credit for activities in special-interest areas.

DENT 6480. Advanced General Dentistry Elective. (; 1-10 cr. ; Student Option; Every Fall, Spring & Summer)
Block rotations of 2 to 10 weeks in selected special clinics and programs such as prisons, regional treatment centers, and migrant worker health care programs.

DENT 6490. Health Ecology: Independent Study. (; 1-10 cr. ; Student Option; Every Fall & Spring)
Arranged with any Health Ecology faculty member.

DENT 6591. Pediatric Dentistry Independent Study. (; 2 cr. ; Student Option;)
Students may be assigned independent projects or additional clinical experiences in pediatric dentistry.

DENT 6713. Endodontics: Independent Study. (; 2 cr. ; A-F or Audit; Every Fall & Summer)
Has three phases: case presentations, literature review, laboratory. prereq: Completion of 3rd yr of dental school, dept consent

DENT 6715. Advanced Endodontic Elective. (; 0 cr. ; S-N only; Every Fall)
Current data relevant to methods/materials in endodontic dentistry.

DENT 6931. Application of Occlusal Applicances. (; 1 cr. ; S-N only; Every Fall & Spring)
Focuses on fabrication, application, and adjustment of occlusal applicances. Clinical, lab, and practice issues.

DENT 7000. Dental Clinic. (; 1-6 cr. ; Student Option; Periodic Fall, Spring & Summer)

DENT 7021. Contemporary Diagnosis and Management of Orofacial Pain. (; 1 cr. ; A-F only; Spring Odd Year)
Pain mechanisms, pathways, and assessment of orofacial pain. Pharmacology of pain and strategies for effective pre- and post-operative pain management.

DENT 7031. Advanced Seminar in Clinical Geriatric Dentistry. (; 1-2 cr. ; S-N or Audit; Every Fall)
Oral health problems in elderly, clinical implications of biological aging changes, geriatric medical concerns, medical risk assessment, medication issues, ethical/legal concerns, dental management of patients in long-term care settings. prereq: [Advanced or grad] student in [dentistry or other AHC discipline]

DENT 7032. Field Experience: Administration in a Multidisciplinary Health Center. (; 1-3 cr. ; Student Option; Every Spring & Summer)
Administrative and management issues in a multidisciplinary health care environment. Student placement with faculty approval and oversight at the Amherst H. Wilder Senior Health Clinic or other sites. Project emphasis on strategic planning, organizational structure, budgeting and financial management, personnel management, communications, quality assurance activities, or other topics.

DENT 7033. Teaching and Evaluation in Dentistry. (; 3 cr. ; A-F or Audit; Every Spring)
Application of educational and psychological principles to professional dental education. Design and implementation of curricular components based on principles of learning and instruction. Review of evaluation and measurement theories and practices in the context of student performance and assessment. Survey of program evaluation methods. prereq: Dent or OBio grad student or instr consent

DENT 7051. Advanced Study in the Theory and Principles of Oral Medicine. (2 cr. ; A-F or Audit; Every Fall)
Principles essential to problem-oriented patient evaluation and to patient-oriented treatment planning. Emphasizes state-of-the-art diagnostic sciences, therapy. Normal physiology of various organ systems. Disease pathophysiology of special interest to dentist. Lectures, seminars, clinicopathologic conferences.

DENT 7052. Oral and Maxillofacial Radiologic Interpretation. (2 cr. ; A-F or Audit; Periodic Fall & Spring)
Use of oral/maxillofacial radiology as diagnostic tool. Recognizing radiographic patterns of normal tissues. Detecting/evaluating radiographic evidence of deviations from normal patterns. Using radiographs, other procedures, to develop differential/tentative/ final diagnosis/treatment plan/prognosis. Emphasizes using concepts of oral/general pathology, basic biological science courses, to understand/evaluate disease process.

DENT 7061. Special Oral Pathology I. (1 cr. ; S-N or Audit; Every Fall & Spring)
Review of clinical, radiographic, and treatment aspects of oral disease and oral manifestations of systemic disease. prereq: Resident [or grad student] in discipline other than oral pathology

DENT 7062. Special Oral Pathology II. (1 cr. [max 2 cr.] ; S-N only; Every Spring)

Review of the clinical, radiographic, and treatment aspects of oral disease and oral manifestations of systemic disease. Prereq-7061, resident [or grad student] in discipline other than oral pathology.

DENT 7071. General Practice Residency Dental Clinic. (; 13 cr. [max 78 cr.] ; S-N only; Every Fall, Spring & Summer)
Clinical course for residents of the General Practice Residency Program.

DENT 7082. Craniofacial Growth and Development. (2 cr. ; A-F only; Every Fall)
This course is structured as a combination of two-hour lectures, seminars, and distance learning meeting once a week. The overall objectives of this course are to present essential concepts necessary to understand growth and development as it pertains to orthodontic diagnosis and treatment planning.

DENT 7101. Management Philosophy for Dental Practices. (; 1 cr. ; A-F only; Every Fall & Spring)
Seminar on philosophy and techniques used in the administration and management of offices for dental specialists. prereq: Dentistry grad student

DENT 7102. Conscious Sedation. (; 2 cr. ; A-F only; Every Fall)
Oral, inhalation, and intravenous sedation for dental patients. Topics include patient selection and physical risk assessment; selection and administration of sedative agents; and prevention, recognition, and management of medical emergencies. prereq: Dentistry grad student

DENT 7111. Current Literature Review in Dentistry. (2 cr. ; A-F only; Every Fall & Spring)
Current literature in dentistry and related disciplines. Formal setting for students to meet and review current literature that is of significance to all. prereq: Grad student in [dentistry or oral biology] or instr consent

DENT 7112. Treatment Planning Seminar. (; 2 cr. [max 4 cr.] ; A-F only; Every Fall & Spring)
Multidisciplinary format for discussion of complex dental patients. Evaluating, diagnosing, and developing a comprehensive treatment plan for complex dental patients.

DENT 7121. Psychological Issues in Medical and Dental Patient Management. (; 1 cr. ; Student Option; Every Fall & Spring)
Psychological issues in medical and dental evaluation and treatment, psychopathology, stress, and illness.

DENT 7123. Temporomandibular Disorders and Orofacial Pain. (1 cr. ; A-F or Audit; Every Spring)
Basic didactic information needed to recognize/manage patients with temporomandibular disorders. Overview of scope/complexity of clinical practice of TMD/Orofacial Pain management.

DENT 7220. Prosthetically-Driven Implant Surgery and Treatment Planning. (1 cr. ; A-F only; Every Fall)
Patient selection. Treatment planning for implant therapy. Indications/contra-indications of various types of implants. Treatment planning, implant surgery, bone grafting procedures. prereq: Prosthodontics resident

DENT 7411. Dental Biomaterials in Prosthodontics. (1 cr. ; A-F only; Summer Odd Year)
Understanding structure-properties relationship. Role/performance of synthetic materials in living environment.

DENT 7991. Independent Study. (; 1-4 cr. [max 8 cr.] ; Student Option No Audit; Every Fall, Spring & Summer)
Individualized study under supervision of graduate faculty member in MS-Dentistry Program. Focus determined by faculty and student. prereq: Enrolled in an advanced dental education program

DENT 7993. Curricular Practical Training Elective. (1 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
This course is an elective internship or employment to gain practical work experience, advance professional skills and explore career interests.

DENT 8031. Topics and Problems in Dental Education. (; 1-3 cr. ; Student Option; Every Spring & Summer)
Independent study in student learning, instructional development, curriculum planning, student testing and evaluation, and academic administration, where these areas and their interfaces are applied directly to professional dental education. Provides opportunity for applying and extending concepts learned in Dent 7033.

DENT 8081. Clinical Topics in TMD. (2 cr. ; A-F only; Spring Even Year)
Structured as a combination of 2-hour lectures and seminars meeting once a week. The overall objectives are to present essential concepts necessary to the diagnosis and management of temporomandibular disorders (TMD), as well as background on how TMD can affect patient care for the orthodontist. It should be noted the course is not designed to meet the needs of a person providing specialty care for TMD and orofacial pain. The students will learn evidence-based approaches to diagnose and provide and predictable and efficient treatment for patients with mild TMD conditions. Critical review of classic and current TMD and orthodontic literature is an important component of this course. Hands-on clinical experience will consist of two clinical sessions.

DENT 8090. Evidence-based Clinical Pediatric Dentistry. (; 2 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Selected pediatric dentistry topics. In-depth literature review, seminar discussion.

DENT 8091. Interdisciplinary Care of the Cleft Palate Patient. (; 1 cr. ; S-N or Audit; Every Summer)
Comprehensive surgical, dental, and speech and hearing evaluation and management of patients with cleft lip and palate.

DENT 8100. Topics in Advanced Periodontology: Literature Review. (; 2 cr. ; Student Option; Every Fall, Spring & Summer)
State-of-the-art information on a variety of topics concerning risk factors and therapeutic modalities for periodontal disease.

DENT 8101. Dental Implantology: A Multidisciplinary Approach. (; 1 cr. [max 2 cr.] ; Student Option; Every Fall & Spring)
Dental implant therapy from perspective of several dental disciplines.

DENT 8120. Advanced Principles and Techniques of Orofacial Pain Disorders. (2 cr. [max 3 cr.] ; A-F or Audit; Every Spring)
Interdisciplinary study of theory, principles, epidemiology, mechanisms associated with TMJ/craniofacial pain disorders. Basis for scientific understanding of diagnostic/management strategies. prereq: Participation in TMJ, orofacial pain advanced education program

DENT 8121. Current Literature in TMD and Orofacial Pain. (1 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Review of current literature/how it relates to past literature. Theories on pain, philosophies of management.

DENT 8123. Advanced Topics in Orofacial Pain. (; 2 cr. ; A-F or Audit; Every Spring)
Review of cutting edge research and clinical findings regarding etiology and treatment of acute and chronic orofacial pain conditions and related disorders. prereq: Grad student in dentistry or other health sciences grad student or instr consent

DENT 8124. Journal Club OFP Literature 2. (; 1 cr. [max 3 cr.] ; A-F only; Fall Odd Year)
Literature Review Course with different topics in relation to OFP

DENT 8200. Dental Clinic for Oncology Fellows. (13 cr. ; S-N only; Every Fall, Spring & Summer)
Train oral/maxillofacial surgeons in principals/practice of head/neck oncology. Treatment of benign/malignant disease including salivary gland tumors. Training will emphasize multidisciplinary care of head/neck oncology patient.

DENT 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

DENT 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

Dermatology (DERM)

DERM 7182. Dermatology Preceptorship. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
This elective is useful to the student planning a career in a primary care specialty or dermatology.

DERM 7183. Advanced Dermatology. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
Students will gain further experience in all aspects of dermatology. This course is

appropriate for medical students interested in pursuing a career in Dermatology.

DERM 7185. Research in Dermatology. (; 4-8 cr. [max 16 cr.] ; H-N only; Every Fall, Spring & Summer)
An introduction to research in dermatology. The student pursues a research project through clinical or laboratory research. The specific project is individually formulated by the student and faculty. As time permits during this course, the student is invited to attend research and teaching conferences conducted by the Department of Dermatology.

DERM 7910. Dermatology Medical Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Dermatology medical residency.

DERM 7920. Medicine/Dermatology Medical Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Medicine/dermatology medical residency.

DERM 7930. Dermatology Medical Fellowship. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Dermatology medical fellowship.

Design (DES)

DES 5130. Visual Literacy. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Understanding concept of visual literacy; analysis of visual communication and design elements; review of visual learning research; application of visual literacy into practice. University credit earned through completion of the UX Design MasterTrack? Certificate. For more information, visit: https://design.umn.edu/academics/explore-all-certificates/ux-design-mastertracktm-certificate

DES 5131. User Research for User Experience Design. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Qualitative research skills specific to the field of user experience; understanding of qualitative research methods; development and critique of a product proposal with data reasoning. University credit earned through completion of the UX Design MasterTrack? Certificate. For more information, visit: https://design.umn.edu/academics/explore-all-certificates/ux-design-mastertracktm-certificate

DES 5132. User Testing for User Experience Design. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Further developed qualitative research skills using empathy mapping, user journeys, and usability tests; understanding of UX toolkit; ability to evaluate service BluePrints/Wireframes/Task flows; prototypes design; understanding of UI design analysis and critical evaluation. University credit earned through completion of the UX Design MasterTrack? Certificate. For more information, visit: https://design.umn.edu/academics/explore-all-certificates/ux-design-mastertracktm-certificate

DES 5160. Topics in Design. (; 1-4 cr. [max 24 cr.] ; A-F only; Every Fall, Spring & Summer)
Topics in design

DES 5165. Design and Globalization. (; 3 cr. ; A-F or Audit; Every Fall)
Design and Globalization is designed as a course for students of diverse disciplines as well as both graduate and undergraduate students. The course is also part of the Interior Environments Minor as well as meets the Lib Ed theme of "Diversity and Social Justice in the US." Offering it on-line, benefits and increases access to students beyond the St. Paul campus, enabling us to increase enrollment as well as reach a broader range of students and disciplines. Interior Design is already switching the two history classes on-line as a way to increase enrollment and add flexibility in the curriculum.

DES 5168. Evidence-Based Design. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Origins of evidence-based design/possible benefits and detractors. Students learn various components as a process/ explore methods of integrating process via application to a design project in their area of expertise. Process, impact, influences, and anticipated outcomes are documented/ analyzed as compared to a typical design process approach. prereq: CDes grad student or instr consent

DES 5170. Topics in Design. (; 3 cr. [max 24 cr.] ; A-F or Audit; Periodic Fall, Spring & Summer)
In-depth investigation of single specific topic, announced in advance.

DES 5185. Human Factors in Design. (; 3 cr. ; A-F or Audit; Periodic Fall)
Theories/methods that influence the assessment of physical, social, and psychological human factors. Development of user needs with application to designed products that interact with human body. prereq: Grad student or sr or instr consent

DES 5188. Anthropometrics, Sizing & Fit. (4 cr. ; A-F only; Periodic Fall & Spring)
Comprehensive attention to ergonomics and anthropometric variance across populations is crucial to the advancement of wearable products and apparel. This course will examine the relationship between body size, body shape, product design, sizing systems, and fit. Students will examine existing sizing systems and develop new sizing systems using anthropometric data, body scan technology, and OptiTex 3D patternmaking software. A special focus will be given to examining innovative tools that encourage the merging of anthropometrics and design throughout the design process. This class is suitable for students across a variety of disciplines.

DES 5193. Directed Study in Design. (; 1-6 cr. [max 36 cr.] ; A-F only; Every Fall, Spring & Summer)
Directed Study in Design prereq: dept consent

DES 5196. Field Study: National/ International. (; 1-10 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Faculty-directed field study in a national or international setting.

DES 5901. Principles of Wearable Technology. (; 2 cr. ; A-F or Audit; Every Spring)
Exploration of technologies, theories, and best practices for designing and developing systems incorporating wearable technology. This lecture-based class will introduce students to the physical principles that underlie many wearable technology subsystems, will discuss design approaches that conscientiously consider user experience and wearability in systems design. This course is an introductory course that focuses on wearable technology concepts blending User-Centered Design with Engineering Systems development. It is intended to be approachable for students with a wide variety of interests and backgrounds. Course material is explored through readings, lectures, discussions, and course projects. Optional laboratory course (DES.5902) provides hands-on opportunities to put these principles into practice.

DES 5902. Wearable Technology Laboratory Practicum. (2 cr. ; A-F or Audit; Every Spring)
Laboratory session to develop skills in building and testing wearable technology systems. The student must be enrolled concurrently with DES 5901 (Principles of Wearable Technology). Students will be provided opportunities for hands-on prototyping to gain a practical appreciation for the challenges related to wearable systems development. Course material is explored through laboratory sessions and course projects.

DES 8102. Quantitative Research Methods. (; 3 cr. ; A-F only; Fall Even Year)
Quantitative research methods for issues related to humans, their behaviors, and everyday living in the designed environment.

DES 8103. Qualitative and Mixed Methods Research. (; 3 cr. ; A-F or Audit; Every Spring)
A scientific approach to qualitative research. Methods/strategies combined to explore complex research questions.

DES 8112. Design Theory. (; 3 cr. ; A-F or Audit; Spring Even Year)
Theories used in design disciplines. Existing designed environments. Designer's purpose. Problem-solving processes. Interaction between humans and design. Field investigations.

DES 8113. Teaching and Assessment. (; 2 cr. ; A-F or Audit; Fall Odd Year)
Educational processes/methods in design studio/lecture courses. Learning styles, best practices for grading. Methods of critique. Interacting with students. Active learning. Teaching with technology. Lecture, practicum.

DES 8114. Design Studio. (; 4 cr. ; A-F or Audit; Fall Even Year)
Advanced problem analysis, design solution. prereq: Design grad student or instr consent

DES 8115. Grant Writing. (; 2 cr. ; A-F or Audit; Fall Even Year)
Interdisciplinary course.

DES 8151. Product Development: Theory and Practice. (; 3 cr. ; A-F only; Spring Odd Year)
Product development theories/methods as applied in many design fields. Emphasizes

retail setting. Seminar format discussion, case studies, observation/critique of hands-on industry product development project.

DES 8164. Innovation Theory and Analysis. (; 3 cr. ; A-F or Audit; Spring Odd Year)
Theories and factors that influence adoption and diffusion of designed products. Methodologies used in analysis of diffusion process.

DES 8166. Material Culture and Design. (; 3 cr. ; A-F or Audit; Periodic Spring)
Research approaches to material culture study using artifacts from Goldstein Museum of Design. prereq: [DHA or DES] grad student or instr consent

DES 8167. Aesthetics of Design. (; 3 cr. ; A-F or Audit; Periodic Spring)
How we perceive, analyze, value, and evaluate design outcomes/results.

DES 8170. Topics in Design. (; 1-3 cr. [max 6 cr.] ; A-F or Audit; Every Fall & Spring)
In-depth investigation of topic announced in advance.

DES 8181. Research Ethics. (; 1 cr. ; S-N or Audit; Every Spring)
Overview of ethical concerns/questions in conducting/disseminating research. Mentoring relationships, use of human subjects, data handling, plagiarism, authorship, publishing, research funding, social responsibility of researchers, code of conduct. prereq: Grad student

DES 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

DES 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

DES 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Doctoral pre-thesis credits. prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

DES 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

DES 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Develpmt Std and Soc Change (DSSC)

DSSC 8111. Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change. (3 cr. ; S-N or Audit; Every Fall)
Approaches practiced by physical, biological, social science, and humanities scholars. "Ways of knowing" in different cultures/groups. Issues/methodological challenges facing interdisciplinary/international studies. Taught by faculty from biological, social sciences, and humanities. prereq: Grad DSSC minor or instr consent

DSSC 8112. Scholarship and Public Responsibility. (1 cr. [max 2 cr.] ; S-N only; Every Spring)
Seminar. Concerns/themes relevant to public engagement in academic work. Diverse practices of reading, writing, and pedagogy. Privileged locations of knowledge. Tactics of civil society organizing. Politics of collaborative work. prereq: Grad DSSC minor or instr consent

DSSC 8211. Doctoral Research Workshop in Development Studies and Social Change. (; 3 cr. ; S-N or Audit; Every Fall)
Interdisciplinary workshop to assist doctoral students in writing successful research and grant proposals to support their dissertation research on themes related to global social change. Enables students to develop interdisciplinary peer review and feedback skills and consider ethical and practical issues global south research. prereq: Grad DSSC minor or instr consent

DSSC 8310. Topics in Development Studies and Social Change. (; 1-3 cr. [max 9 cr.] ; S-N only; Every Fall & Spring)
Seven-week to full semester seminar. Topical issues in development and social change.

DSSC 8993. Directed Study. (1-3 cr. [max 9 cr.] ; S-N only; Every Fall, Spring & Summer)
Directed study with consent from DGS prereq: DSSC graduate student

Doctor of Dental Surgery (DDS)

DDS 6111. Periodontology I Lecture. (; 1 cr. [max 1.5 cr.] ; A-F or Audit; Every Spring & Summer)
Periodontal anatomy, physiology/ etiology of periodontal diseases. Clinical, histopathological, and pathogenesis of gingivitis and periodontitis. Role of genetics, tobacco use, and systemic disorders.

DDS 6112. Periodontology II A: Technique. (; 1 cr. [max 2 cr.] ; S-N or Audit; Every Spring)
Presurgical procedures in periodontics. Clinical skills to examine, diagnose, prevent, and treat periodontal patients. Prereq-In DDS program.

DDS 6113. Periodontology III Lecture. (2 cr. ; A-F only; Every Spring)
Clinical procedures associated with surgical phase of periodontal therapy, including implants. Evaluation of periodontal treatment, maintenance phase, relationship between periodontics and other disciplines in dentistry. Clinical research. Integrating periodontics into general practice.

DDS 6114. Clinical Pharmacology Correlations in Dentistry. (; 1 cr. ; A-F only; Every Summer)
Pharmacologic therapeutic areas with potential clinical relevance in dentistry. Application to therapeutic prescribing decisions. Mechanisms of action. Indications, dosing drug interactions, prescribing concerns. Discussion of published literature.

DDS 6123. Periodontology Clinic DDS3 Summer. (2 cr. ; S-N or Audit; Every Summer)
Nonsurgical and surgical treatment of periodontal diseases, evaluation of periodontal therapy, and implementation of maintenance programs. COURSE PURPOSE These courses are designed to enable the dental student to gain expertise, knowledge, and confidence in the clinical skills needed to examine, diagnose, and treat the periodontal patient.

DDS 6125. Periodontology Clinic D3 Fall. (2 cr. ; S-N only; Every Fall)
Third year dental student nonsurgical and surgical treatment of periodontal diseases, evaluation of periodontal therapy, and implementation of maintenance programs. COURSE PURPOSE These courses are designed to enable the third year dental student to gain expertise, knowledge, and confidence in the clinical skills needed to examine, diagnose, and treat the periodontal patient.

DDS 6126. Periodontology Clinic D3 Spring. (2 cr. ; A-F only; Every Spring)
Third-year dental student nonsurgical and surgical treatment of periodontal diseases, evaluation of periodontal therapy, and implementation of maintenance programs. These courses are designed to enable the third-year dental student to gain expertise, knowledge, and confidence in the clinical skills needed to examine, diagnose, and treat the periodontal patient.

DDS 6127. Periodontology Clinic DDS4 Summer. (2 cr. ; S-N or Audit; Every Summer)
This course is designed to enable the dental student to gain expertise, knowledge and confidence in the clinical skills needed to examine, diagnose, and treat the periodontal patient. Students are expected to complete skills assessments and a patient case presentation during the year.

DDS 6128. Periodontology Clinic D4 Fall. (2 cr. ; S-N or Audit; Every Fall)
This course is designed to enable the fourth year dental student to gain expertise, knowledge and confidence in the clinical skills needed to examine, diagnose, and treat the periodontal patient. Students are expected to complete skills assessments and a patient case presentation during the year.

DDS 6129. Periodontology Clinic D4 Spring. (2 cr. ; A-F only; Every Spring)
This course is designed to enable the fourth year dental student to gain expertise, knowledge and confidence in the clinical skills needed to examine, diagnose, and treat the periodontal patient. Students are expected to complete skills assessments and a patient case presentation during the year.

DDS 6130. Introduction to Clinical Dentistry. (2 cr. [max 4 cr.] ; S-N or Audit; Every Spring)
Methods/procedures consistent with preclinical teaching in traditional predoctoral program. prereq: Enrolled in PASS

DDS 6131. Pediatric Dentistry Pre-Clinic. (2 cr. ; A-F or Audit; Every Spring & Summer)
Physical, emotional, dental, and language development. Diagnosis, prevention, and management of oral diseases in children.

DDS 6141. Pediatric Dentistry Clinic. (3 cr. [max 3.6 cr.] ; A-F only; Every Fall, Spring & Summer)
Preventive/clinical topics/techniques. Diagnosis, treatment planning, and clinical treatment of pediatric patients. Prereq-3rd yr DDS student.

DDS 6151. Pain and Anxiety Control. (; 1 cr. ; A-F or Audit; Every Fall)
Didactic/clinical aspects of pain/anxiety control as pertains to dentistry. Emphasizes use of local anesthetics, conscious sedation (nitrous oxide inhalation). Acute/chronic pain mechanisms, neuropathic pain, issues pertaining to narcotic/other drug abuse.

DDS 6152. Oral and Maxillofacial Surgery I. (; 1 cr. [max 1.1 cr.] ; A-F only; Every Fall)
Introduction to concepts of oral/maxillofacial surgery. Emphasizes fundamental skills of oral surgery that apply to practice of general dentistry.

DDS 6153. Oral and Maxillofacial Surgery II. (1 cr. [max 1.2 cr.] ; A-F only; Every Spring)
Fundamental clinical/diagnostic skills that apply to practice of general dentistry. Surgical procedures, complications, facial fractures, congenital abnormalities. Prereq-Oral Surgery I.

DDS 6161. Oral & Maxillofacial Surgery Clinic Rotation. (2 cr. [max 2.5 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Oral Surgery Clinic experience.

DDS 6169. Occlusal Management I. (1 cr. ; A-F only; Every Spring)
This courses offers the first year dental student an interdisciplinary introduction to clinical occlusion. There will be didactic lectures and an opportunity for a clinical experience of intra-oral scanning demo, hands-on clinical scanning and visualization of digital records and occlusion. Students are required to be admitted to the DDS program prior to taking this course.

DDS 6171. Orthodontics I. (3 cr. ; A-F only; Every Fall)
Supervision, guidance, and correction of growing or mature dentofacial structures. Growth/development of craniofacial structures. Diagnostic methods, biology of tooth movement and biomechanics. Clinical diagnosis, treatment planning.

DDS 6172. Orthodontics II. (; 1 cr. [max 1.5 cr.] ; A-F only; Every Spring)
Lectures examine clinical management of specific orthodontic problems; and principles and procedures in preventative, interceptive, and corrective orthodontics examined through case analysis and treatment planning. Lab covers practical applications of developing occlusion analysis; and fundamentals of orthodontic appliances.

DDS 6181. Orthodontic Clinic Rotation. (1 cr. ; S-N or Audit; Every Fall & Spring)
Diagnosis, treatment timing, and treatment objectives; skills required to perform orthodontic procedures.

DDS 6211. Introduction to Oral Biology. (; 0.6 cr. ; S-N only; Every Spring)
Biology of the mouth. Broad overview of current information on the following topics: plaque microbiology, bone growth and remodeling, oral diseases, bad breath, and amalgam fillings. Prereq-1st yr [DDS or DT student].

DDS 6212. Topics in Dental Biochemistry. (; 1.1 cr. ; A-F only; Every Spring)
Biological, chemical, and biochemical phenomena in oral cavity and their interrelationships. Biological/chemical basis of dental caries. How saliva, dental plaque, and plaque fluid interact with and impact caries process. Metabolic handling, anticaries mechanisms of fluoride. prereq: 1st yr [DDS or DT student]

DDS 6213. Microbiology for Dental Students. (; 2 cr. [max 4 cr.] ; A-F or Audit; Every Spring)
General microbiology, bacterial pathogenesis, virology. Oral microbial ecology, dental caries, periodontal diseases. Evaluation of current literature through student essays. Discussions on methodology. Prereq-In DDS program.

DDS 6214. General Histology. (; 4 cr. ; A-F or Audit; Every Fall)
Structure/function of cells, tissues, and organs. Prereq-Accepted into DDS program.

DDS 6215. Dental Pharmacology. (; 3 cr. ; A-F only; Every Spring)
Concepts of drug action/tools for lifelong learning. Principles of drug action. Drugs that act on various bodily systems. prereq: Must be in DDS program

DDS 6216. Integrated Case Based Seminars. (1 cr. ; S-N or Audit; Every Spring)
Seminars for second year dental students to discuss various dental cases and prepare them for entering clinic earlier in the curriculum.

DDS 6231. Physical Evaluation I. (; 2 cr. ; A-F only; Every Summer)
Concepts of diagnosis and patient evaluation for exam of patients in various adult clinical programs in School of Dentistry. prereq: 1st yr [DDS or DT student]

DDS 6232. Physical Evaluation II. (; 2 cr. [max 2.2 cr.] ; A-F or Audit; Every Spring)
Lecture and case-based series designed to review physical evaluation of common medical-systemic problems of patient management and care based on principles of medical management, thorough evaluation, and recognition of the medically compromised patient. Includes acute management of medical emergencies in dental practice.

DDS 6233. Oral and Maxillofacial Radiology. (; 2 cr. ; A-F only; Every Spring)
General principles of radiology, radiation physics, dosimetry, biology, radiation protection, regulations and recent concepts of imaging.

DDS 6234. Radiographic Interpretation. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall)
Dental record keeping. Documentation/analysis of medical/clinical findings. Patient's rights, informed consent. Radiographic interpretation of deviations from normal. Prereq-In DDS program.

DDS 6235. Oral Radiology Preclinical Lab I. (; 1 cr. ; S-N only; Every Fall)
Preclinical demonstration-participation phases in radiographic technique, using mounted human skulls. Prereq-In DDS program.

DDS 6241. Oral Medicine/Diagnosis Clinic I. (1 cr. ; S-N only; Every Spring)
Comprehensive patient evaluation. Medical history/interview, general physical exam/ evaluation, head/neck exam, intraoral exam, occlusion-TMJ exam. Periodontal, dental, and radiological exams. Prereq-3rd yr DDS student.

DDS 6242. Oral Medicine/Diagnosis II. (1 cr. ; A-F only; Every Spring)
Comprehensive patient evaluation. Medical history/interview, general physical exam/ evaluation, head/neck exam, intraoral exam, occlusion-TMJ exam. Periodontal, dental, and radiological exams. Prereq-DDS student.

DDS 6243. Oral Radiology Clinic. (0.5 cr. ; S-N only; Every Fall & Spring)
Radiographing dental school patients, radiographic interpretations, panoramic/ extraoral technique seminars, quality assurance procedures. Prereq-3rd yr DDS student.

DDS 6244. Oral Radiology Clinic II. (0.5 cr. ; S-N only; Every Spring)
This course consists of radiographing dental school patients, radiographic interpretations, panoramic and extraoral technique seminars and quality assurance procedures.

DDS 6245. Oral Radiology Clinic D3 Summer. (1 cr. ; S-N only; Every Summer)
Radiographing dental school patients, radiographic interpretations, panoramic/ extraoral technique seminars, quality assurance procedures. prereq:3rd yr DDS student.

DDS 6246. Oral Radiology Clinic D3 Fall. (1 cr. ; S-N only; Every Fall)
Radiographing dental school patients, radiographic interpretations, panoramic/ extraoral technique seminars, quality assurance procedures. prereq:3rd yr DDS student.

DDS 6247. Oral Radiology Clinic D3 Spring. (1 cr. ; A-F only; Every Spring)
Radiographing dental school patients, radiographic interpretations, panoramic/ extraoral technique seminars, quality assurance procedures. prereq: 3rd yr DDS student

DDS 6251. Oral Histology and Embryology and Medical Genetics. (; 2 cr. [max 3 cr.] ; A-F only; Every Spring)

Embryologic development and histologic structure of tissues in the head, face, and mouth with emphasis on clinical correlations, principles of medical genetics, complex traits of the orofacial region, and genetic contributions to oral diseases.

DDS 6252. Oral and Maxillofacial Pathology. (; 3 cr. [max 3.1 cr.] ; A-F or Audit; Every Fall & Spring)
Recognizing, diagnosing, and managing diseases with maxillofacial, oral, or dental manifestations. Deductive approaches to identifying associated diseases.

DDS 6253. General Pathology for the Dental Student. (2 cr. [max 5 cr.] ; A-F only; Every Summer)
General Pathology provides students with a basic understanding of the foundational aspects of pathology, such as inflammation, tissue injury and repair, and neoplasia. After finishing this course, students will understand in general how disease impacts body tissues and organ systems, and will recognize common abnormal patterns produced by oral and systemic diseases. This course precedes the Systemic Pathology course (DDS 6254) given in the DDS2 fall semester, and provides the foundational knowledge necessary for understanding systems-based pathology.

DDS 6254. Systemic Pathology for the Dental Student. (2 cr. ; A-F only; Every Fall)
Systemic Pathology provides students with a basic understanding of the causes, mechanisms, and effects of human disease in all organ systems. After finishing this course, students will understand how diseases impact patients, and will be able to modify treatment and care accordingly. Students will also be able to recognize common oral manifestations of systemic diseases in order to provide more complete patient care. This course is preceded by the General Pathology course (DDS 6253) given in the DDS2 summer semester.

DDS 6271. TMD & Orofacial Pain. (; 1 cr. ; A-F or Audit; Every Fall & Summer)
Evaluation and differential diagnosis of temporomandibular and orofacial pain disorders. Rehabilitation treatment strategies for the most common TM disorders, including splints, physical therapy, behavioral therapy, and medications.

DDS 6310. Introduction to Dental Clinics. (1 cr. [max 2 cr.] ; S-N or Audit; Every Fall)
This course is designed to expose the first year doctor of dental surgery students to clinical activities early in their dental training. It will allow students to become oriented to the clinics, dispensary personnel, clinic supplies and patient communication. Students will be trained in infection control and the care of standard dental equipment and instruments. It will also provide modeling of appropriate professional demeanor, attire and interactions with other dentists, student operators and patients. Each student will be assigned to 10 - 3 hours assisting sessions.

DDS 6314. Treatment Planning. (; 3 cr. ; S-N or Audit; Every Spring)
Management of dental patients. Process/ development of comprehensive treatment plans. Treatment planning in private-practice setting.

DDS 6315. Clinical Geriatric Dentistry Rotation. (0 cr. ; S-N only; Every Fall)
The purpose of this rotation is to complement and reinforce information provided in didactic course DDS 6338 Geriatrics and Special Needs Patient Care to enable upper level students time to interact with older adults with complex dental, medical and psycho-social concerns during routine dental appointments.

DDS 6316. Comprehensive Care Clinic D3 Summer. (2 cr. ; S-N only; Every Summer)
Application of clinical knowledge, skills, and the principles of care to the comprehensive assessment, diagnosis, treatment planning, treatment, and management of patients.

DDS 6317. Comprehensive Care Clinic D3 Fall. (2 cr. ; S-N only; Every Fall)
Application of clinical knowledge, skills, and the principles of care to the comprehensive assessment, diagnosis, treatment planning, treatment, and management of patients.

DDS 6318. Comprehensive Care Clinic D3 Spring. (2 cr. ; S-N only; Every Spring)
Application of clinical knowledge, skills, and the principles of care to the comprehensive assessment, diagnosis, treatment planning, treatment, and management of patients.

DDS 6319. Comprehensive Care Clinic D4 Summer. (2 cr. ; S-N only; Every Summer)
Patient management skills, Diagnosis, treatment planning, delivery of comprehensive care, efficient use of clinic time.

DDS 6320. Comprehensive Care Clinic D4 Fall. (2 cr. ; S-N or Audit; Every Fall)
Patient management skills, diagnosis, treatment planning, delivery of comprehensive care, efficient use of clinic time.

DDS 6321. Comprehensive Care Clinic D4 Spring. (2 cr. ; S-N only; Every Spring)
Patient management skills, diagnosis, treatment planning, delivery of comprehensive care, efficient use of clinic time.

DDS 6322. Treatment Planning Clinic II. (; 1 cr. ; A-F or Audit; Every Spring)
Devise initial plan from established database; make case presentation; develop final treatment plan, informed consent and appointment plan; and make financial arrangements. prereq: Patient Management II Resource Workbook

DDS 6325. Dental Professional Development I. (; 2 cr. ; S-N only; Every Fall)
First of a series that prepares the student in professionalism and practice management. Uses self-assessment and strategic planning to lead students to identify personal and professional aspirations. Four sequential levels of learning creating progressively higher levels of competence using a blended-learning format including online education, simulations and self-directed learning.

DDS 6326. Dental Professional Development II. (1 cr. ; S-N only; Every Summer)
Focuses on Career Planning, Personal Strategic Planning, Personal Finance and Debt Management. Students apply principles and tools learned to their future professional practice and career.

DDS 6327. Dental Professional Development III. (1 cr. [max 2 cr.] ; S-N only; Every Fall)
This course focuses on preparing the student in professionalism, critical thinking, problem solving and practice management. It uses a blended-learning format that includes on-line education, simulations and self-directed learning. It lays the groundwork for students to develop day-to-day leadership skills needed to operate a successful dental practice.

DDS 6328. Dental Professional Development IV. (1 cr. ; S-N only; Every Summer)
Fourth and final course sequence in Dental Professional Development. Focuses on completing business plans and refining personal and professional strategic plans applying skills learned in the previous three courses.

DDS 6331. Dental Public Health I. (2 cr. ; S-N only; Every Fall)
Public health approach to disease. Tools to address public oral health needs. Oral health care in United States. Factors impacting supply/demand for dental services. Critical thinking regarding dental care delivery. Prereq-1st yr in DDS Program.

DDS 6332. Dental Public Health II. (; 1 cr. ; S-N only; Every Spring)
Aspects/principles of prevention. Risk assessment, screening, dietary analysis. Models of health education, health promotion. How dental profession influences public. Student groups research/present materials about oral health topic.

DDS 6333. Understanding Health Systems. (; 1 cr. ; S-N only; Every Summer)
Understanding Health Systems is a third year Doctor of Dental Surgery course, under the division of Primary Care.

DDS 6336. Dental Practice Management. (2 cr. ; S-N only; Every Spring)
Skills in planning, organizing, leading, and controlling the clinical, business, and human aspects of dental practice.

DDS 6337. Current Legal Issues for the New Dentist. (2 cr. ; S-N only; Every Fall & Summer)
Legal issues: regulation of the profession, associateships, purchasing a dental practice, starting a practice, dental risk management, contract law considerations. Prereq-In DDS program.

DDS 6338. Special Issues in Oral Health Care: Geriatric, Hospital, and Special Needs Patient Dentistry. (2 cr. ; S-N only; Every Summer)
Delivering optimal oral health care to older adults and patients with special needs. Clinical management of patients with social, psychological, physiological, and dental characteristics. Dentistry in hospital setting. Prereq-4th yr DDS program student.

DDS 6339. Emergency Preparedness. (; 1 cr. [max 2 cr.] ; S-N only; Every Summer)
Emergency preparedness for the dental office with emphasis on teamwork skills. Online module, lectures, and participation in simulated realistic disaster scenarios with interprofessional teams. Prereq-Must be enrolled in a School of Dentistry program.

DDS 6340. Medical Emergencies and Patient Safety in the Dental Clinical Environment. (0.5 cr. ; S-N only; Every Spring)
Hands-on/didactic training in recognizing/ managing medical emergencies. Patient safety/ reduction of risks for accidental patient injury in dental clinical environment.

DDS 6341. Dental Public Health & Access to Oral Health Elective. (; 2 cr. ; A-F only; Every Fall)
This course uses examples and issues in dentistry and dental public health as a strategy for understanding health policy and public health program development at the local, state, and national levels. This is a multi-institutional elective about health policy and advocacy ? delivered remotely for Harvard, UNC, ECU, and UMN students.

DDS 6344. Dental Service-Learning DDS3 Summer. (1 cr. ; S-N only; Every Summer)
This is an elective clinical experience course for DDS and ADT students only. Dental Service-Learning is designed to enable students to experience providing oral health care to patient populations who do not have regular access to such care. Clinical experiences in restorative dentistry, emergency dental care, and oral and maxillofacial surgery will be provided under the supervision of University of Minnesota School of Dentistry Faculty.

DDS 6345. Dental Service-Learning DDS3 Fall. (1 cr. ; S-N only; Every Fall)
This is an elective clinical experience course for DDS and ADT students only. Dental Service-Learning is designed to enable students to experience providing oral health care to patient populations who do not have regular access to such care. Clinical experiences in restorative dentistry, emergency dental care, and oral and maxillofacial surgery will be provided under the supervision of University of Minnesota School of Dentistry Faculty.

DDS 6346. Dental Service-Learning DDS3 Spring. (1 cr. ; S-N only; Every Spring)
This is an elective clinical experience course for DDS and ADT students only. Dental Service-Learning is designed to enable students to experience providing oral health care to patient populations who do not have regular access to such care. Clinical experiences in restorative dentistry, emergency dental care, and oral and maxillofacial surgery will be provided under the supervision of University of Minnesota School of Dentistry Faculty.

DDS 6347. Dental Service-Learning DDS4 Summer. (1 cr. ; S-N only; Every Summer)
This is an elective clinical experience course for DDS and ADT students only. Dental Service-Learning is designed to enable students to experience providing oral health care to patient populations who do not have regular access to such care. Clinical experiences in restorative dentistry, emergency dental care, and oral and maxillofacial surgery will be provided under the supervision of University of Minnesota School of Dentistry Faculty.

DDS 6348. Dental Service-Learning DDS4 Fall. (1 cr. ; S-N only; Every Fall)
This is an elective clinical experience course for DDS and ADT students only. Dental Service-Learning is designed to enable students to experience providing oral health care to patient populations who do not have regular access to such care. Clinical experiences in restorative dentistry, emergency dental care, and oral and maxillofacial surgery will be provided under the supervision of University of Minnesota School of Dentistry Faculty.

DDS 6349. Dental Service-Learning DDS4 Spring. (1 cr. ; S-N only; Every Spring)
This is an elective clinical experience course for DDS and ADT students only. Dental Service-Learning is designed to enable students to experience providing oral health care to patient populations who do not have regular access to such care. Clinical experiences in restorative dentistry, emergency dental care, and oral and maxillofacial surgery will be provided under the supervision of University of Minnesota School of Dentistry Faculty.

DDS 6360. Introduction to Outreach Experiences. (; 0 cr. ; S-N only; Every Spring)
Provide dental care to underserved populations in various clinical settings throughout Minnesota.

DDS 6361. Outreach Experiences D4 Summer. (; 2 cr. ; S-N only; Every Summer)
Dental care/involvement in community health promotion/service events to under-served populations throughout Minnesota.

DDS 6362. Outreach Experiences D4 Fall. (2 cr. ; S-N only; Every Fall)
Provide dental care/involvement in community health promotion/service events to underserved populations in various clinical settings throughout Minnesota. Prereq-Doctor of Dental Surgery Program.

DDS 6363. Outreach Experiences D4 Spring. (; 2 cr. ; S-N only; Every Spring)
Dental care/involvement in community health promotion/service events to under-served populations throughout Minnesota.

DDS 6411. Biomaterials Science I. (; 1 cr. ; A-F only; Every Spring)
Prosthodontics, operative dentistry. Students apply scientific principles to selection/utilization of biomaterials, and evaluate a recent research publication. prereq: in DDS program.

DDS 6412. Biomaterials Science II. (1 cr. ; A-F only; Every Summer)
This course continues where Biomaterials Science I leaves off instructing students on additional applications of scientific principles in the selection and utilization of dental biomaterials.

DDS 6431. Oral Anatomy I. (; 2 cr. [max 4 cr.] ; A-F or Audit; Every Fall)
Morphological characteristics of human dentition and associated contiguous structures. Foundational knowledge applied to situations in general clinical practice. Lectures, lab. Prereq-1st yr DDS student.

DDS 6432. Oral Anatomy Laboratory I. (; 2 cr. ; A-F or Audit; Every Fall)
Application of oral anatomy. Fixed prosthodontic lab techniques. Fundamentals of tooth preparation. Prereq-1st yr DDS student.

DDS 6433. Introduction to Psychomotor Skill Development I and II. (0.7 cr. [max 1.4 cr.] ; S-N only; Every Fall)
Virtual-reality-based training for psychomotor skills. Mirror skills, proper ergonomics. Preparation of intra-coronal activity. Prereq-1st yr DDS student.

DDS 6434. Operative Dentistry I. (; 2 cr. ; A-F or Audit; Every Spring)
Restoration of small caries lesions, cervical abrasion lesions, and attrition defects. Practical aspects of caries risk assessment, lesion identification, and comprehensive caries management. Emphasizes indications for surgical intervention, principles of restoration design, and rationale for various design features. Prereq-Dental Anatomy, Biomaterials.

DDS 6435. Operative Dentistry I Laboratory. (; 2 cr. [max 2.3 cr.] ; A-F or Audit; Every Spring)
Restoration of small caries lesions, cervical abrasion lesions, and attrition defects in clinical simulation setting. Emphasizes designing/ executing retentive/resistant restorations, conserving tooth structure, and operating in clinically relevant orientations. Self-evaluation techniques, discriminatory skills. Prereq-Dental Anatomy, Biomaterials.

DDS 6436. Operative Dentistry II. (; 2 cr. [max 2.1 cr.] ; A-F only; Periodic Fall, Spring & Summer)
Diagnosis, treatment planning, and treatment of moderate to severe phase of dental caries. Use of dental amalgam, cast gold, composite resin, and cast porcelain. Aesthetic modification to teeth. Prereq-In DDS program.

DDS 6437. Operative Dentistry II Lab. (; 3 cr. ; A-F only; Periodic Fall, Spring & Summer)
Exercises in treatment of moderate to severe phase of dental caries utilizing dental amalgam, cast gold, composite resin, and cast porcelain. Aesthetic modifications to teeth. Prereq-In DDS program.

DDS 6438. Operative Dentistry III. (; 3 cr. ; A-F or Audit; Every Fall)
Integration/application of skills/knowledge in diagnosis, treatment planning, and treatment. Clinical setting. Prereq-Operative Dentistry [I, II], Operative Dentistry [I, II] Lab.

DDS 6439. Evidence Based Restorative. (1 cr. [max 1.4 cr.] ; A-F only; Every Fall)
Contemporary aspects of operative Dentistry. Students, working in groups, answer clinical

questions. Evidence-based approach. Prereq-3rd yr DDS student.

DDS 6441. Operative Dentistry Clinic II. (; 4 cr. ; A-F only; Every Fall & Spring)
Students, under direction of instructor, place single tooth restorations on patients, perform dental exams, and prepare treatment plans for patients with consultation from Operative Dentistry Division faculty. prereq: Operative Dentistry [I, II, III], Operative Dentistry [I, II] lab

DDS 6442. Operative Dentistry Clinic V. (7.5 cr. ; A-F only; Every Spring)
Clinical application of operative dentistry diagnosis, treatment planning, clinical judgment, and technical skills. Prereq-Operative Dentistry I, II, III, Operative Dentistry I and II Lab.

DDS 6443. Operative Dentistry Clinic D3 Summer. (2 cr. ; S-N only; Every Summer)
Third year dental students, under direction of instructor, place single tooth restorations on patients, perform dental exams, and prepare treatment plans for patients with consultation from Operative Dentistry Division faculty. prereq: Operative Dentistry [I, II, III], Operative Dentistry [I, II] lab

DDS 6444. Operative Dentistry Clinic D3 Fall. (2 cr. ; S-N only; Every Fall)
Third year dental students, under direction of instructor, place single tooth restorations on patients, perform dental exams, and prepare treatment plans for patients with consultation from Operative Dentistry Division faculty. prereq: Operative Dentistry [I, II, III], Operative Dentistry [I, II] lab

DDS 6445. Operative Dentistry Clinic D3 Spring. (2 cr. ; A-F only; Every Spring)
Third year dental students, under direction of instructor, place single tooth restorations on patients, perform dental exams, and prepare treatment plans for patients with consultation from Operative Dentistry Division faculty. prereq: Operative Dentistry [I, II, III], Operative Dentistry [I, II] lab

DDS 6446. Operative Dentistry Clinic D4 Summer. (2 cr. ; S-N only; Every Summer)
4th year dental student clinical application of operative dentistry diagnosis, treatment planning, clinical judgment, and technical skills. Prereq: Operative Dentistry I, II, III, Operative Dentistry I and II Lab.

DDS 6447. Operative Dentistry Clinic D4 Fall. (2 cr. ; S-N or Audit; Every Fall)
4th year dental student clinical application of operative dentistry diagnosis, treatment planning, clinical judgment, and technical skills. Prereq: Operative Dentistry I, II, III, Operative Dentistry I and II Lab.

DDS 6448. Operative Dentistry Clinic D4 Spring. (3 cr. ; A-F only; Every Spring)
4th year dental student clinical application of operative dentistry diagnosis, treatment planning, clinical judgment, and technical skills. Prereq: Operative Dentistry I, II, III, Operative Dentistry I and II Lab.

DDS 6451. Introduction to Endodontics Lecture and Laboratory. (3 cr. ; A-F or Audit; Every Summer)
Study of morphology, physiology, and pathology of the human dental pulp and periradicular tissues.

DDS 6455. Endodontic Dentistry Clinic D3 Summer. (1 cr. ; S-N only; Every Summer)
Endodontic dentistry clinic practice for third year dental students.

DDS 6456. Endodontic Dentistry Clinic D3 Fall. (1 cr. ; S-N only; Every Fall)
Endodontic clinical practice for third year dental students.

DDS 6457. Endodontic Dentistry Clinic D3 Spring. (1 cr. ; A-F or Audit; Every Spring)
Endodontic clinical practice for third year dental students.

DDS 6458. Endodontic Dentistry Clinic D4 Summer. (1 cr. ; S-N only; Every Summer)
Endodontic clinical practice for fourth year dentistry students.

DDS 6459. Endodontic Dentistry Clinic D4 Fall. (1 cr. ; S-N or Audit; Every Fall)
Endodontic clinical practice for fourth year dental students.

DDS 6460. Endodontic Dentistry Clinic D4 Spring. (1 cr. ; A-F or Audit; Every Spring)
Endodontic clinical practice for fourth year dentistry students.

DDS 6461. Endodontic Clinic D3. (; 2 cr. ; S-N only; Every Fall & Spring)
Clinical practice for endodontics.

DDS 6462. Endodontic Clinic. (2 cr. ; A-F or Audit; Every Spring)
Clinical practice for endodontics.

DDS 6468. Preclinical Prosthodontics Technique Lecture I. (1 cr. ; S-N or Audit; Every Spring)
This course will provide students with fundamental knowledge and procedural skills necessary of managing simulated patient cases that require full crown restoration.

DDS 6469. Preclinical Prosthodontics Technique Laboratory I. (1 cr. [max 2 cr.] ; S-N or Audit; Every Spring)
This course will provide students with fundamental knowledge and procedural skills necessary of managing simulated patient cases that require full crown restoration. Lab sessions will allow students time to practice skills on typodonts.

DDS 6471. Preclinical Prosthodontics Single Crown Restoration Lecture II. (; 1 cr. [max 2 cr.] ; A-F or Audit; Every Summer)
Provides fundament knowledge/procedural skills necessary for managing simulated patient cases that require full crown restoration.

DDS 6472. Preclinical Prosthodontic Single Crown Restoration Technique Laboratory II. (; 2 cr. [max 4 cr.] ; A-F or Audit; Every Summer)
Lab techniques, fundamentals of tooth preparation.

DDS 6473. Preclinical Prosthodontic Technique Lecture III. (; 1 cr. [max 1.5 cr.] ; A-F or Audit; Every Fall)
Fixed, removable, occlusion topics.

DDS 6474. Preclinical Prosthodontics Technique Laboratory III. (; 2 cr. [max 2.1 cr.] ; A-F or Audit; Every Fall)
Fixed, removable, occlusion topics.

DDS 6475. Preclinical Prosthodontics Techniques Lecture IV. (; 2 cr. ; A-F only; Every Fall)
Theory/practice in complete denture construction. Diagnosis, treatment planning/sequencing for edentulous patient. Instruments, terminology, principles, technical/clinical procedures. Prereq-DDS program.

DDS 6476. Preclinical Prosthodontic Technique Laboratory IV, Complete Dentures. (; 2 cr. [max 2.3 cr.] ; A-F or Audit; Every Fall)
Technical/clinical laboratory procedures used for fabrication/replacement of teeth with complete dentures. Prereq-DDS program.

DDS 6477. Preclinical Prosthodontics Technique Lecture V, Removable Partial Dentures. (; 2 cr. [max 2.5 cr.] ; A-F only; Every Spring)
Principles/philosophies of removable partial denture prosthodontics. Design/fabrication of removable prosthesis to replace teeth for partially edentulous patient. Lecture format, plus an interactive seminar.

DDS 6478. Preclinical Prosthodontics Technique Laboratory V, Partial Dentures. (; 2 cr. [max 2.2 cr.] ; A-F only; Every Spring)
Technical/clinical laboratory procedures used for fabrication/replacement of teeth with partial dentures.

DDS 6479. Clinical Occlusion. (; 1 cr. [max 2 cr.] ; A-F or Audit; Every Spring)
Clinical variation in occlusion encountered in a typical clinical setting. Guidelines to manage this variation. prereq: Enrolled in dentistry program

DDS 6481. Fixed Prosthodontics Clinic II. (3 cr. ; A-F only; Every Spring)
Diagnosis, design, construction of fixed prosthodontic cases.

DDS 6482. Removable Prosthodontics Clinic II. (3 cr. ; A-F only; Every Spring)
Clinical practice in partial and complete removable denture prosthodontics for DDS third-year students

DDS 6483. Fixed Prosthodontics Clinic IV. (7.5 cr. ; A-F only; Every Spring)
Diagnosis, design, construction of fixed prosthodontic cases.

DDS 6484. Removable Prosthodontics Clinic IV. (4 cr. ; A-F only; Every Spring)
Clinic practice in complete/partial removable denture prosthodontics.

DDS 6485. PASS Prosthodontic Technique I. (4 cr. ; A-F or Audit; Every Spring)
Principles and philosophies of removable partial denture prosthodontics. Design and fabrication of removable prosthesis to replace teeth for partially edentulous patient. Lecture and interactive seminar.

DDS 6487. PASS (Program for Advanced Standing Students) Prosthodontic

Technique 2. (4 cr. ; A-F or Audit; Every Summer)
Pre-clinical didactic and laboratory course designed to provide students with the knowledge and procedural skills necessary for managing simulated patient cases requiring full crown restoration.

DDS 6489. Prosthodontics: Early Clinical Experience. (1 cr. ; S-N or Audit; Every Spring)
The purpose of the course is to provide the second-year dental student with early clinical experiences, specifically in dentures fabrication, that is performed under the supervision of clinical faculty who will provide instruction, assistance, and immediate feedback.

DDS 6491. Preclinical Prosthodontics Technique Lecture VI. (2 cr. ; A-F only; Every Summer)
Implanting fixed/removable protocols. Principles of restoring damaged teeth. prereq: 5901 through 5910.

DDS 6492. Preclinical Prosthodontics Techniques Laboratory VI. (1 cr. ; A-F only; Every Summer)
Implanting fixed/removable protocols. Principles of restoring damaged teeth. Prereq-5901 through 5910.

DDS 6493. Prosthodontics I. (1 cr. [max 2 cr.] ; A-F only; Every Spring)
Links preclinical/clinical areas. Treatment planning for abutments, retainers, and pontics. Design principles for porcelain fused to metal restorations, pontic designs, occlusion. Prereq-Fundamentals of prosthodontics shape/color, aesthetics of anterior prosthodontics.

DDS 6494. Global and Integrated Competency Assessment Course. (1 cr. ; S-N only; Every Spring)
Global/integrated assessment of didactic/ clinical competency for 4th year DDS students. Results of assessment shall be used to establish/maintain standards/competency of University of Minnesota, School of Dentistry.

DDS 6495. Oral & Maxillofacial Surgery Honors Elective Course. (; 1 cr. ; S-N only; Every Fall, Spring & Summer)
This course provides Doctor of Dental Surgery students the opportunity to participate in a week long externship experience in the Oral & Maxillofacial clinic at the University of MN, School of Dentistry. Students will be shadowing the OMS Residents as they care for patients. This includes evaluation and management of a surgical patient, pre- & post- operative care, and treatment planning.

DDS 6496. Predoctoral Prosthodontic Honors Course. (; 1 cr. ; S-N only; Every Fall & Spring)
Clinical, laboratory, and seminar based course for senior dental honors students. Theory and practice in complete denture construction and implant restoration.

DDS 6497. Fixed Prosthodontic Clinic D3 Summer. (1 cr. ; S-N only; Every Summer)
Third year dental students diagnosis, design, construction of fixed prosthodontic cases.

DDS 6498. Removable Prosthodontics Clinic D3 Summer. (1 cr. ; S-N only; Every Summer)
Clinical practice in partial and complete removable denture prosthodontics for third year DDS students.

DDS 6499. Fixed Prosthodontics Clinic D3 Fall. (1 cr. ; S-N only; Every Fall)
Third year dental students diagnosis, design, construction of fixed prosthodontic cases during Fall semester.

DDS 6501. Removable Prosthodontics Clinic D3 Fall. (1 cr. ; S-N only; Every Fall)
Clinical practice in partial and complete removable denture prosthodontics for third year DDS students fall semester.

DDS 6502. Fixed Prosthodontics Clinic D3 Spring. (3 cr. ; A-F only; Every Spring)
Third year dental students diagnosis, design, construction of fixed prosthodontic cases in clinic Spring semester.

DDS 6503. Removable Prosthodontics Clinic D3 Spring. (3 cr. ; A-F only; Every Spring)
Clinical practice in partial and complete removable denture prosthodontics for third year DDS students, spring semester.

DDS 6504. Fixed Prosthodontics Clinic D4 Summer. (1 cr. ; S-N only; Every Summer)
D4 summer term of diagnosis, design, construction of fixed prosthodontic clinic cases.

DDS 6505. Removable Prosthodontic Clinic D4 Summer. (1 cr. ; S-N only; Every Summer)
D4 summer term of complete and partial removable denture prosthodontic clinic cases.

DDS 6506. Fixed Prosthodontics Clinic D4 Fall. (1 cr. ; S-N or Audit; Every Fall)
D4 fall term of diagnosis, design, construction of fixed prosthodontic clinic cases.

DDS 6507. Removable Prosthodontic Clinic D4 Fall. (1 cr. ; S-N or Audit; Every Fall)
D4 fall term of complete and partial removable denture prosthodontic clinic cases.

DDS 6508. Fixed Prosthodontic Clinic D4 Spring. (3 cr. ; A-F only; Every Spring)
D4 spring term of diagnosis, design, construction of fixed prosthodontic clinic cases.

DDS 6509. Removable Prosthodontic Clinic D4 Spring. (3 cr. ; A-F only; Every Spring)
D4 spring term of complete and partial removable denture prosthodontic clinic cases.

DDS 6588. Common Hope: Short-term Clinical Experience in Guatemala Elective. (0 cr. ; S-N only; Every Spring)
Students spend up to two weeks working with Common Hope in Guatemala providing oral health care in cities of Antiqua/San Rafael. Clinical care given under direct supervision of School of Dentistry faculty licensed dentist.

DDS 6601. Phillips Neighborhood Elective Volunteer Experience. (0 cr. ; No Grade Associated; Every Fall, Spring & Summer)
Opportunity to observe/assist in provision of health care services to populations diverse in age, ethnicity, social environment. Experience unique clinical settings.

DDS 6605. Advanced Practice Management Elective. (0-2 cr. ; S-N only; Every Spring)
Fundamentals of business management related to maintaining dental practice. Components include economics, planning practice philosphy, operational decisions, financial decisions, finanacial analysis, business taxation, evaluation.

DDS 6606. Rural Dentistry Scholars Elective. (1 cr. ; S-N only; Every Summer)
The Rural Dentistry Scholars Elective course (RDSP) is for second and third year DDS students and Dental Therapy students selected to participate in the MN Collaborative Rural Oral Health Project (MN-CROHP) to address the rural dental workforce issues. Students spend 3.5 weeks in a rural dental practice in selected counties in MN under the mentorship of a rural dentist. During the same period they participate in community activities for oral health promotion and disease prevention instruction during community events and in K-12 schools and network with other health care providers in the community. Through a grant, students receive stipend and receive reimbursement for housing and travel costs.

DDS 6607. Interprofessional Leadership and Facilitation Elective. (; 1 cr. ; S-N only; Every Fall)
Instruction on Kotter's 8-Step Process for leading change. Attend facilitator training associated with AHC course Foundations of Interprofessional Communication/Collaboration. Facilitate six small group sessions of first year students within AHC. prereq: Four-year DDS student

DDS 6611. Study Abroad Externship. (1-10 cr. [max 25 cr.] ; S-N only; Every Fall, Spring & Summer)
Short-term externship to become familiar with particular aspect of oral health or participate in international exchange program.

DDS 6613. Endodontic Topics for the General Dentist. (1 cr. ; S-N only; Every Fall & Spring)
Presentations on scientific/biologic basis for root canal therapy.

DDS 6614. Predoctoral Periodontal Honors. (; 2 cr. ; A-F only; Every Spring)
Surgical periodontics. Lab exercises, gingivectomy, modified widman flap, apically positioned flap with osseous recontouring, free gingival graft procedures. Surgically placed dental implants in aplastic madible. Students assist senior perio residents in surgery, perform surgery on their own patient.

DDS 6615. Oral and Maxillofacial Pathology Independent Study. (; 1 cr. [max 2 cr.] ; S-N or Audit; Every Fall & Spring)
Independent projects in oral and maxillofacial pathology designed by student and faculty. This elective covers primarily retrospective surgical pathology studies although active laboratory research may be possible.

DDS 6616. Advanced Simulation Clinic Elective I. (0.5 cr. ; S-N only; Every Fall, Spring & Summer)
Operative dental procedures. Psycho-motor skills for performing basic operative

preparations according to specifications of DentSim software. Prereq-DDS program.

DDS 6617. Advanced Simulation Clinic Elective II. (0.5 cr. ; S-N only; Every Fall, Spring & Summer)
Additional operative dental procedures. Psycho-motor skills for performing basic operative preparations according to specifications of DentSim software. Prereq-DDS program.

DDS 6619. Moderate Sedation Techniques. (; 0 cr. ; S-N only; Every Fall)
Planning/administration of moderate sedation via parenteral access (intravenous).

DDS 6621. Introduction to CAD/CAM Restorations. (2 cr. ; S-N only; Every Fall, Spring & Summer)
CAD/CAM in restorative dentistry. Emphasizes clinical aspects. Students deliver CAD/CAM restorations to patients.

DDS 6622. EBD: Advanced Dental Materials for Esthetic & Digital Applications. (1 cr. ; S-N only; Every Fall, Spring & Summer)
Advanced evidence-based aesthetic restorative materials/digital clinical modalities. Rationale of prescribing different esthetic/adhesive/digital treatment modalities. Selection of various dental materials based on scientific rationale. prereq: DDS program

DDS 6623. Oral Disease Clinic Elective. (0 cr. ; S-N only; Every Fall, Spring & Summer)
Students experience clinical oral pathology diseases not normally seen during dental clinic rotations. Students observe operator protocol, management, and referrals.

DDS 6624. Disaster 101 Elective. (1 cr. ; S-N only; Every Fall & Spring)
Disaster preparedness. Timeliness/quality of response. Students participate in simulated disaster scenarios in interprofessional teams. Prereq-In DDS program.

DDS 6625. Pediatric Dentistry Honors Elective. (; 0.5 cr. ; A-F only; Every Fall, Spring & Summer)
Didactic discussions/clinical sessions with pediatric patients requiring advanced dental treatment and/or advanced behavioral management skills.

DDS 6626. Orofacial Pain Clinic Elective. (1 cr. [max 2 cr.] ; S-N only; Every Fall, Spring & Summer)
Two days of observation in the Orofacial Pain Clinic while residents and faculty evaluate and manage patients with orofacial pain conditions. Students will gain working knowledge of patient interviewing skills, musculoskeletal exam of the head and jaw, jaw range of motion and function. They will also gain knowledge of how to prescribe and deliver dental appliances.

DDS 6627. Oral Pathology Clinical Pathologic Correlation. (1 cr. [max 4 cr.] ; S-N only; Every Fall & Spring)
This oral pathology elective has two parts, every week one clinical oral path case will be uploaded in the course website for students to review. Students will meet as a group once a month for discussion of the four cases. One student will introduce one case involving discussion of the history, clinical presentation, establishing a clinical differential diagnosis, discuss of next steps in diagnosis and treatment planning.

DDS 6628H. Pre-Doctoral Oral Surgery Honors. (; 2 cr. ; A-F only; Every Fall & Spring)
A School of Dentistry predoctoral honors clinical rotation in oral surgery for DDS students to provide the opportunity to advance the fundamental skills of oral surgery and to expose the student to more oral and maxillofacial surgery procedures.

DDS 6629. Pre-Dental Summer Research Training. (1 cr. ; S-N only; Every Summer)
Summer Research Opportunity for newly admitted DDS students.

DDS 6630. Dental Research Training. (2-6 cr. ; S-N or Audit; Every Summer)
Research project, written report.

DDS 6631. DDS/PhD Research Elective I. (2 cr. [max 6 cr.] ; S-N only; Every Fall, Spring & Summer)
Integrate research education with dental education. Attend labs one-half day per week, MNCrest seminar monthly, and oral biology student seminar weekly. Additional research time/credits may be permitted with approval of associate dean for academic affairs. Prereq-Students must be part of the MinnCResT program.

DDS 6632. DDS/PhD Research Elective II. (2 cr. [max 6 cr.] ; S-N only; Every Fall, Spring & Summer)
Integrate research education with dental education. Attend lab one-half day per week, MinnCResT seminar monthly, and oral biology student seminar weekly. Additional research time/credits may be permitted with approval of associate dean for academic affairs. Prereq-Students must be part of the MinnCResT Program.

DDS 6640. Curricular Practical Training Elective. (1 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
This course is an elective internship or employment to gain practical work experience, advance professional skills and explore career interests.

DDS 6900. Dental Clinic. (1-15 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Elective clinical course for students and adult special students who want additional clinical training in comprehensive dental care.

DDS 6912. DDS3 Alternate Clinic Summer. (; 1 cr. ; S-N only; Every Summer)
Due to the COVID-19 pandemic, the DDS3 students will augment the clinical curriculum with an alternative clinical course that introduces them into clinic using distance learning format. This course will require students to attend daily sessions provided by the clinical disciplines. Each student will be required to complete assignments for each alternative clinical based activity.

DDS 6915. DDS4 Alternate Clinic Summer. (; 1 cr. ; S-N only; Every Summer)
Due to COVID-10 pandemic, the DDS4 students will augment the clinical curriculum with an alternative clinical course using distance learning format. This course will require students to attend daily sessions provided by the clinical disciplines. Each student will be required to complete a daily assignment for each alternative clinical based activity.

DDS 6918. Evidence Based Dentistry. (; 2 cr. ; A-F only; Every Fall & Spring)
Background knowledge and skills to integrate the best research evidence with clinical expertise and patient preferences in making clinical decisions. Principles of evidence-based dentistry are discussed as well as their clinical application. Prereq-Must be in DDS program.

DDS 6922. DDS4 Alternative Clinical Curriculum. (; 1 cr. ; S-N only; Every Spring)
Starting on April 6, 2020, the DDS4 will augment the clinical curriculum with an alternative clinical course using distance learning format. This course will require students to attend daily sessions provided by the clinical disciplines. Each student will be required to complete a daily assignment for each alternative clinical based activity.

DDS 6931. Dental Clinic. (1-15 cr. ; S-N only; Every Fall, Spring & Summer)
Elective clinical course. Clinical training in comprehensive dental care.

DDS 7103. Biochemistry & Cell Biology for Dental Students. (4 cr. [max 8 cr.] ; A-F only; Every Fall)
This course covers four main classes of biomolecules (nucleic acids, proteins, carbohydrates, and lipids) and how they interact at the cellular and organismal levels. Dental students will learn about the building blocks that comprise these biomolecules and how they are produced and degraded as part of normal cellular growth processes. These basic biochemical concepts will then be transferred to cellular processes including enzyme kinetics, roles of salivary enzymes in health and disease, metabolic pathways, and regulation of cellular processes such as cell cycle progression and the blood-clotting cascade. Upon completion of the course, students will be able to explain the role of these biomolecules in health and disease, with an emphasis on oral health, as well as being capable of diagnosing diseases based on biochemical characterization of patient samples.

DDS 7112. Periodontology II-B: Technique. (1 cr. ; A-F or Audit; Every Summer)
Periodontology II-B: Technique (DDS 7112) is a one-credit course that is designed to introduce first-year dental students to the fundamentals of periodontal instrumentation and techniques. This course utilizes periodontal curriculum content introduced in Periodontology I (DDS 6111) and Periodontology II: Technique (DDS 6112). Periodontology II-B: Technique curriculum will continue to expand on the topics of DDS 6112, of teaching practical lab and clinical experiences to allow the student to attain

beginner skills in evaluation, prevention, and non-surgical treatment of gingival and periodontal disease as well as practical experience in infection control protocol and in the electronic health record.

DDS 7113. D2 Periodontology Clinic I. (1 cr. ; S-N only; Every Fall)
DDS 7113 is a one-credit course that is designed to build on periodontal curriculum content introduced in Periodontology I (DDS 6111) and Periodontology II and IIb (DDS 6112 and DDS 7112). DDS 7113 Fall 2019 curriculum will provide a one-time clinical rotation experience (previously part of DDS 6112). The clinical rotation will provide the second year dental student the opportunity to provide preventive/maintenance periodontal care for a School of Dentistry patient. This opportunity will also provide the dental student an experience in OSHA procedures, HIPPA protocol, infection control protocol, Axium charting, patient management, clinical dispensing procedures, and financial management of the appointment.

DDS 7114. D2 Periodontology Clinic II. (1 cr. ; S-N only; Every Spring)
The DDS 7114 is a one credit course that is designed to build on periodontal curriculum content introduced in Periodontology I (DDS 6111) and Periodontology II A, B, and fall clinic (DDS 6112, DDS 7112 and DDS 7113). DDS 7114 will provide a one-time clinical rotation experience. The clinical rotation in the 7th floor Periodontology Clinic will provide the dental student the opportunity to provide scaling and root planing/maintenance periodontal care for a School of Dentistry patient. This opportunity will also provide the dental student an experience in OSHA procedures, HIPPA protocol, infection control protocol, Axium charting, patient management, clinical dispensing procedures and financial management of the appointment.

DDS 7327. Dental Professional Development III B. (1 cr. ; S-N only; Every Spring)
This course continues from DDS 6327 (DDS3 Fall semester) and focuses on preparing the student in professionalism, critical thinking, problem solving and practice management. It uses a blended-learning format that includes on-line education, simulations and self-directed learning. It lays the groundwork for students to develop day-to-day leadership skills needed to operate a successful dental practice.

DDS 7328. Dental Professional Development IVb. (1 cr. ; S-N only; Every Fall)
This course is the last in a series of courses (DPD 1 ? 4b) taught throughout the dental education curriculum to prepare students for dental practice and incorporates ethics and professionalism in practice. The course provides a forum for the discussion of clinical scenarios in the context of ethics and professionalism using simulation, self- and peer assessment, active discourse, and reflection. Inquiry and reflective practice are essential to professional practice and the foundation of life-long learning.

Dutch (DTCH)

DTCH 5490. Topics in Dutch Literature. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall)
Topic may focus on a specific author, group of authors, genre, period, or subject matter. Topics specified in Class Schedule.

DTCH 5993. Directed Studies. (1-4 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. Prereq-instr consent, dept consent, college consent.

Early Modern Studies (EMS)

EMS 5500. Topics in Early Modern Studies. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Selected topics in early modern studies from various disciplinary perspectives/world regions. prereq: Grad student

EMS 8100. Workshop in Early Modern Studies. (; 1-3 cr. ; S-N only; Every Fall & Spring)
Lectures and workshops offered by various centers, departments, institutes, and libraries across disciplines on Twin Cities campus. Online reports and discussion. prereq: instr consent

EMS 8250. Seminar in Early Modern Studies. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Current research and debates in early modern studies. Theoretical approaches to major questions shaping seminar's subject matter.

EMS 8500. Topics in Early Modern Studies. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Selected topics in early modern studies from various disciplinary perspectives and world regions. prereq: Grad student

EMS 8993. Directed Study. (; 1-6 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Students work on tutorial basis. Guided individual reading or study. prereq: Grad student

Earth Sciences (ESCI)

ESCI 5102. Climate Change and Human History. (; 3 cr. ; Student Option; Spring Even Year)
Causes of long-/short-term climate change. Frequency/magnitude of past climate changes, their geologic records. Relationship of past climate changes to development of agrarian societies and to shifts in power among kingdoms/city-states. Emphasizes last 10,000 years. prereq: 1001 or equiv or instr consent

ESCI 5201. Time-Series Analysis of Geological Phenomena. (; 3 cr. ; A-F or Audit; Periodic Fall)
Time-series analysis of linear and nonlinear geological and geophysical phenomena. Examples drawn from ice age cycles, earthquakes, climatic fluctuations, volcanic eruptions, atmospheric phenomena, thermal convection and other time-dependent natural phenomena. Modern concepts of nonlinear dynamics and complexity theory applied to geological phenomena. prereq: Math 2263 or instr consent

ESCI 5203. Mineral and Rock Physics. (; 3 cr. ; Student Option; Periodic Spring)
Physical properties of minerals and rocks as related to the composition and dynamics of the Earth's crust, mantle, and core. prereq: 2201, Phys 1302

ESCI 5204. Geostatistics and Inverse Theory. (; 3 cr. ; Student Option; Fall Odd Year)
Statistical treatment of geological and geophysical data. Statistical estimation. Stochastic processes/fields. Non-linear/ non-assumptive error analysis. Cluster analysis. Eigenvalue-eigenvector methods. Regional variables. Correlograms and kriging. Theoretical framework of linear geostatistics and geophysical inverse theory. prereq: Stat 3011 or instr consent

ESCI 5302. Isotope Geology. (; 3 cr. ; A-F or Audit; Every Fall)
Theory and uses of radioactive, radiogenic, and stable isotopes in geology. Radioactive dating, geothermometry, and tracer techniques in geologic processes. prereq: 3303W or instr consent

ESCI 5331. Hydrologic Modeling. (3 cr. ; Student Option; Spring Even Year)
Models are indispensable tools in hydrology that come in many shapes, forms, and sizes. The hydrological knowledge and computational skills needed for each can thus greatly vary. Students will be introduced to different hydrologic modeling approaches through hands-on examples (running simulations) and through ?looking under the hood? (exposure to numerical methods and coding techniques). The goal is not to become an expert in every type of hydrological model, but it is to gain familiarity with the range of models in the hydrologic toolkit and how they work; be equipped to choose, implement, and interpret models effectively; and know how to critically assess model assumptions, sensitivities, and limitations. Students will learn common techniques for generating and calibrating model inputs, compiling and/or executing models, and plotting results. Prerequisites: Introductory level hydrology / hydrogeology, Calculus, Some previous exposure to Matlab or Python (or another programming language). Students without these prerequisites may contact the instructor to seek consent to register.

ESCI 5341. Numerical Geodynamic Modeling. (3 cr. ; Student Option; Spring Even Year)
The objective of this course is for students to gain a basic understanding of numerical geodynamic modeling. The course consists of a lecture component and in-class modeling exercise component. The lecture component will cover general concepts of continuum mechanics/fluid dynamics, classical geodynamic problems, such as heat transfer and mantle flow, and numerical approaches to solving these problems using the finite difference and finite element methods. Through

the in-class modeling exercises and homework assignments, students will learn to write numerical codes to solve simple problems, such as 2-D heat conduction and Stokes flow. prereq: Instructor?s consent is required if the following prerequisites are not met: Introductory/first-year Calculus (MATH 1371 and 1372 or equivalent), Linear Algebra and Differential Equations (MATH 2373 or equivalent), Multivariable Calculus and Vector Analysis (MATH 2374 or equivalent), and Introductory/first-year physics (PHYS 1301 and 1302 or equivalent).

ESCI 5353. Electron Microprobe Theory and Practice. (; 3 cr. ; Student Option; Periodic Fall)
Characterizing solid materials with electron beam instrumentation, including reduction of X-ray data to chemical compositions. prereq: [One yr chem, one yr physics] or instr consent

ESCI 5402. Science and Politics of Global Warming. (; 3 cr. ; Student Option; Spring Odd Year)
Detection/attribution of global warming using radiation, climate system, and carbon cycle. Effects on society/biodiversity. National/ global efforts. Controversy over responses/ consequences.

ESCI 5403. Computer Applications in Earth & Environmental Sciences. (3 cr. ; Student Option No Audit; Every Spring)
This class is meant to provide students with skills in scientific computer programming, with a special focus on the Earth & environmental sciences and other disciplines where spatial data are important. The course assumes no previous knowledge of computer programming. Although the class will use MATLAB, topics covered in the course include concepts common to all programming languages including functions, logic, branching, loops, data types, binary code, data formatting for input/output, among others. Additionally, students will develop problem-solving skills in learning how to design algorithms to achieve a task and in learning how to troubleshoot and debug their code. Students taking the class at the 5xxx level will be required to complete a programming project related to their own research. This course will be different from other introductory-level programming courses in that it will have a spatial emphasis and focus on examples and datasets related to the Earth and environmental sciences. Students will learn how to access a variety of Earth and environmental science data repositories and work with data in standard formats (i.e. NetCDF). Working with geographically referenced data in different projections will be explored using different toolboxes available for that purpose. Plotting of data will also be extensively covered including the production of publication-quality figures and animations.

ESCI 5503. Advanced Petrology. (; 3 cr. ; Student Option; Fall Odd Year)
Quantitative approach to modern igneous/ metamorphic petrology. Emphasizes thermodynamics of minerals/melts and with applications to phase diagrams, thermobarometry, melting relationships, and energetics of petrologic mass transfer. prereq: 2302, CHEM 1061, CHEM 1065, [MATH 1372 or MATH 1272 or MATH 1572]

ESCI 5705. Limnogeology and Paleoenvironment. (; 3 cr. ; Student Option; Periodic Fall)
Within-lake, hydrogeologic, and landscape (geological/biological) processes that lead to formation of various proxy records of paleoenvironment. Systems approach to physical, geochemical, biogeochemical, and biotic proxies. Basic principles, case studies. Emphasizes how proxy records relate to paleoclimate. prereq: instr consent

ESCI 5805. Standards and Practices for Professional Geoscienists. (3 cr. ; Student Option; Every Spring)
This course is meant to provide students with a clear understanding of the standards and practices regularly used by Geoscience professionals in industry and agency. The course builds on the foundational knowledge offered through the core curriculum of the Earth Sciences undergraduate major, and fills a critical gap in showing how this knowledge is translated into common standards and practices, regulations, funding mechanisms, and even professional expectations within a variety of geoscience disciplines. In short, this course aims to smooth a student?s transition from University to an entry-level position from which they can build a successful and sustainable career. This course is targeted for both upper level undergraduates and graduate students. Aspects of the course include: -Detailed discussion of regional stratigraphy, bedrock and glacial geology and how they relate to various industrial applications and environmental issues. -Examination of state and federal environmental regulations, as well as the phases of environmental impact statements. -Survey of fundamental investigation techniques (GeoProbe drilling, hollow-stem auger drilling, well installation, analytical testing ? soil, groundwater, air). -Introduction to environmental clean-up grants and their management. -Assessment of topics covered in the National Association of State Boards of Geology (ASBOG) Fundamentals of Geology (FG) exam. This exam is a required step on the way to becoming a registered geologist. The exam is offered in mid-March, and the expectation is that students participating in the class will take it. -Coordination and completion of the 40 hour HAZWOPER training through UMN. -Invited lectures from select representatives of various subfields and professional organizations (groundwater & contaminant hydrogeology, mining & geophysical exploration, environmental engineering, petroleum) to give students a jumpstart in their professional networking.

ESCI 5971. Field Hydrogeology. (; 2 cr. ; Student Option; Every Summer)
Aquifer, vadoze zone, and surface water hydrology field techniques. Shallow soil boring and sampling. Well installation. Single/ multiple well aquifer testing. Ground water sampling for chemical analysis. Weather data collection, hydrogeologic mapping, water balance calculation. prereq: instr consent

ESCI 5980. Seminar: Current Topics in Earth Sciences. (; 1-4 cr. [max 12 cr.] ; S-N or Audit; Periodic Fall & Spring)
Topics in earth sciences investigated in a seminar format.

ESCI 8001. Introductory Graduate Seminar. (; 2 cr. ; S-N or Audit; Every Fall)
Graduate level survey of important research, concepts, and methods in the earth sciences; familiarization with program faculty/facilities and basics of science writing and proposal craft. prereq: Grad student status in earth sci

ESCI 8203. Environmental Geophysics. (3 cr. ; Student Option; Every Fall)
Seismic exploration (reflection/refraction). Potential techniques (gravity/magnetics), electrical techniques of geophysical exploration. prereq: Phys 1301 or equivalent

ESCI 8204. Geomagnetism and Paleomagnetism. (3 cr. ; Student Option; Spring Even Year)
Present geomagnetic field at Earth's surface, secular variation, geomagnetic field reversals. Physical/chemical basis of paleomagnetism. Origin of natural remanent magnetization, mineralogy of magnetic minerals, magnetic polarity stratigraphy, apparent polar wander, environmental magnetism. prereq: 2201, Phys 1302, [Math 1272 or instr consent]

ESCI 8212. Geodynamics. (3 cr. ; Student Option; Spring Odd Year)
This course focuses on the dynamics of the solid Earth, particularly that of the lithosphere and the asthenosphere, probing further into the geodynamic problems that are introduced in ESCI 2201 through applications of continuum mechanics. Key continuum mechanics concepts to be examined include constitutive relations for different rheological classes (elastic, plastic, viscous, viscoelastic, viscoelastoplastic), conservation laws (conservation of mass, momentum, and energy; continuity, force balance, and heat transfer), and simplifications and assumptions involved in their applications. Geodynamic problems to be discussed include plate cooling, lithospheric deformation, mantle convection, shear (viscous and frictional) heating, subduction, faulting, and their effects on the Earth?s thermochemical structures, geoid and topography, and the distributions of earthquakes and volcanism. Analytical solutions and numerical models of simple geodynamic problems are introduced, and recent applications of complex geodynamic models to explain geological, geophysical, and geochemical observations are discussed based on selected scientific journal articles.

ESCI 8243. Principles of Rock Magnetism. (; 1-3 cr. ; Student Option; Periodic Fall)
Remanent magnetizations, their classification and origins. Fundamentals of fine particle magnetism; magnetic minerals; separation of multicomponent magnetizations; effects of chemical change on magnetization; magnetic proxies of climatic and environmental change; biomagnetism. prereq: 4204 or instr consent

ESCI 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

ESCI 8353. Phase Equilibrium in Mineral Systems. (; 3 cr. ; Student Option; Periodic Fall)
Principles of homogeneous and heterogeneous equilibria and their application to problems in petrology. Emphasis on derivations from first principles and formulation of algebraic and graphical methods essential to multicomponent systems. prereq: 4301, Chem 3501, Math 2243

ESCI 8354. Igneous Petrology. (; 3 cr. ; Student Option; Periodic Fall)
Igneous rocks and processes, emphasizing geochemistry of melts and minerals. Content varies with instructor and student interest. prereq: 4301 or instr consent

ESCI 8355. Metamorphic Petrology. (; 3 cr. ; Student Option; Periodic Fall)
Metamorphic processes; relation of theory and observation to current problems. Relation of fundamental concepts and techniques to progressive development of mineral assemblages. Term paper required. prereq: 8353

ESCI 8401. Aqueous Environmental Geochemistry. (3 cr. ; Student Option; Every Spring)
General principles of solution chemistry applied to geology. Solution-mineral equilibria. Redox processes in natural waters. Geochemistry of hydrothermal fluids. Environmental geochemistry.

ESCI 8402. Biogeochemical Cycles in the Ocean. (3 cr. ; Student Option; Spring Even Year)
Marine biogeochemistry/chemical oceanography. Processes controlling chemical composition of oceans past/present. Cycles of major/minor constituents, including carbon, nitrogen, phosphorus, silicon, oxygen/their isotopes. Role of cycles in climate system. prereq: [Chem 1021, Chem 1022] or instr consent

ESCI 8404. Analytical geochemistry for aqueous solutions and geological materials. (3 cr. ; A-F only; Every Fall)
Chemical analysis of natural samples is essential not only in geochemical research but nearly all other subfields of Earth and Environmental Science research today. Some analytical capability routine to geochemists, such as high precision isotope analysis, has also found potential applications in many other disciplines. Outside academia, chemical analysis is fundamental to many activities directly relevant to our everyday life, ranging from pollution monitoring to soil testing. With the explosion of analytical capability and increasing applications of geochemical analysis, there is greater need for students in Earth and Environmental Sciences to get familiarized with some common analytical instruments and to grasp some fundamental principles of analytical chemistry. This course will introduce several modern analytical equipment with a particular focus on plasma source mass spectrometers, as well as important techniques developed for precise and accurate analysis of geological and environmental samples. During this course, students will have access to some of the most advanced analytical equipment in geochemical research and gain hands-on experience during in-class lab practice. The lab practice is primarily designed to illustrate some key concepts covered in lectures, rather than a comprehensive training on instrument operation. At the end of this course, students are expected to be capable of critically evaluating geochemical data and master a set of analytical skills that can serve their future careers in research or other chemical analysis related professions. This course is designed to be accessible to students with limited prior analytical experiences. Prerequisites recommended to attend this course are PHYS 1301 (or equivalency) and CHEM 1061 (or equivalency).

ESCI 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(no description) prereq: Doctoral student, adviser and DGS consent

ESCI 8501. Structural Geology. (4 cr. ; Student Option; Every Fall)
Fundamental concepts related to deformation of Earth's crust. Processes associated with deformation, faulting, folding, fabric development. Lab/recitation include solving problems, conducting physical/numerical experiments. Term Paper. Field trips. prereq: 2301 or instr consent

ESCI 8502. Tectonic Styles. (3 cr. ; Student Option; Spring Odd Year)
Origin/nature of major types of tectonic disturbances affecting crust/lithosphere, including analysis of form/development of individual structural components/relationship to plate tectonics. Changes over geologic time in nature of orogenic processes. prereq: 4501 or 8501 or instr consent

ESCI 8511. Mechanics of Sediment Transport. (; 3 cr. ; A-F or Audit; Spring Even Year)
Particle motion in fluids. Criteria for incipient motion. Formulations for bedload and suspended load. Bedform mechanics, hydraulic resistance relations. Channel stability, aggradation/degradation, alluvial stream morphology.

ESCI 8601. Introduction to Stream Restoration. (; 3 cr. ; A-F or Audit; Every Fall)
Background material essential for participating in a stream restoration project. How to assimilate geologic, hydrologic, and ecological data at the watershed and reach scales to plan a restoration project and evaluate/critique existing stream restoration projects. prereq: Grad student in CE or ESCI or EEB or WRS or FW or BAE or FR or HORT or ENR or LA or SRSE or instr consent

ESCI 8602. Stream Restoration Practice. (; 2 cr. ; S-N only; Every Summer)
Field experience, group design project. Students provide a stream restoration context for each other?s elective coursework, complete critical assessments of stream restoration projects, and design a stream restoration site. prereq: 8601 or CE 8601

ESCI 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Doctoral pre-thesis credits. prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

ESCI 8701. Geomorphology. (4 cr. ; Student Option; Every Fall)
Landscapes and the processes that shape them, encompassing fluvial, hill-slope, glacial, aeolian, and coastal environments. Mechanics of solids and fluids at Earth's surface. Erosion, deposition, and sediment transport. Prereqs: MATH 1271 (Calculus I) or equivalent; PHYS 1301 (Physics I: Classical Mechanics) or equivalent; or instructor consent.

ESCI 8712. Transport Phenomena and Analytical Geohydrology. (; 3-4 cr. ; Student Option; Every Fall)
Microscopic flow parameters, momentum, mass and energy transport through porous media. Geologic factors in aquifer performance, equations for groundwater flow, and analysis of pump tests. prereq: 5701 or CE 3502 or instr consent

ESCI 8718. Numerical Methods in Hydrogeology. (; 4 cr. ; A-F or Audit; Periodic Fall)
Introduction to finite difference and finite element methods in hydrogeology. Students develop one- and two-dimensional models of diffusion and advection-dispersion equations. prereq: 5701, CSci 1107 or instr consent

ESCI 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(no description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

ESCI 8801. Geomicrobiology. (3 cr. ; Student Option; Every Spring)
Geosphere/biosphere interactions over temporal/spatial scales. Global biogeochemical cycling, microbe-metal interactions, microbial paleobiology, environmental geomicrobiology, life detection, habitability of planets. prereq: One semester college level biology

ESCI 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(no description) prereq: Max 18 cr per semester or summer; 24 cr required

ESCI 8970. Seminar: Current Topics in Earth Sciences. (; 1-4 cr. [max 32 cr.] ; Student Option; Periodic Fall & Spring)
Seminar course. Individual topics will be determined and added per semester. prereq: instr consent

ESCI 8980. Seminar: Current Topics in Earth & Environmental Sciences. (; 1-4 cr. [max 30 cr.] ; S-N or Audit; Every Fall & Spring)

Selected seminar topics in Earth & Environmental Sciences. prereq: instr consent

ESCI 8994. Research in Earth Sciences. (; 1-4 cr. [max 30 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent research under faculty supervision. prereq: instr consent

Ecology, Evolution, and Behav (EEB)

EEB 5042. Quantitative Genetics. (; 3 cr. ; A-F only; Every Fall)
Fundamentals of quantitative genetics. Genetic/environmental influences on expression of quantitative traits. Approaches to characterizing genetic basis of trait variation. Processes that lead to change in quantitative traits. Applied/evolutionary aspects of quantitative genetic variation. prereq: [BIOL 4003 or GCD 3022] or instr consent; a course in statistics is recommended

EEB 5053. Ecology: Theory and Concepts. (; 4 cr. ; Student Option; Fall Odd Year)
Classical and modern mathematical theories of population growth, interspecific interactions, ecosystem dynamics and functioning, with emphasis on underlying assumptions and on effects of added biological reality on robustness of predictions, stability, interspecific interactions, ecosystem structure and functioning. prereq: Biol 3407 or instr consent

EEB 5068. Plant Physiological Ecology. (; 3 cr. ; Student Option No Audit; Spring Even Year)
Plant function, its plasticity/diversity in ecological context.Impact of environmental stresses on major physiological processes of plants, including photosynthesis, respiration, water uptake/transport, and nutrient uptake/ assimilation. Lab, field trip to Cedar Creek. prereq: BIOL 2022 or BIOL 3002 or BIOL 3407 or BIOL 3408W or instr consent

EEB 5371. Principles of Systematics. (; 3 cr. ; Student Option; Fall Odd Year)
Theoretical/practical procedures of biological systematics. Phylogeny reconstruction. Computer-assisted analyses, morphological and molecular approaches, species concepts/speciation, comparative methods, classification, historical biogeography, nomenclature, use/value of museums. prereq: Grad student or instr consent

EEB 5381. Sustainability Science: Interactions Between Human and Environmental Systems. (3 cr. ; Student Option No Audit; Spring Odd Year)
This course addresses core ideas in sustainability science -- an emerging field of problem-driven research dealing with the interactions between human and environmental systems. The problem that motivates the course, and the field, is the challenge of sustainability: improving the well-being of present and future generations in ways that conserve the planet?s life support systems over the long term. The goal of the course is to introduce students interested in sustainability science to the field?s principle themes, cutting-edge findings, active debates, and unresolved research questions. To this end, participants will critically discuss a set of presentations and papers covering the field in a systematic way, drawing on and integrating contemporary research from earth systems science, resource economics, institutional analysis, ecology, geography, development studies, health sciences, engineering, and other disciplines.

EEB 5407. Ecology. (3 cr. ; Student Option; Every Fall)
Principles of ecology from populations to ecosystems. Applications to human populations, disease, exotic organisms, habitat fragmentation, biodiversity, and global dynamics of the earth.

EEB 5409. Evolution. (3 cr. ; Student Option; Every Fall & Spring)
Diversity of forms in fossil record and in presently existing biology. Genetic mechanisms of evolution, including natural selection, sexual selection, genetic drift. Examples of ongoing evolution in wild/domesticated populations and in disease-causing organisms. Lab. prereq: One semester college biology

EEB 5412. Introduction to Animal Behavior. (3 cr. ; Student Option No Audit; Every Fall & Spring)
EEB 5412 is a lecture-only course for graduate students. Why do animals behave the way they do? This question is relevant to conservation, agriculture, human health, veterinary medicine, developing artificial intelligence and understanding the origins of human behavior. This writing intensive course provides a broad introduction to animal behavior. As one of the most interdisciplinary fields in all of biology, understanding animal behavior requires an understanding of cell biology, physiology, genetics, development, ecology, endocrinology, evolution, learning theory, and even physics and economics! This course will draw on questions and methods from each of these disciplines to answer what on the surface appears to be a very simple question: Why is that animal doing that? The course will review such key topics as feeding behavior, reproductive behavior, perception, learning, animal conflict, social behavior, parental care, and communication. Throughout the course, students will be immersed in the scientific process, reading scientific literature, thinking critically, formulating their own research questions, and answering them in an independent project.This is a writing intensive course that covers scientific process and how to formulate research questions. prereq: Undergrad biology course Credit granted for only one of the following: EEB 3411, EEB 3412W, EEB 3811W, EEB 5412

EEB 5534. Biodiversity Sci: The origins, maintenance, consequences, detection and assessment of biodiversity. (ENV; 3 cr. ; Student Option; Every Fall & Spring)
Biodiversity science is a rapidly expanding field of enquiry with increasing digital resources and global monitoring capabilities precisely at the moment in history that scientists recognize as the Sixth Extinction. In other words, we are currently facing a biodiversity crisis with threats to the Earth's biota not seen since the dinosaurs perished 65 million years ago. "Biodiversity" was coined by W.G. Rosen and E.O Wilson in the 1980s to describe the variation in all of life on Earth. The term is now widely used in both the scientific and popular literature and is at the center of scientific enquiry, conservation efforts, large-scale collaborative pursuits of technological advances to allow monitoring from space, and global assessments that interface with international policy. Biodiversity requires integration across multiple disciplines from evolution, to ecology, remote sensing, conservation biology, economics and the social sciences, including the environmental policy. Biodiversity science is thus inherently interdisciplinary. As a consequence, rarely does a single course provide students the opportunity to focus on this critical topic from multiple perspectives and dimensions. This new course seeks to provide students intensive study of biodiversity from six perspectives: 1) the origins of biodiversity, including the processes of speciation and extinction over macroevolutionary timescales and those involved in generating biological variation at microevolutionary scales; 2) the ecological problem of species coexistence, given the nature of competitive interactions and biological filters with a focus on the interactions of individual species and major threats to biodiversity; 3) the consequences of biodiversity and biodiversity loss for ecosystem functions, focusing on ecosystem scale processes; 4) the services or benefits to humans attributed to biodiversity, including cultural benefits of biodiversity; here we discuss both practical and ethical arguments for sustaining biodiversity; 5) methods of detecting biodiversity including classic field biodiversity observations and taxonomic collections and emerging remote sensing methods that harness hyperspectral data and satellite imagery; and 6) scientific assessments of biodiversity that communicate the science of biodiversity to policymakers, particularly the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES). The IPBES involves scientists from around the world and integrates indigenous and local knowledge (ILK). The United Nations and governments around the globe are sponsoring the IPBES, building on earlier assessments such as a prominent one in the UK. Several guest lecturers from across the University will participate in discussions and aid in development of computer labs (including Sharon Jansa (CBS), Keith Barker (CBS), Joe Knight (CFANS), and others).

EEB 5601. Limnology. (; 3 cr. ; Student Option; Every Fall)
Advanced introduction to description/analysis of interaction of physical, chemical, and biological factors that control functioning of life in lakes and other freshwater aquatic environments. prereq: Grad student or instr consent

EEB 5609. Ecosystem Ecology. (; 3 cr. ; Student Option; Every Fall)

Regulation of energy and elements cycling through ecosystems. Dependence of cycles on kinds/numbers of species within ecosystems. Effects of human-induced global changes on functioning of ecosystems.

EEB 5611. Biogeochemical Processes. (3 cr. ; Student Option; Periodic Spring)
Application of biochemistry, ecology, chemistry, and physics to environmental issues. Issues in biogeochemistry. Impact of humans on biogeochemical processes in soils, lakes, oceans, estuaries, forests, urban/managed ecosystems, and extreme environments (e.g., early Earth, deep sea vents, thermal springs). prereq: [BIOC 2331, CHEM 2301] or instr consent

EEB 5851. Health and Biodiversity. (ENV; 3 cr. ; A-F only; Every Spring)
Basics of biodiversity, human/animal health, interdependence. Strategies for sustainable health. prereq: At least one year of college Biology or equivalent

EEB 8100. EEB Department Seminar. (1 cr. [max 4 cr.] ; S-N only; Every Fall & Spring)
This seminar series is focused on topics of general interest to faculty and students in EEB and often are presented by visiting scientists, including leaders in specific fields.

EEB 8150. EEB Lab Tours. (1 cr. [max 2 cr.] ; S-N only; Every Fall)
Laboratory Tour seminar to acquaint incoming graduate students with the research of EEB graduate faculty, their postdocs and current graduate students. Faculty members will conduct lab tours in their laboratory and/or inform students about their research. This seminar will be organized by the DGS or a faculty member designated by the DGS.

EEB 8151. EEB Lab Tours. (1 cr. ; S-N only; Every Spring)
The goal of the Laboratory Tour seminar is to acquaint incoming graduate students with the research of EEB graduate faculty, their postdocs and current graduate students. Faculty members will conduct lab tours in their laboratory and/or inform students about their research. This seminar will be organized by the DGS or a faculty member designated by the DGS.

EEB 8200. Sustainability Science Distributed Graduate Seminar. (; 3 cr. ; Student Option; Every Spring)
Theories of sustainability science. Interactions between human/environmental systems. Improving present/future generations. Presentations/papers. Contemporary research from earth systems science, resource economics, institutional analysis, ecology, geography, development studies, health sciences, engineering.

EEB 8201. Graduate Foundations in Ecology, Evolution and Behavior Semester 1. (4 cr. ; A-F only; Every Fall)
Foundational knowledge in ecology, evolution, behavior. prereq: Grad student in Ecology, Evolution and Behavior

EEB 8202. Graduate Foundations in Ecology, Evolution and Behavior - Semester 2. (; 4 cr. ; A-F only; Every Spring)
Foundational knowledge in ecology, evolution, behavior. Second semester of two-semester sequence. prereq: 8601, EEB grad student

EEB 8301. Prelim Proposal Writing Seminar. (1 cr. ; S-N only; Every Fall)
The purpose of this class is to learn about the structure and format of research proposals. This course helps prepare students for writing the written preliminary exam the following semester. prereq: EEB graduate Student

EEB 8302. EEB Written Prelim Workshop. (1 cr. ; S-N only; Every Spring)
Provide time for students to meet/discuss issues associated with writing written preliminary exam. Workshop sections of written preliminary exam with peers. Exam should be reviewed informally by committee/revised by student before final submission. prereq: EEB grad student

EEB 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

EEB 8360. Behavioral Biology Seminar. (; 1 cr. [max 5 cr.] ; S-N or Audit; Every Fall & Spring)
Research topics in selected areas. prereq: instr consent

EEB 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

EEB 8500. NSF GRF Graduate Research Fellowship Proposal Writing Seminar. (; 1 cr. [max 2 cr.] ; S-N only; Every Fall)
Prepare EEB students to submit a competitive fellowship proposal to an external organization (e.g., NSF Graduate Research Fellowship program). In addition to announced meeting time, students meet once a week in small groups to discuss proposals/provide each other with feedback. prereq: EEB grad student only

EEB 8601. Introduction to Stream Restoration. (; 3 cr. ; Student Option; Fall Even Year)
Science/policy behind stream restoration. How to evaluating/critiquing a stream restoration project. Assimilate geomorphic, hydrologic, and ecological data at watershed and reach scales to plan a restoration project. Developing a monitoring/assessment program for an existing or future restoration project. prereq: Grad student in [CE or GEO or EEB or WRS or FW or BAE or FR or HORT or ENR or LA or SRSE] or instr consent

EEB 8602. Stream Restoration Practice. (; 2 cr. ; S-N only; Fall Odd Year)
Field experience, group design project. Students provide a stream restoration context for each other's elective coursework, complete critical assessments of stream restoration projects, and design a stream restoration site. prereq: CE 8601 or GEO 8601

EEB 8641. Spatial Ecology. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Introduction to spatial ecology. Role of space in population dynamics and interspecific interaction. Single species/multispecies models. Deterministic/stochastic theory. Modeling, effects of implicit/explicit space on competition, pattern formation, stability, diversity, and invasion. Reading/discussion of recent literature. prereq: [3407, 2 sem calculus] or instr consent

EEB 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

EEB 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

EEB 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

EEB 8980. Seminar on Current Topics. (; 1-3 cr. [max 30 cr.] ; S-N only; Every Fall & Spring)
Current research in ecology, evolution, behavior. prereq: EEB grad student

EEB 8990. Graduate Seminar. (1-3 cr. [max 30 cr.] ; Student Option; Every Fall & Spring)
Research topics in selected areas. prereq: instr consent

EEB 8991. Independent Study: Ecology, Evolution, and Behavior. (; 1-10 cr. ; Student Option; Every Fall & Spring)
Individual research on a specialized topic. prereq: instr consent

EEB 8994. Directed Research. (; 1-5 cr. [max 10 cr.] ; S-N or Audit; Every Fall & Spring)
TBD prereq: instr consent

Economics (ECON)

ECON 5890. Economics of the Health-Care System. (; 3 cr. ; A-F or Audit; Every Fall)
Economic analysis of U.S. health-care sector. Emphasizes problems of pricing, production, distribution. Health-care services as one factor contributing to nation's health. prereq: 3101 or instr consent

ECON 8003. Microeconomic Analysis. (; 2 cr. ; Student Option; Every Spring)
Theories of consumer demand, producer supply, and market equilibrium; general equilibrium and welfare. Sample topics: externalities, economics of information and uncertainty, and game theory. This seven-week course meets with 4163. prereq: 8002

ECON 8004. Microeconomic Analysis. (; 2 cr. ; Student Option; Every Spring)
Theories of consumer demand, producer supply, and market equilibrium; general equilibrium and welfare. Sample topics:

externalities, economics of information and uncertainty, and game theory. This seven-week course meets with 4164. prereq: 8003

ECON 8101. Microeconomic Theory. (; 2 cr. ; Student Option; Every Fall)
Decision problems faced by the household and firm; theories of choice under conditions of certainty and uncertainty. Partial equilibrium analysis of competition and monopoly. General equilibrium analysis. Welfare economics: economic efficiency of alternative market structures, social welfare functions. Dynamics: stability of markets, capital theory. Seven-week course. prereq: 5151 or equiv, Math 2243 or equiv, concurrent registration is required (or allowed) in Math 5615 or concurrent registration in Math 8601, grad econ major or instr consent

ECON 8102. Microeconomic Theory. (; 2 cr. ; Student Option; Every Fall)
Decision problems faced by the household and firm; theories of choice under conditions of certainty and uncertainty. Partial equilibrium analysis of competition and monopoly. General equilibrium analysis. Welfare economics: economic efficiency of alternative market structures, social welfare functions. Dynamics: stability of markets, capital theory. Seven-week course. prereq: 8101, concurrent registration is required (or allowed) in Math 5615 or concurrent registration is required (or allowed) in Math 8601, grad econ major or instr consent

ECON 8103. Microeconomic Theory. (; 2 cr. ; Student Option; Every Spring)
Decision problems faced by the household and firm; theories of choice under conditions of certainty and uncertainty. Partial equilibrium analysis of competition and monopoly. General equilibrium analysis. Welfare economics: economic efficiency of alternative market structures, social welfare functions. Dynamics: stability of markets, capital theory. Seven-week course. prereq: 8102, concurrent registration is required (or allowed) in Math 5616 or concurrent registration is required (or allowed) in Math 8602 or comparable abstract math course, grad econ major or instr consent

ECON 8104. Microeconomic Theory. (; 2 cr. ; Student Option; Every Spring)
Decision problems faced by the household and firm; theories of choice under conditions of certainty and uncertainty. Partial equilibrium analysis of competition and monopoly. General equilibrium analysis. Welfare economics: economic efficiency of alternative market structures, social welfare functions. Dynamics: stability of markets, capital theory. Seven-week course. prereq: 8103, concurrent registration is required (or allowed) in Math 5616 or concurrent registration is required (or allowed) in Math 8602 or comparable abstract math course, grad econ major or instr consent

ECON 8105. Macroeconomic Theory. (; 2 cr. ; Student Option; Every Fall)
Dynamic general equilibrium models: solving for paths of interest rates, consumption, investment, prices. Models with uncertainty, search, matching, indivisibilities, private information. Implications for measurement and data reporting. Overlapping generations and dynasty models. Variational and recursive methods. This seven-week course meets with 4165. prereq: 5152 or equiv, Math 2243, Math 2263 or equiv or instr consent

ECON 8106. Macroeconomic Theory. (; 2 cr. ; Student Option; Every Fall)
Dynamic general equilibrium models: solving for paths of interest rates, consumption, investment, prices. Models with uncertainty, search, matching, indivisibilities, private information. Implications for measurement and data reporting. Overlapping generations and dynasty models. Variational and recursive methods. This seven-week course meets with 4166. prereq: 8105

ECON 8107. Macroeconomic Theory. (; 2 cr. ; Student Option; Every Spring)
Dynamic general equilibrium models: solving for paths of interest rates, consumption, investment, prices. Models with uncertainty, search, matching, indivisibilities, private information. Implications for measurement and data reporting. Overlapping generations and dynasty models. Variational and recursive methods. This seven-week course meets with 4167. prereq: 8106

ECON 8108. Macroeconomic Theory. (; 2 cr. ; Student Option; Every Spring)
Dynamic general equilibrium models: solving for paths of interest rates, consumption, investment, prices. Models with uncertainty, search, matching, indivisibilities, private information. Implications for measurement and data reporting. Overlapping generations and dynasty models. Variational and recursive methods. This seven-week course meets with 4168. prereq: 8107

ECON 8111. Introduction to Mathematical Economics. (; 2 cr. ; Student Option; Every Fall & Spring)
Use of mathematical models in economic theory. prereq: Math 2243 or equiv, concurrent registration is required (or allowed) in Econ 8101, concurrent registration is required (or allowed) in Math 5615 or equiv or instr consent; Math 4242 recommended

ECON 8112. Introduction to Mathematical Economics. (; 2 cr. ; Student Option; Periodic Fall)
Use of mathematical models in economic theory. Standard techniques. prereq: 8111, concurrent registration is required (or allowed) in 8102, concurrent registration is required (or allowed) in Math 5615 or comparable abstract math course

ECON 8113. Introduction to Mathematical Economics. (; 2 cr. ; Student Option; Periodic Fall)
Use of mathematical models in economic theory. May include special topics. prereq: 8112, Math 5616 or comparable abstract math course, concurrent registration is required (or allowed) in 8103

ECON 8117. Noncooperative Game Theory. (; 2 cr. ; Student Option; Every Fall)
Solution concepts for noncooperative games in normal form, including Nash and perfect equilibrium and stable sets of equilibria. Extensive form games of perfect and incomplete information, sequential equilibrium, and consequences of stability for extensive form. Applications including bargaining and auctions. Seven-week course. prereq: Math 5616 or equiv or instr consent

ECON 8118. Noncooperative Game Theory. (; 2 cr. ; Student Option; Every Fall & Spring)
Solution concepts for noncooperative games in normal form, including Nash and perfect equilibrium and stable sets of equilibria. Extensive form games of perfect and incomplete information, sequential equilibrium, and consequences of stability for extensive form. Applications including bargaining and auctions. Seven-week course. prereq: 8117

ECON 8119. Cooperative Game Theory. (; 2 cr. ; Student Option; Every Spring)
Basics of cooperative game theory, emphasizing concepts used in economics. Games with and without transferable utility; the core, the value, and other solution concepts. Recent results, including potentials, reduced games, consistency, and noncooperative implementation of cooperative solution concepts. Seven-week course. prereq: 8104, Math 5616 or equiv or instr consent

ECON 8181. Advanced Topics in Microeconomics. (; 2 cr. [max 4 cr.] ; Student Option; Every Fall)
Faculty and student presentations based on recent literature. Seven-week course. prereq: 8104 or instr consent

ECON 8182. Advanced Topics in Microeconomics. (; 2 cr. [max 4 cr.] ; Student Option; Every Spring)
Faculty and student presentations based on recent literature. Seven-week course. prereq: 8104 or instr consent

ECON 8185. Advanced Topics in Macroeconomics. (; 2 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
Faculty and student presentations based on recent literature. Seven-week course. prereq: 8108 or instr consent

ECON 8186. Advanced Topics in Macroeconomics. (; 2 cr. [max 4 cr.] ; Student Option; Periodic Spring)
Faculty and student presentations based on recent literature. Seven-week course. prereq: 8108 or instr consent

ECON 8191. Workshop in Mathematical Economics. (; 1 cr. [max 10 cr.] ; Student Option; Every Fall)
Students conduct research and present papers under faculty supervision. prereq: 8104 or instr consent

ECON 8192. Workshop in Mathematical Economics. (; 1 cr. [max 10 cr.] ; Student Option; Every Spring)
Students work on research and present papers under faculty supervision. prereq: 8104 or instr consent

ECON 8201. Econometric Analysis. (; 2 cr. ; Student Option; Every Fall)

Basic linear regression model, its variants. Panel data, censored/truncated regression, discrete choice models. Time series, simultaneous equation models. prereq: [[3101 or equiv], [Math 1272 or equiv], Stat 5102] or instr consent

ECON 8203. Econometric Analysis. (; 2 cr. ; Student Option; Every Spring)
Basic linear regression model, its variants. Panel data, censored/truncated regression, discrete choice models. Time series, simultaneous equation models. prereq: 8202

ECON 8204. Econometric Analysis. (; 2 cr. ; Student Option; Every Spring)
Basic linear regression model, its variants. Panel data, censored/truncated regression, discrete choice models. Time series, simultaneous equation models. prereq: 8203

ECON 8205. Applied Econometrics. (; 2 cr. ; Student Option; Every Fall)
Application in research, including classical and Bayesian approaches; formulation, comparison, and use of models and hypotheses; inference and prediction in structural models; simulation methods. Seven-week course. prereq: Math 4242 or equiv, concurrent registration is required (or allowed) in Econ 8101, concurrent registration is required (or allowed) in Econ 8105, concurrent registration is required (or allowed) in Stat 5101 or instr consent

ECON 8206. Applied Econometrics. (; 2 cr. ; Student Option; Every Fall)
Application in research, including classical and Bayesian approaches; formulation, comparison, and use of models and hypotheses; inference and prediction in structural models; simulation methods. Seven-week course. prereq: 8205, concurrent registration is required (or allowed) in 8102, concurrent registration is required (or allowed) in 8106, concurrent registration is required (or allowed) in Stat 5101 or instr consent

ECON 8207. Applied Econometrics. (; 2 cr. ; Student Option; Every Spring)
Application in research, including classical and Bayesian approaches; formulation, comparison, and use of models and hypotheses; inference and prediction in structural models; simulation methods. Seven-week course. prereq: 8206, concurrent registration is required (or allowed) in 8103, concurrent registration is required (or allowed) in 8107, concurrent registration is required (or allowed) in Stat 5102 or instr consent

ECON 8208. Applied Econometrics. (; 2 cr. ; Student Option; Periodic Spring)
Application in research, including classical and Bayesian approaches; formulation, comparison, and use of models and hypotheses; inference and prediction in structural models; simulation methods. Seven-week course. prereq: 8207, concurrent registration is required (or allowed) in 8104, concurrent registration is required (or allowed) in 8108, concurrent registration is required (or allowed) in Stat 5102 or instr consent

ECON 8211. Econometrics. (; 2 cr. ; Student Option; Every Fall)
Linear regression; general linear hypotheses; Gauss Markov Theorem, generalized least squares and their applications. Decision-theoretic choice among estimators. Simultaneous equations models; identification and estimation. Asymptotic distribution theory. Applications, including multivariate time series models and/or limited dependent variables models. Seven-week course. prereq: 5151, 5152, Math 4242 or equiv, Stat 5102 or instr consent

ECON 8212. Econometrics. (; 2 cr. ; Student Option; Every Fall)
Linear regression; general linear hypotheses; Gauss Markov Theorem, generalized least squares and their applications. Decision-theoretic choice among estimators. Simultaneous equations models; identification and estimation. Asymptotic distribution theory. Applications, including multivariate time series models and/or limited dependent variables models. Seven-week course. prereq: 8211

ECON 8213. Econometrics. (; 2 cr. ; Student Option; Periodic Fall)
Linear regression; general linear hypotheses; Gauss Markov Theorem, generalized least squares and their applications. Decision-theoretic choice among estimators. Simultaneous equations models; identification and estimation. Asymptotic distribution theory. Applications, including multivariate time series models and/or limited dependent variables models. Seven-week course. prereq: 8212

ECON 8281. Advanced Topics in Econometrics. (; 2 cr. [max 4 cr.] ; Student Option; Periodic Fall & Spring)
Faculty and student presentations based on recent literature. This is a 7-week course. prereq: 8213 or instr consent

ECON 8291. Workshop in Econometrics. (; 1-3 cr. [max 10 cr.] ; Student Option; Every Fall)
Workshop in Econometrics prereq: 8213 or instr consent

ECON 8292. Workshop in Econometrics. (; 1-3 cr. [max 10 cr.] ; Student Option; Periodic Fall & Spring)
Workshop in Econometrics prereq: 8213 or instr consent

ECON 8311. Economic Growth and Development. (; 2 cr. ; Student Option; Every Fall)
Methods of analyzing dynamical systems; applying methods to new models of growth and development; deriving and evaluating models' quantitative implications in light of growth and development in a number of countries. Seven-week course. prereq: 8104, 8106 or instr consent

ECON 8312. Economic Growth and Development. (; 2 cr. ; Student Option; Every Fall & Spring)
Methods of analyzing dynamical systems; applying methods to new models of growth and development; deriving and evaluating models' quantitative implications in light of growth and development in a number of countries. Seven-week course. prereq: 8311 or instr consent

ECON 8313. Economic Growth and Development. (; 2 cr. ; Student Option; Every Spring)
Methods of analyzing dynamical systems; applying methods to new models of growth and development; deriving and evaluating models' quantitative implications in light of growth and development in a number of countries. Seven-week course. prereq: 8312 or instr consent

ECON 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

ECON 8381. Advanced Topics in Economic Development. (; 2 cr. [max 4 cr.] ; Student Option; Periodic Fall & Spring)
Faculty and student presentations based on recent literature. Seven-week course. prereq: 8312 or instr consent; offered when feasible

ECON 8391. Workshop in Economic Growth and Development. (; 1 cr. [max 10 cr.] ; Student Option; Every Fall)
Workshop in Economic Growth and Development prereq: instr consent

ECON 8392. Workshop in Economic Growth and Development. (; 1 cr. [max 10 cr.] ; Student Option; Every Fall, Spring & Summer)
tbd prereq: instr consent

ECON 8401. International Trade and Payments Theory. (; 2 cr. ; Student Option; Every Fall)
Impact of trade on factor rentals. Stolper-Samuelson, Rybczynski, and factor price equalization theorems. Heckscher-Ohlin theorem. Derivation of offer curves and general international equilibrium. Transfer problem. Seven-week course. prereq: 8103, 8105 or instr consent

ECON 8402. International Trade and Payments Theory. (; 2 cr. ; Student Option; Every Fall & Spring)
Tariffs, quotas, and other barriers to trade; gains from trade; trading blocs; increasing returns; growth. This is a seven-week course. prereq: 8401 or instr consent

ECON 8403. International Trade and Payments Theory. (; 2 cr. ; Student Option; Every Spring)
International business cycles; exchange rates; capital movements; international liquidity. This is a 7-week course. prereq: 8402 or instr consent

ECON 8404. International Trade and Payments Theory. (; 2 cr. ; Student Option; Periodic Fall)
Theoretical models of international trade. Trade data, empirical work on trade. Seven week course. prereq: [8402, 8403] or instr consent

ECON 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

ECON 8481. Advanced Topics in International Trade. (; 2 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)

Faculty and student presentations based on recent literature. Seven-week course. prereq: 8403 or instr consent

ECON 8482. Advanced Topics in International Trade. (; 2 cr. [max 4 cr.] ; Student Option; Periodic Fall & Spring)
Faculty and student presentations based on recent literature. Seven-week course. prereq: 8403 or instr consent

ECON 8491. Workshop in Trade and Development. (; 1 cr. [max 10 cr.] ; Student Option; Every Fall)
Workshop in Trade and Development prereq: instr consent

ECON 8492. Workshop in Trade and Development. (; 1-3 cr. [max 10 cr.] ; Student Option; Every Spring)
tbd prereq: instr consent

ECON 8501. Wages and Employment. (2 cr. [max 4 cr.] ; Student Option; Every Fall)
Economic analysis of labor markets and their operation under conditions of both individual and collective bargaining. Implications of labor market operations for resource allocation, wage and price stability, income and employment growth. Wage structures and wage levels. Wage and employment theories and practices. Economic impacts of unions. Seven-week course. prereq: 8102, 8106 or instr consent

ECON 8502. Wages and Employment. (; 2 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
Economic analysis of labor markets and their operation under conditions of both individual and collective bargaining. Implications of labor market operations for resource allocation, wage and price stability, income and employment growth. Wage structures and wage levels. Wage and employment theories and practices. Economic impacts of unions. Seven-week course. prereq: 8501 or instr consent

ECON 8503. Wages and Employment. (; 2 cr. [max 4 cr.] ; Student Option; Every Spring)
Economic analysis of labor markets and their operation under conditions of individual/ collective bargaining. Implications of labor market operations for resource allocation, wage/price stability, income/employment growth. Wage structures and wage levels. Wage/employment theories/practices. Economic impacts of unions. Seven-week course. prereq: 8502 or instr consent

ECON 8581. Advanced Topics in Labor Economics. (; 2 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
Faculty and student presentations based on recent literature. Seven-week course. prereq: 8502 or instr consent

ECON 8582. Advanced Topics in Labor Economics. (; 2 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
Faculty and student presentations based on recent literature. Seven-week course. prereq: 8502 or instr consent

ECON 8601. Industrial Organization and Government Regulation. (; 2 cr. ; Student Option; Every Fall)
Behavior of businesses and industries: productivity, firm size distributions, exit-entry dynamics, etc. Theories of the firm, industry structure and performance, invention and innovation, and technology adoption. Positive and normative theories of regulation. Seven-week course. prereq: 8102 or instr consent

ECON 8602. Industrial Organization and Government Regulation. (; 2 cr. ; Student Option; Every Fall)
Behavior of businesses and industries: productivity, firm size distributions, exit-entry dynamics, etc. Theories of the firm, industry structure and performance, invention and innovation, and technology adoption. Positive and normative theories of regulation. Seven-week course. prereq: 8601 or instr consent

ECON 8603. Industrial Organization and Government Regulation. (; 2 cr. ; Student Option; Every Spring)
Behavior of businesses and industries: productivity, firm size distributions, exit-entry dynamics, etc. Theories of the firm, industry structure and performance, invention and innovation, and technology adoption. Positive and normative theories of regulation. Seven-week course. prereq: 8602 or instr consent

ECON 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

ECON 8681. Advanced Topics in Industrial Organization. (; 2 cr. [max 4 cr.] ; Student Option; Periodic Fall & Spring)
Faculty and student presentations based on recent literature. Seven-week course. prereq: 8603 or instr consent

ECON 8691. Workshop in Applied Microeconomics. (; 1 cr. [max 10 cr.] ; Student Option; Every Fall)
Workshop in Applied Microeconomics prereq: instr consent

ECON 8692. Workshop in Applied Microeconomics. (; 1 cr. [max 10 cr.] ; Student Option; Every Spring)
tbd prereq: instr consent

ECON 8701. Monetary Economics. (; 2 cr. ; Student Option; Every Fall)
Economic role of principal financial institutions. Determinants of value of money. Principal problems of monetary policy. Seven-week course. prereq: 8103, 8106 or instr consent

ECON 8702. Monetary Economics. (; 2 cr. ; Student Option; Every Fall & Spring)
Economic role of principal financial institutions. Determinants of value of money. Principal problems of monetary policy. Seven-week course. prereq: 8701 or instr consent

ECON 8703. Monetary Economics. (; 2 cr. [max 4 cr.] ; Student Option; Every Spring)
Economic role of principal financial institutions. Determinants of value of money. Principal problems of monetary policy. Seven-week course. prereq: 8702 or instr consent

ECON 8704. Financial Economics. (; 2 cr. ; Student Option; Every Fall)
Role of financial institutions in efficient allocation of risk; multiperiod and continuous-time securities markets; theory of firm under uncertainty; financial intermediation; derivation of empirical asset-pricing relationships; tests concerning alternative market structures. Seven-week course. prereq: 8103, 8106 or instr consent

ECON 8705. Financial Economics. (; 2 cr. ; Student Option; Every Fall & Spring)
Role of financial institutions in efficient allocation of risk; multiperiod and continuous-time securities markets; theory of firm under uncertainty; financial intermediation; derivation of empirical asset-pricing relationships; tests concerning alternative market structures. Seven-week course. prereq: 8704 or instr consent

ECON 8706. Financial Economics. (; 2 cr. ; Student Option; Every Spring)
Role of financial institutions in efficient allocation of risk; multiperiod and continuous-time securities markets; theory of firm under uncertainty; financial intermediation; derivation of empirical asset-pricing relationships; tests concerning alternative market structures. Seven-week course. prereq: 8705 or instr consent

ECON 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

ECON 8781. Advanced Topics in Monetary Economics. (; 2 cr. [max 4 cr.] ; Student Option; Every Spring)
Faculty and student presentations based on recent literature. Seven-week course. prereq: 8702 or instr consent

ECON 8791. Workshop in Macroeconomics. (1 cr. [max 10 cr.] ; Student Option; Every Fall)
Workshop in Macroeconomics prereq: instr consent

ECON 8792. Workshop in Macroeconomics. (; 1 cr. [max 10 cr.] ; Student Option; Every Spring)
Workshop in Macroeconomics prereq: instr consent

ECON 8801. Public Economics. (2 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
Theories of public choice and role of government in economy. Economic effects of taxes, public debt, and public expenditure. Current problems in economics of public sector, including political economy. Seven-week course. prereq: 8103, 8106 or instr consent

ECON 8802. Public Economics. (; 2 cr. ; Student Option; Every Fall & Spring)
Theories of public choice and role of government in economy. Economic effects of taxes, public debt, and public expenditure.

Current problems in economics of public sector, including political economy. Seven-week course. prereq: 8801 or instr consent

ECON 8803. Public Economics. (; 2 cr. ; Student Option; Periodic Spring)
Theories of public choice and role of government in economy. Economic effects of taxes, public debt, and public expenditure. Current problems in economics of public sector, including political economy. Seven-week course. prereq: 8802 or instr consent

ECON 8881. Advanced Topics in Public Economics. (; 2 cr. [max 4 cr.] ; Student Option; Every Fall)
Faculty and student presentations based on recent literature. Seven-week course. prereq: 8803 or instr consent

ECON 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

ECON 8891. Workshop in Public Economics and Policy. (; 1 cr. [max 10 cr.] ; Student Option; Periodic Fall & Spring)
Workshop in Public Economics and Policy prereq: instr consent

ECON 8892. Workshop in Public Economics and Policy. (; 1-3 cr. [max 10 cr.] ; Student Option; Periodic Fall & Spring)
Workshop in Public Economics and Policy prereq: instr consent

ECON 8990. Individual Graduate Research. (; 1-7 cr. ; Student Option; Every Fall, Spring & Summer)
Individual Graduate Research prereq: instr consent

Education (EDUC)

EDUC 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

EDUC 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

EDUC 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

EDUC 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

EDUC 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Educational Psychology (EPSY)

EPSY 5001. Learning, Cognition, and Assessment. (3 cr. ; Student Option; Every Fall, Spring & Summer)
Principles of learning, cognition, cognitive development, classroom management, motivation, instruction, assessment. Behaviorism, cognitive/social constructivism, human information processing theory. Intelligence, knowledge acquisition, reasoning skills, scholastic achievement, standardized testing, reliability/validity, student evaluation, performance assessment, portfolios, demonstrations. Applications to instruction/ organization of curricular materials. prereq: MEd/initial licensure student or CLA music ed or preteaching major or instr consent; psych course recommended

EPSY 5015. Teaching Students with Special Needs in Inclusive Settings. (1 cr. ; A-F only; Every Summer)
Areas of exceptionality defined in federal/state regulations. Historical perspectives, definitions, etiology, characteristics, needs, and service delivery systems. Collaborating with special education personnel. prereq: Enrolled in a teacher initial licensure program

EPSY 5016. Teaching Students with Special Needs in Inclusive Settings. (1 cr. ; A-F only; Every Fall & Spring)
Attending to constant transitions/development in which children/adolescents negotiate their road to adulthood. How to foster learning/ positive development. prereq: Enrolled in teacher initial licensure program

EPSY 5017. Teaching Exceptional Students in General Education Classrooms. (2 cr. ; A-F or Audit; Every Summer)
This course will provide an overview of the areas of exceptionality defined in federal and state regulations. The focus of this course will be on historical perspectives, definitions, etiology, characteristics, needs, and service delivery systems for each area of exceptionality as well as the general educator?s role in collaborating with special education personnel in order to meet the needs of students with special needs.

EPSY 5101. Intelligence and Creativity. (; 3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Contemporary theories of intelligence and intellectual development and contemporary theories of creativity and their implications for educational practices and psychological research.

EPSY 5114. Psychology of Student Learning. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
This course is an introduction to the theories, data, and methods of Educational Psychology most relevant to understanding student thinking and learning. The first third of the course reviews those aspects of cognitive development that are foundational for education. The second third considers how cognitive psychology informs questions of learning, memory, knowledge, and transfer. With this background in place, the final third of the course will focus on the classroom: on instruction, motivation, individual differences, and group differences. The course concludes by considering the neural correlates of classroom learning.

EPSY 5116. Education of the Gifted and Talented. (; 3 cr. ; Student Option No Audit; Every Spring)
Theories of giftedness, talent development, instructional strategies, diversity and technological issues, implications for educational practices and psychological inquiry, and international considerations.

EPSY 5119. Mind, Brain, and Education. (; 3 cr. ; Student Option No Audit; Periodic Spring)
How educationally relevant skills/concepts develop in both typical/atypical children. prereq: 3301 or equiv

EPSY 5121. Debugging Failure in Learning. (3 cr. ; Student Option; Fall Odd Year)
This course investigates the double-edge potential of failure to catalyze and thwart learning. The goal is to develop a multi-dimensional framework drawing on psychological, cognitive, interpersonal, and systemic perspectives that can be used in research to document, understand, problematize, and ultimately support students experiences with failure during learning. Central topics include causal attributions, play-based failures, counter storytelling, inequities, framing, and motivation. Course activities include reviews of experimental and observational research; reflections on video of students and instructors navigating moments of failure; and opportunities to develop research designs and/or analyze new data attending to failure.

EPSY 5122. Programming Fundamentals for Social Science Research. (3 cr. ; Student Option; Every Fall)
What is computer programming, and how can it be used to improve your research? This course teaches the fundamental concepts and techniques of programming using the open-source Python 3 language, while emphasizing a variety of applications to social science research, including data analysis, visualization, task automation, and retrieving data from the internet through APIs and scraping. The course covers fundamental programming concepts, as well as software engineering topics such as writing robust code, testing, debugging, collaboration, version control, and working with file systems. The course is taught with an active, hands-on approach to programming, including class discussions and group work. It is designed to be accessible to students without any prior programming experience.

EPSY 5123. Programming Workflows for Psychological Research. (3 cr. ; Student Option; Every Spring)
How can researchers use open-source programming to create a reproducible and

flexible workflow? This course teaches programming and computer-based skills that are increasingly important methods in psychological research, like fundamental programming concepts, data wrangling in R, online experiments and surveys with JavaScript, version control with git, using the Open Science Framework, and writing reproducible reports with R Markdown. It emphasizes open science practices and readily implementable skills for a more streamlined and automated research workflow. The course is taught with an active, hands-on approach to programming, including class discussions and group work. It is designed to be accessible to students without any prior programming experience. prereq: Students should have taken an undergraduate- or graduate-level statistics course.

EPSY 5135. Human Relations Workshop. (; 4 cr. ; Student Option; Every Fall & Summer)
Experiential course addressing issues of prejudice and discrimination in terms of history, power, and social perception. Includes knowledge and skills acquisition in cooperative learning, multicultural education, group dynamics, social influence, effective leadership, judgment and decision-making, prejudice reduction, conflict resolution.

EPSY 5151. Cooperative Learning. (; 3 cr. ; Student Option; Every Spring)
Participants learn how to use cooperative learning in their setting. Topics include theory and research, teacher's role, essential components that make cooperation work, teaching social skills, assessment procedures, and collegial teaching teams.

EPSY 5157. Social & Developmental Psychology of Education. (; 3 cr. ; A-F or Audit; Every Fall)
Social and developmental psychology provide underpinnings for a range of methods for conducting research in real-world settings. They also lay conceptual foundations for understanding a range of social and developmental processes. The course will cover a full range of topics within social and developmental psychology, plus selected topics in personality psychology, and examine their implications for understanding and structuring educational and other professional settings. Discussions will include a strong focus on educator and practitioner applications of the research.

EPSY 5200. Special Topics: Psychological Foundations. (; 1-4 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Focus on special topics in psychological and methodological concepts relevant to advanced educational theory, research, and practice not covered in other courses.

EPSY 5216. Introduction to Research in Educational Psychology and Human Development. (3 cr. ; A-F or Audit; Every Fall)
Designing/conducting a research study. Reviewing literature, formulating research problem, using different approaches to gather data, managing/analyzing data, reporting results. prereq: 5261 or intro statistics course

EPSY 5220. Special Topics: Quantitative Methods. (; 1-4 cr. [max 30 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Focus on special topics in methodological concepts involving theory, research, and practice in statistics, measurement, evaluation, and statistics education not covered in other courses.

EPSY 5221. Principles of Educational and Psychological Measurement. (; 3 cr. ; Student Option; Every Fall & Spring)
Concepts, principles, and methods in educational/psychological measurement. Reliability, validity, item analysis, scores, score reports (e.g., grades). Modern measurement theories, including item response theory and generalizability theory. Emphasizes construction, interpretation, use, and evaluation of assessments regarding achievement, aptitude, interests, attitudes, personality, and exceptionality.

EPSY 5243. Principles and Methods of Evaluation. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Introductory course in program evaluation; planning an evaluation study, collecting and analyzing information, reporting results; overview of the field of program evaluation.

EPSY 5244. Survey Design, Sampling, and Implementation. (; 3 cr. ; Student Option; Every Fall)
Survey methods, including mail, phone, and Web-based/e-mail surveys. Principles of measurement, constructing questions/forms, pilot testing, sampling, data analysis, reporting. Students develop a survey proposal and a draft survey, pilot the survey, and develop sampling/data analysis plans. prereq: [5221 or 5231 or 5261 or equiv], [CEHD grad student or MEd student]

EPSY 5245. Advanced Survey Data Analysis for Categorical and Rating Scale Data. (; 1 cr. ; Student Option; Periodic Spring)
Practical course. Specific nature of survey data (typically categorical or ordinal). Appropriate data analytic methods. prereq: 5244, 5261

EPSY 5247. Qualitative Methods in Educational Psychology. (; 3 cr. ; Student Option; Every Fall)
Introduction to qualitative methods of inquiry. Contrasting different research traditions (e.g., case study, phenomenology, ethnography, social interactionism, critical theory). Practice with field notes, observations, and interviewing. Use of NVIVO to track/code data. prereq: Graduate student or Applied Psychology in Educational and Community Settings Minor

EPSY 5261. Introductory Statistical Methods. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
EPSY 5261 is designed to engage students in statistics as a principled approach to data collection, prediction, and scientific inference. Students first learn about data collection (e.g., random sampling, random assignment) and examine data descriptively using graphs and numerical summaries. Students build conceptual understanding of statistical inference through the use of simulation-based methods (bootstrapping and randomization) before going on to learn parametric methods, such as t-tests (one-sample and two-sample means), z-tests (one-sample and two-sample proportions), chi-square tests, and regression. This course uses pedagogical methods grounded in research, such as small group activities and discussion. Attention undergraduates: As this is a graduate level course, it does not fulfill the Mathematical Thinking Liberal Education requirement. If you would like to take a statistics course in our department that fulfills that requirement, please consider EPSY 3264.

EPSY 5262. Intermediate Statistical Methods. (; 3 cr. ; Student Option; Every Fall & Spring)
Application of statistical concepts/procedures. Analysis of variance, covariance, multiple regression. Experimental design: completely randomized, block, split plot/repeated measures. prereq: 3264 or 5261 or equiv

EPSY 5271. Becoming a Teacher of Statistics. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Current methods of teaching first courses in statistics. Innovative teaching methods, materials, and technological tools. Types of first courses, reform recommendations, goals for student learning, recommended content, teaching methods, technology, student assessment. prereq: 5261 or equiv

EPSY 5272. Statistics Teaching Internship. (; 1-3 cr. ; S-N only; Every Fall & Spring)
Supervised teaching experience. prereq: Grad student, instr consent

EPSY 5400. Special Topics in Counseling Psychology. (; 1-4 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Theory, research, and practice in counseling and student personnel psychology. Topics vary.

EPSY 5401. Counseling Procedures. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Emphasis on the counseling relationship and principles of interviewing. Case studies, role playing, and demonstration. For individuals whose professional work includes counseling and interviewing. prereq: Upper div student

EPSY 5402. Counseling History and Theories. (; 3 cr. [max 4 cr.] ; A-F only; Every Fall)
This course provides a broad introduction to professional counseling. Students will explore the major historical and contextual factors that have influenced the counseling field, with particular focus on theories and models of counseling practice. Roles and responsibilities of the professional counselor will also be discussed. Coursework will emphasize professional development via self-reflection, awareness of context and culture, and cultivation of counselor identity.

EPSY 5403. Counseling Diverse Populations. (; 3 cr. ; A-F or Audit; Every Spring)
This course addresses counseling implications for diverse individuals and families. Students

will understand the impact of worldview and other factors such as ethnicity, culture, religious preference, socioeconomic status, gender identity, sexual orientation, and disabilities in community, higher education, and school settings. Students will examine their own worldviews as it relates to the topics discussed. Advocacy and social justice practices for working with diverse populations will also be addressed.

EPSY 5404. Group Counseling. (; 3 cr. ; A-F or Audit; Every Spring)
This course addresses foundations of group counseling that can be applied to multiple settings with a variety of diverse populations and age groups. Essential group leadership skills, types of groups, stages, planning, and evaluating groups will be covered. Additional topics include legal and ethical issues involved in group counseling, group dynamics, and therapeutic factors.

EPSY 5405. Career Counseling. (; 3 cr. ; A-F or Audit; Every Fall)
This course covers career development theories, career counseling procedures and techniques, career assessment/interpretation, and career development programming across the lifespan. Career interventions and resources will be discussed that relate to diverse populations within school, community, and higher education settings.

EPSY 5406. Ethics in Counseling. (; 3 cr. ; A-F only; Every Fall)
This course will help students deeply explore the ethical standards and legal principles that must be referenced when making decisions in the practice of counseling. Students will learn how to apply the ethical standards and federal/state legal statutes to complex counseling cases. Ethical standards related to assessment, diagnosis, and practice are discussed in relation to counseling diverse populations in school, community, and higher education settings.

EPSY 5407. Diagnosis and Treatment in Counseling. (; 3 cr. [max 4 cr.] ; A-F only; Every Spring)
Etiology, symptom patterns, and assessment/ treatment for various psychological disorders. Models of diagnosis. Empirically validated psychological assessment and counseling methods. Attention to cultural competency in assessment, diagnosis, and treatment.

EPSY 5408. Evidence-Based Counseling Relationships. (3 cr. ; A-F only; Every Fall)
This course introduces students to fundamental techniques and skills of professional counseling. Students will practice basic interviewing skills, with a focus on rapport-building and evidence-based counseling relationships. Specific techniques for facilitating exploration, insight, and change will also be covered. Finally, students will integrate the knowledge of counseling models and basic skills through a series of videotaped counseling practice and self-reflection assignments.

EPSY 5409. Trauma and Crisis Counseling. (3 cr. ; A-F only; Every Spring)
This course provides an overview of theories and skills commonly used by counselors working with clients in crisis. The first half of the course will cover assessment, impacts, and treatment of psychological trauma, including trauma-informed approaches to crisis situations. The second half of the course will cover specific types of crises commonly seen by counselors in a range of community and educational settings, with a focus on ethical and multiculturally-competent practice. There will be an emphasis on resiliency and self-care throughout the course.

EPSY 5414. School Counselor Accountability, Advocacy, and Leadership. (3 cr. ; A-F only; Every Fall)
This course will equip school counselors-in-training with the knowledge and skills to develop intentional, data-driven school counseling programs. Focus will be given to evidence-based counseling interventions. Students will learn how to use data both in the development and evaluation of their school counseling program. Students will practice using data to advocate while also developing their leadership skills.

EPSY 5415. Counseling Children and Adolescents. (; 3 cr. [max 4 cr.] ; A-F or Audit; Every Fall & Summer)
Development, issues, and needs of children, kindergarten through high school ages. Counseling/developmental theory/strategies. Cultural diversity, legal/ethical issues in counseling children/adolescents. prereq: Grad student or MEd student or K-12 [counseling endorsement or licensure] student

EPSY 5416. Introduction to Clinical Mental Health Counseling. (3 cr. ; A-F only; Every Fall)
This course will help students understand the foundations of the clinical mental health counseling profession. The major focus will be on developing a counselor identity and learning about the history and evolution of mental health counseling as a field.

EPSY 5417. Counseling Research Practicum. (; 1-2 cr. [max 3 cr.] ; Student Option; Every Fall & Spring)
The purpose of this course is to enable students to develop applied research expertise consistent with their responsibilities as licensed professional counselors, licensed professional clinical counselors, higher education counselors, school counselors, career counselors, and professionals in other counseling-related fields. This is the first course in the 2-course Counseling Research Practicum sequence.

EPSY 5427. Advanced Counseling Research Practicum. (; 2 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
The purpose of this course is to enable students to gain further skills in developing applied research expertise consistent with their responsibilities as licensed professional counselors, licensed professional clinical counselors, higher education, school, and career counselors, and professionals in other counseling-related fields. This is the second of a 2-course Counseling Research Practicum sequence. prereq: Completion of EPSY 5417 for 2 credit hours

EPSY 5429. Advanced Concepts in Community Counseling. (3 cr. ; A-F only; Every Fall)
This course provides advanced counseling students a deeper opportunity to research and discuss recent trends and new ideas in community counseling. Current research and practice around addiction and co-occurring disorders, alternative health treatments, neurocounseling, and genetics will be covered. Students will also become familiar with the history and current role of psychopharmacology in counseling, including current treatment guidelines for common psychotropic medications. Finally, students will investigate and discuss ?big ideas,? such as the use of technology, for the future of counseling practice in both community mental health settings.

EPSY 5435. Introduction to School Counseling. (3 cr. [max 6 cr.] ; A-F only; Every Fall)
History/evolution of school counselor role in schools. Duties/demands of school counselor. Examine comprehensive guidance programming in K-12 schools. Issues in school counseling profession. prereq: Ed Psych Counselor Ed grad student in school counselor prog or instr consent

EPSY 5436. Crisis Management and Consulting in Schools. (3 cr. ; A-F or Audit; Every Fall)
Issues, topics, problems. Diversity in school counseling. Review, discussion, analysis of current literature. Students develop prevention, intervention, guidance programs for K-12 schools. prereq: CSPP grad student in school counselor program or instr consent

EPSY 5437. Counseling Research Design & Evidence-Based Practices. (; 3 cr. ; A-F only; Every Spring)
This capstone course is an integration of science and practice. Students will learn research design techniques that are relevant and accessible to counselors in full-time practice, counselor educators, counseling consultants, and others in the counseling professions. Students will develop knowledge and skills related to identifying evidence-based counseling practices, developing and measuring client outcomes, analyzing and using data in counseling, and understanding how to implement ethical and culturally relevant research, data interpretation, and reporting strategies. The bulk of coursework will be the development, presentation, and defense of a research proposal in students? areas of interest. Students will learn the importance of research in advancing the counseling profession, and will practice using multiple data sources to inform programs and services in schools, counseling agencies, and higher education settings.

EPSY 5439. Case Conceptualization and Treatment Planning. (3 cr. ; A-F only; Every Spring)

This course introduces students to fundamental assessment, interviewing, case conceptualization, and treatment planning skills used by counselors in community and higher education settings. Students will have the opportunity to observe and practice intake interviews, to conceptualize clients from a culturally-informed, biopsychosocial perspective, and identify and communicate measurable treatment goals and effective interventions. Students will also work in groups to more deeply investigate and apply various approaches to case conceptualization and receive feedback from peers.

EPSY 5461. Cross-Cultural Counseling. (; 3 cr. ; A-F or Audit; Every Fall)
Effect of cross-cultural/cross-national psychological differences in human traits/ characteristics. Framework for development/ implementation of counseling interventions.

EPSY 5481. Practicum in School Counseling. (; 3 cr. ; A-F only; Every Spring)
This course is designed to support student growth in their development as a school counselor and to add to the training that they receive at their on-site placements. While enrolled in this course, students will be counseling clients in schools for the first time since entering this program. This class is designed to provide group supervision and support during their time on site. It is also designed to provide classroom instruction in areas that are relevant to the practice of school counseling. The course content will be delivered via class discussion, case presentations, tape review and online discussions. During the practicum, students will accrue a minimum of 100 hours, but will not exceed 200 hours at their practicum site. Faculty will collaborate biweekly with site supervisors to ensure that their needs are met and to provide support for the individual supervision that takes place on site.

EPSY 5482. Practicum in Community and Higher Education Counseling. (; 3 cr. ; A-F only; Every Summer)
This course is designed to support student growth in their development as a counselor and to add to the training that they receive at their on-site placements. While enrolled in this course, students will be counseling clients in various settings for the first time since entering this program. This class is designed to provide group supervision and support during their time on site. It is also designed to provide classroom instruction in areas that are relevant to the practice of counseling. The course content will be delivered via class discussion, case presentations, tape review and online discussions.

EPSY 5483. Internship I. (; 3 cr. [max 4 cr.] ; A-F or Audit; Every Fall)
Supervised practice in counseling with individuals and groups; emphasizes systematic evaluation of student?s counseling practice through direct observations, video, and audio tapes.

EPSY 5484. Internship II. (; 3 cr. [max 4 cr.] ; A-F or Audit; Every Spring)
Intermediate supervised practice in counseling with individuals and groups; emphasizes ethical issues with systematic evaluation of student?s practice through direct observations, video, and audio tapes.

EPSY 5604. Transition From School to Work and Community Living for Persons With Special Needs. (3 cr. ; Student Option; Every Spring & Summer)
Use of strategies/models for improving transition of youth from school to work and community living. Course content that specifically addresses all phases of student assessment, individualized transition planning. Parent, family, and student involvement in designing post school options. Community-based services (employment, residential living, social and recreational services, etc). Comprehensive interagency approaches.

EPSY 5605W. Collaborative Practices for the Special Educator. (WI; 3 cr. ; A-F only; Every Spring)
Skills/knowledge required to consult/collaborate with school personnel, families, other professionals to maintain effective educational support.

EPSY 5609. Infants and Toddlers with Delays/Disabilities: Family-Centered Approaches to Early Intervention. (; 3 cr. ; A-F or Audit; Every Fall)
This course was designed to provide pre-service and current teachers as well as related service providers with the knowledge and skills needed to understand the dynamic ecosystems of families with a child with disabilities. Students will be introduced to the major methods, philosophies, and current research that emphasize effective family-professional collaboration in planning and service delivery for infants and young children with disabilities. The focus is on a family-centered approach to assess and design educational plans and interventions, with a specific emphasis on relationship building and understanding the diverse perspectives on family life and developmental expectations.

EPSY 5613. Foundations of Special Education I. (DSJ; 3 cr. ; A-F or Audit; Every Fall & Spring)
To review the foundations of special education, culminating in an understanding of the application of the IDEAL Problem Solving Model. The course will address concepts related to exceptionality; historical and legal foundations; problem solving and tools of inquiry; collaborative relationships with families, educational, and community professionals; support of students with disabilities in general education; characteristics of students with high and low incidence disabilities, and ethics. Teacher candidates will learn methods of formative assessment using curriculum-based measures (CBM) and practice analyzing data to make instructional decisions and inform early intervention for struggling students.

EPSY 5614W. Assessment and Due Process in Special Education. (WI; 3 cr. ; A-F or Audit; Every Fall & Spring)
Participants will learn basic standardized assessment and how it directly relates to special education. In addition, students will use the assessment as part of an ongoing process for making instructional programming decisions. Students will apply skills in designing and evaluating assessment plans and in making eligibility decisions.

EPSY 5616W. Classroom Management and Behavior Analytic Problem Solving. (WI; 3 cr. ; Student Option; Every Fall & Spring)
Focuses on principles of behavior analysis and procedures used in the assessment and management of classroom behavior. Although the application of behavioral principles in educational settings is the central purpose of this course, complementary issues related to general classroom management will also be addressed. Consistent with the mission of the College of Education and Human Development, this course aims to strengthen effective educational practice, promote inquiry, and build leadership skills for regular and special educators and professionals in allied fields. prereq: For online sections, students must be an ASD certificate candidate or a Special Education Major or Special Education M.Ed./M.A.

EPSY 5617. Academic and Social Interventions for Students with Mild to Moderate Disabilities. (3 cr. ; A-F only; Every Spring)
Use problem solving model to make data-based decisions regarding implementation and evaluation of instruction for students with academic and behavioral difficulties. prereq: instr consent

EPSY 5618. Specialized Interventions for Students With Mild/Moderate Disabilities in Reading & Written Language. (; 3 cr. ; A-F or Audit; Every Fall)
The purpose of this course is to prepare teachers of students at risk and with academic disabilities to address their specific learning needs in the area of reading and written language, using a data-based decision-making approach. Through course readings, lectures, discussions, cooperative group work, microteaching, and field experiences, students will gain knowledge and skills to address the needs of children with difficulties or disabilities that affect reading and writing, including children with dyslexia and dysgraphia.

EPSY 5622. Programs and Curricula for Students with Developmental Disabilities. (; 3 cr. ; Student Option; Every Summer)
Developing programs/curricula for students with moderate, severe, profound developmental delays, as well as severe multihandicapping conditions. Special consideration given to preparing children/youth for integrated community environments. prereq: 5621 or [5661 and 5662]

EPSY 5623. Ethics in Applied Behavior Analysis. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
This course explores ethical and professional considerations that pertain to the practice of applied behavior analysis as well as ethical and disciplinary standards of the profession. Specifically, this course examines the Professional and Ethical Compliance

Code for Behavior Analysts. Emphasis will be placed upon ethical and professional conduct and legal issues relevant to BCBA level practitioners. Topics such as informed consent, due process, protection of confidentiality, and selection of least intrusive, least restrictive behavior change procedures will be discussed. This course will focus on ethical decision-making processes. Issues related to cultural and ethnic diversity and ethics in applied behavior analysis will also be explored.

EPSY 5625. Education of Infants, Toddlers, and Preschool Children with Disabilities: Introduction. (; 2 cr. ; A-F or Audit; Every Fall)
Examination of key issues and practices related to early intervention and early childhood special education, with an emphasis on family-focused and inclusive services for children birth to age six. Students enrolled in this course will be provided with a background in historical and philosophical issues relating to special education, components of due process and data privacy, the IEP/IFSP process, an overview of various disabilities and disorders, and information regarding how disabilities may affect individuals and families.

EPSY 5629. Strategic Instructional Methods for Students Academically At-Risk. (3 cr. ; A-F only; Every Fall & Summer)
Knowledge/skills needed to teach KU-CRL research-based learning strategies for students considered academically at-risk. Content relevant to basic skills/content instruction for students in K-12 settings will be included. prereq: Special Education graduate or licensure student or instr consent

EPSY 5631. Module 1: Introduction to Augmentative and Alternative Communication. (; 1 cr. ; A-F only; Every Fall, Spring & Summer)
Terms/concepts related to augmentative/ alternative communication. Myths/facts regarding AAC.

EPSY 5632. Module 2: Evidence-based Methods for AAC Assessment and Intervention. (; 2 cr. ; A-F only; Every Fall & Summer)
Evidence-based tools to conduct augmentative/ alternative communication (AAC) assessments. AAC intervention plans. Data-driven strategies to evaluate progress.

EPSY 5637. Core Practices in Special Education: Foundations of Special Education. (; 1 cr. ; S-N only; Every Fall)
This course is an online module designed to be taken the first semester of a 4-semester sequence in the Clinical EBD Licensure Program. All materials necessary for proficient completion of the course will be delivered via on-line course. There will be no additional readings associated with this online module. prereq: Enrolled in Special Ed MEd or Special Ed ILP MEd program with EBD Residency-Based subplan

EPSY 5638. Core Practices in Special Education: IEP Writing. (; 1 cr. ; S-N only; Every Spring)
This course is an online module designed to be taken the second semester, in conjunction with the IEP Process course, of a 4-semester sequence in the Clinical EBD Licensure Program. All materials necessary for proficient completion of the course will be delivered via on-line course. There will be no additional readings associated with this online module.

EPSY 5641. Foundations of Deaf Education. (; 3 cr. ; A-F only; Every Fall)
Philosophical foundations of deaf and hard of hearing (DHH) education. Engage in discussion, debates, and processes that have influenced deaf education, communication methodologies, and placement options in the US. Considered from the perspective of deaf and hard of hearing children, adults, and their families.

EPSY 5642. Early Intervention for Infants, Toddlers and Families: Deaf and Hard of Hearing. (; 3 cr. ; A-F only; Every Summer)
Early identification and intervention with deaf and hard of hearing children including the development of ASL and English, Emergent Literacy in the homes and the role of Deaf Mentors. Emphasis on the importance of early exposure to fully accessible language and addressing the issue of language deprivation. prereq: Preservice teacher in deaf education licensing program or instr consent.

EPSY 5643. Seminar: Identity, Culture and Diversity in Deaf Education. (; 2 cr. ; A-F only; Every Fall)
Reflecting on your own identity as a future teacher of the deaf and how to facilitate the identity development of your students. Having a deep understanding of the diversity of students and their families and how best to foster these relationships and communication. Synthesis of previously learned material into practice.

EPSY 5644. Early Childhood Language and Literacy Development and Best Practices: Deaf and Hard of Hearing. (; 3 cr. ; A-F only; Every Fall)
Perspectives and best practices related to the development of early language and literacy skills in ASL and English for deaf and hard of hearing children. prereq: Preservice teacher in deaf education licensing program or instr consent

EPSY 5645. Deaf Plus: Educating and Understanding Deaf Students with Disabilities. (; 2 cr. ; A-F only; Every Spring)
Building an understanding of the complex issues and best practices involved in educating deaf learners with disabilities. Working with families and service providers, identifying resources, understanding identification, placement, assessment and intervention strategies to modify curriculum to work with deaf students with varying disabilities.

EPSY 5646. Best Practices Teaching Reading and Writing for School Age: Deaf and Hard of Hearing. (; 3 cr. ; A-F only; Every Spring)
Understanding and application of best practices for teaching reading/writing with DHH students in school age settings including incorporating bilingual strategies (making connections between ASL and English).

EPSY 5647. Spoken Language Practices and Assistive Technology: Deaf and Hard of Hearing. (; 2 cr. ; A-F only; Every Summer)
Study of the role and function of spoken English and Assistive technology in classrooms with students who are deaf or hard of hearing. Including understanding of speech and hearing mechanisms. Emphasis on application of spoken language practices in bimodal settings. prereq: EPSY 5642, 5644

EPSY 5651. Best Practices Teaching Content Areas: Deaf Education. (; 3 cr. ; A-F only; Every Spring)
The purpose of this course is to prepare future teachers of the deaf to understand and apply best practices for teaching students who are deaf and hard of hearing across curricular subject areas and emphasizes infusion of language and literacy into all content areas. This course is designed to be a highly practical ?how to? course that will prepare students to go into classrooms with an understanding of how to integrate content across curricula using bilingual strategies and how to adapt materials to meet the needs of deaf and hard of hearing students at various reading levels.

EPSY 5652. Incorporating Academic ASL in the Classroom: Deaf and Hard of Hearing. (; 3 cr. ; A-F only; Every Fall)
Understanding/application of best practices incorporating Academic ASL in classrooms for students who are deaf or hard of hearing. Practice their own academic ASL skills while learning to facilitate their future students academic language. Demonstrating complex ASL across all subject areas using bilingual strategies and conceptually accurate signs.

EPSY 5653. ASL/English Structure and Application. (; 3 cr. ; A-F only; Every Fall)
Understanding the structure and assessment of ASL and English in deaf and hard of hearing children and how to analyze each language. Students gain knowledge of the parts of each language, various assessments prepare future teachers to evaluate and facilitate the development of ASL and English. Readings drawn from both bilingual and Deaf education.

EPSY 5654. Current Research, Issues Trends in Deaf Education. (; 1 cr. ; A-F only; Every Spring)
Examining current research, issue trends in Deaf Education to help prepare future teachers to develop an understanding of research and apply critical thinking to analyze new issues, problem solve, and consider participating in research to practice opportunities that may arise during their career in Deaf Education.

EPSY 5657. Interventions for Behavioral Problems in School Settings. (3 cr. ; A-F or Audit; Every Fall)
Comprehensive behavioral programs for students with social and or emotional disabilities. Instructing students with social and or emotional disabilities.

EPSY 5659. Foundations of Behavior Analysis. (3 cr. ; A-F only; Every Fall)
Behavior analysis is the science of behavior along a continuum of basic to applied learning

processes, both operant and respondent. Applied behavior analysis (ABA) is concerned with the improvement and understanding of human behavior. It is the science in which strategies derived from the principals of basic behavior analysis are applied systematically to improve socially significant behavior and experimentation is used to identify the variables responsible for change (Cooper, Heron, & Heward, 2007). This course focuses on basic concepts and methodologies involved in behavior analysis, and their relation to other theories of learning and behavior. This course is designed for individuals interested in learning from the perspective of behavior analysis and individuals who are interested in learning theory as it applies to individuals with significant cognitive and language impairments. This course is also designed to prepare students for the Behavior Analyst Certification Board (BACB) exam.

EPSY 5661. Introduction to Autism Spectrum Disorder. (; 3 cr. ; A-F only; Every Fall)
Knowledge/skills needed to promote learning/ success for school age children with Autism Spectrum Disorder. Definition, etiology, and characteristics of ASD. Current research/ issues. Collaborative problem solving, family-professional partnerships, educational programming.

EPSY 5663. Assessment and Intervention for Individuals with Autism Spectrum Disorder. (; 3 cr. ; A-F only; Every Spring)
Selection/use of range of procedures, including non-biased, specific assessments to screen/ identify children with autism spectrum disorder. Specific intervention strategies designed to teach beginning communication/social skills to children with Autism Spectrum Disorder (ASD). prereq: 5661, Special Ed grad, licensure student, ASD Certificate student, IDP major or instr consent

EPSY 5681. Educating Preschoolers with Disabilities: Specialized Approaches and Interventions. (; 3 cr. ; A-F only; Every Spring)
This course provides an opportunity to engage in in-depth learning related to a variety of specialized approaches and interventions designed to maximize developmental and educational outcomes for young children, birth to age 6, with disabilities and their families in home, community, and school-based settings. Early educators and early childhood special educators play a major role in the development, implementation, and evaluation of individualized programming and are called upon to provide services that are interdisciplinary, multicultural, family-centered, inclusive, developmentally appropriate, and effective. Thus, early childhood professionals must be knowledgeable of and proficient in their application of curricular adaptations and instructional strategies that address the needs of young children with a broad range of disabilities in a broad range of preschool settings. prereq: [5616, 5625] or instr consent

EPSY 5699. Experimental Teaching Seminar. (2 cr. ; A-F only; Every Fall & Spring)
EPsy 5699 will be taken concurrently with the student teaching experience. Coursework will center around experimental teaching utilizing data-based instruction for affecting student growth academically. Students will demonstrate this understanding by planning and conducting a 3-to-5 lesson instructional sequence for a selected focus learner during their student teaching year. In addition, students will record their instruction and reflect on the effectiveness of their academic instruction. Prereq: instr consent

EPSY 5701. Practicum: Field Experience in General Education - Inclusive Classrooms. (; 1-2 cr. ; S-N only; Every Fall & Spring)
Field-Based Practicum. Observe and actively participate in an inclusive (with and without disabilities) general education classroom. An emphasis is placed on communication skills and reflective practice.

EPSY 5702. Applied Behavior Analysis: Supervision Seminar I. (; 1 cr. [max 3 cr.] ; A-F only; Every Fall)
This course is designed to provide didactic instruction in supervision. Class meets weekly for one hour.

EPSY 5703. Applied Behavior Analysis: Supervision Seminar II. (; 1 cr. ; A-F only; Every Spring)
This course is designed to provide didactic instruction in supervision. Class meets weekly for one hour.

EPSY 5704. Clinical: Field Experiences in Middle and Secondary (HS/T) Special Education Classrooms. (; 1-2 cr. ; S-N only; Every Fall & Spring)
Field experiences (prior to student teaching) meet the requirements set by Minnesota?s Professional Educator Licensing and Standards Board (PELSB). The focus of this course is for initial licensure teacher candidates in the field of special education in preparation for practicing principles required for successful inclusion of students in their least restrictive environment (LRE). Teacher candidates will observe and interact with students with disabilities (license specific) teachers in middle and secondary (high school or transition) school settings. Consistent with the mission of the College of Education and Human Development and the Special Education Programs, this field experience strengthens effective educational practices, promotes inquiry and problem solving skills, and builds leadership skills for special educators who work with students with disabilities specific to the licensure area. All placements are requested and confirmed by the Field Placement Coordinator in the Special Education Program. Placements are based on licensure program requirements and information (e.g., availability) teacher candidates provide on the Field Experience Placement Questionnaire. Field experiences occur during the regular school day; scheduled between the hours of 7:30 a.m. and 4:00 p.m. Schedules vary by school and cooperating teacher. You will receive an email with all placement details once finalized.

EPSY 5705. Clinical: Field Experiences in ECSE or Elementary Special Education Classrooms. (; 1-2 cr. ; S-N only; Every Fall & Spring)
Field experiences (prior to student teaching) meet the requirements set by Minnesota?s Professional Educator Licensing and Standards Board (PELSB). The focus of this course is for initial licensure teacher candidates in the field of special education in preparation for practicing principles required for successful inclusion of students in their least restrictive environment (LRE). Teacher candidates will observe and interact with students with disabilities (license specific) teachers in ECSE and elementary school settings. Consistent with the mission of the College of Education and Human Development and the Special Education Programs, this field experience strengthens effective educational practices, promotes inquiry and problem solving skills, and builds leadership skills for special educators who work with students with disabilities specific to the licensure area. All placements are requested and confirmed by the Field Placement Coordinator in the Special Education Program. Placements are based on licensure program requirements and information (e.g., availability) teacher candidates provide on the Field Experience Placement Questionnaire. Field experiences occur during the regular school day; scheduled between the hours of 7:30 a.m. and 4:00 p.m. Schedules vary by school and cooperating teacher. You will receive an email with all placement details once finalized.

EPSY 5706. Practicum in Moderate to Severe Developmental Disabilities. (2 cr. ; S-N only; Every Fall & Spring)
Practicing principles required for successful inclusion. Address model for best practices/ requirements specified by Minnesota Board of Teaching.

EPSY 5707. Practicum in Moderate to Severe Learning Disabiliites. (3 cr. ; S-N only; Every Fall & Spring)
Moderate/severe learning disabilities. Transfer of theoretical knowledge to practical application. Role of LD teacher in variety of settings.

EPSY 5708. Practicum in Moderate to Severe Emotional/Behavioral Disorders. (2 cr. [max 3 cr.] ; S-N only; Every Fall & Spring)
Moderate/severe emotional behavior disorders. Transfer of theoretical knowledge to practical application. Role of EBD teacher in variety of settings.

EPSY 5741. Student Teaching: Academic and Behavioral Strategist. (3-6 cr. ; S-N only; Every Fall & Spring)
Transfer of theoretical knowledge to practical application. Responsibilities of special education teacher in variety of settings. prereq: Special education licensure program or instr consent

EPSY 5742. Student Teaching: Autism Spectrum Disorders. (; 6 cr. ; S-N only; Every Fall & Spring)
Transfer of theoretical knowledge to practical application. Role/responsibilities of special education teacher in settings of elementary/ secondary age.

EPSY 5751. Student Teaching for Deaf Education. (; 1-6 cr. [max 60 cr.] ; A-F only; Every Spring)
Students participate in educational programming for infants, children, and youth who are deaf or hard of hearing. On-site, directed experiences under supervision of master teachers of deaf/hard of hearing students.

EPSY 5755. Student Teaching: Developmental Disabilities, Mild/Moderate. (; 1-6 cr. ; A-F or Audit; Every Fall & Spring)
Supervised student teaching, or special practicum project, in schools or other agencies serving students at elementary/ secondary levels who have mild to moderate developmental disabilities. prereq: Completion of all licensure coursework, instr consent

EPSY 5756. Student Teaching: Developmental Disabilities, Moderate/ Severe. (; 1-6 cr. ; A-F or Audit; Every Fall & Spring)
Supervised student teaching, or special practicum projects, in schools or other agencies serving students at elementary/ secondary levels who have moderate to severe developmental disabilities. prereq: Completion of all licensure coursework, instr consent

EPSY 5761. Student Teaching in Early Childhood Special Education Settings for Children Aged Three to Five Years. (; 3 cr. [max 6 cr.] ; S-N only; Every Fall & Spring)
Student teachers work closely with their cooperating teacher and University supervisor to design/implement programming for children in classrooms. Course includes a seminar with discussion, cooperative learning experiences, and some lectures. prereq: Licensure candidate in Early Childhood/Early Childhood Licensure Program, completion of all other licensure requirements for ECSE, instr consent; completion of Birth-3 student teaching should be completed after age 3-5 student teaching when possible

EPSY 5762. Student Teaching in Early Childhood Special Education for Children Aged Birth to Three Years. (; 3 cr. [max 6 cr.] ; S-N only; Every Fall & Spring)
Student teachers work closely with cooperating teacher and University supervisor to design/ implement programming for families with children aged birth-to-three in their homes. Course includes seminar with discussion, cooperative learning experiences, and some lectures. prereq: Licensure candidate in Early Childhood/Early Childhood Licensure Program, completion of all other licensure requirements for ECSE, instr consent; completion of Birth-3 student teaching should be completed after age 3-5 student teaching when possible

EPSY 5763. Practicum in Special Education: Behavior Intervention Planning and Implementation. (2 cr. ; S-N only; Every Fall)
This course will be delivered within a clinical model of instruction where the instructor serves as a coaching guide and the candidates participate in a community of practice with their peers. It is expected that given the instructor's coaching and the interactions within the community of practice, that the candidate will complete the portfolio associated with this course and, as part of that completion, demonstrate proficiency in all competencies associated with this course in order to earn a passing grade. As such, there is not a didactic instruction component or assigned readings for this clinical model of instruction-based course.

EPSY 5765. Practicum in Special Education: Instructional Planning and Delivery. (2 cr. ; S-N only; Every Fall)
This course will be delivered within a clinical model of instruction where the instructor serves as a coaching guide and the candidates participate in a community of practice with their peers. It is expected that given the instructor's coaching and the interactions within the community of practice, that the candidate will complete the portfolio associated with this course and, as part of that completion, demonstrate proficiency in all competencies associated with this course in order to earn a passing grade. As such, there is not a didactic instruction component or assigned readings for this clinical model of instruction-based course.

EPSY 5802. History & Scientific Bases of Psychology. (3 cr. ; A-F only; Every Fall)
The course is designed to provide discipline-specific knowledge comprising the core of psychology. Accordingly, students will attain substantial knowledge in (1) history and systems of psychology, (2) affective, (3) biological, (4) cognitive, (5) developmental, and (6) social aspects of behavior.

EPSY 5849. Multi-tiered Systems of Support in Early Childhood Education. (; 3 cr. ; A-F only; Spring Even Year)
This course explores how multi-tiered systems of support (MTSS) are applied in early childhood settings. The course features content on early childhood assessment, intervention, data-based decision making, treatment integrity and information on how to apply MTSS models with unique early childhood populations. This course focuses on educational settings for children ages birth to 5 and is intended primarily for educational psychology students (or students from related disciplines) interested in basic and applied information regarding evidence-based service delivery for young children. The course will explore the three primary components of MTSS frameworks: assessment, intervention and data-based decision making including review of assessments and intervention techniques for infants and preschoolers in various developmental domains. Enrolled students will engage in a variety of instructional strategies to learn the noted content including large and small group discussion, lectures, active learning opportunities to practice and build capacity for specified interventions, technology-based interactions to support intervention, assessment and databased decision making and cooperative learning opportunities to engage content using dynamic methods.

EPSY 5851. Engaging Diverse Students and Families. (; 3 cr. ; Student Option; Every Fall & Spring)
Theoretical, practical, scientific issues involved in school psychological practice/training/ research. Theoretical/empirical bases for developing appropriate dispositions, practices, strategies. Illustrative lectures, discussions, group activities, case studies, presentations. prereq: Honors senior or grad student

EPSY 5991. Independent Study in Educational Psychology. (; 1-8 cr. [max 20 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Self-directed study in areas not covered by regular courses. Specific program of study is jointly determined by student and advising faculty member. prereq: instr consent

EPSY 8112. Mathematical Cognition. (; 3 cr. ; Student Option; Periodic Spring)
Cognitive science research. Papers investigating how adults/children understand fundamental mathematical concepts. Papers drawn from psychology, neuroscience, education literatures. prereq: 5114 or equiv

EPSY 8113. The Psychology of Scientific Reasoning. (3 cr. ; Student Option; Periodic Spring)
Research at intersection of cognitive science, educational psychology, science education. What psychology tells us about how people think, reason, make decisions. Read empirical research that explores psychological processes that underlie scientific reasoning. prereq: 5114 or equivalent

EPSY 8114. Seminar: Cognition and Learning. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Advanced study in critical analysis and application of contemporary psychological theory and research in cognition and learning for education.

EPSY 8115. Psychology of Instruction and Technology. (; 3 cr. ; Student Option; Spring Even Year)
Seminar including, but not limited to, learning and instructional theories, advanced and emerging technologies, and measurement and evaluation. Prereq: A course in learning, instruction, or educational technology or consent of the instructor

EPSY 8116. Reading for Meaning: Cognitive Processes in the Comprehension of Texts. (3 cr. ; Student Option; Every Spring)
Cognitive processes that take place during reading comprehension/implications of these processes for instruction/assessment.

EPSY 8117. Writing Empirical Paper and Research/Grant Proposals in Education and Psychology. (; 3 cr. ; Student Option; Every Fall)
Scientific writing skills. Focuses on logic/ argumentation. Each student produces an empirical paper or research proposal. Breaks down the writing process into components: one component per week. Each week, students write a section of their paper/proposal and critique others'. prereq: instr consent

EPSY 8118. Advanced Cognitive Psychology. (3 cr. ; Student Option; Every Fall)

This course is a graduate introduction to cognitive psychology. It is "advanced" in the sense that it focuses on higher-level cognition, and also in its emphasis on theories and models in addition to empirical results. Graduate students interested in cognitive psychology are invited to register for the course, regardless of disciplinary background.

EPSY 8119. Video-Based Microlongitudinal Research in Learning. (3 cr. ; Student Option; Fall Even Year)
This course provides a hands-on, theoretically comprehensive introduction to the use of video in research on embodied, material, psychological, and cognitive facets of social interaction and human learning. Students in this course will review, practice, critique, and develop approaches to interaction analysis. The course covers theoretical foundations (e.g., discursive psychology, ethnomethodology, learning sciences, design-based research), data collection techniques (e.g., who controls the camera, how to record high quality video and audio), data analysis practices (e.g., stitching together multiple visual perspectives, multimodal transcription, sampling), and the formulation and documentation of research findings. Students will have opportunities to analyze instructor-supplied video data of classroom learning environments and/or work with their own video data.

EPSY 8121. Play-based Learning. (3 cr. ; Student Option; Fall Even Year)
Play has been described as nature's implicit design for learning, and yet play is both notoriously difficult to define and often marginalized in formal schooling. To understand this situation, this course will draw on scholarship primarily from educational psychology and learning sciences perspectives, and secondarily from conversation analysis, game studies, and evolutionary psychology perspectives. The course will build toward an understanding of core features of play, including how rules structure play, how players inhabit roles, and what constitutes playfulness. Students will then apply this play framework critically in reflections on the design of play in learning environments, covering how play differs from games, how power operates within play, how to design for failure in play, and why play is a brittle social activity. The course is meant primarily for graduate students in the Department of Educational Psychology and within the College of Education and Human Development who have an interest in studying the role of play in learning and/or designing learning environments to nurture play. Students in this course will have opportunities to design for play, examine through qualitative methods video data of children playing during learning, and plan for how play might inform their research.

EPSY 8132. Personality Development and Socialization. (; 3 cr. ; Student Option; Every Spring)
Major research and theoretical work. Developmental and educational influences on personality. prereq: Personality or child psych course

EPSY 8157. Key Topics and Issues in Applying Social Psychology to Education. (3 cr. ; Student Option; Periodic Fall & Spring)
This course, designed for advanced graduate students, covers a number of classic and contemporary topics in social psychological theory, research, and methods, examining core theories and how they have persisted or changed over time and how those theories and approaches have been applied to research in and issues of education broadly conceived.

EPSY 8215. Advanced Research Methodologies in Education. (3 cr. ; Student Option; Every Fall)
Quantitative research methods. Models of scientific inquiry. Role of theories/research design. Role of measurement error in quantitative data-based inference. Qualitative methods of inquiry. Quantitative/qualitative methodologies in methodologically-oriented studies in educational measurement, evaluation, stats.

EPSY 8216. Seminar: Research Processes in Psychological Foundations of Education. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Advanced examination of research processes in educational psychology. Invited faculty discuss specific research designs. Students refine/implement research projects and present them in class. prereq: [5216, admitted to doctoral program in psych foundations] or instr consent

EPSY 8220. Special Topics: Seminar in Quantitative Methods. (; 1-6 cr. [max 15 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Seminars focus on specialized current topics in methodology in statistics, measurement, evaluation, and statistics education, including primary-source readings and in-depth exploration of advanced methodologies.

EPSY 8222. Advanced Measurement: Theory and Application. (3 cr. ; Student Option; Spring Odd Year)
Topics in test theory. Classical reliability/ validity theory/methods, generalizability theory. Linking, scaling, equating. Item response theory, methods for dichotomous/polytomous responses. Comparisons between classical, item response theory methods in instrument construction. prereq: [5221 or PSY 5862 or equiv], [8252 or equiv]

EPSY 8224. Performance Assessment Design and Analysis. (3 cr. ; Student Option; Spring Even Year)
Conceptualization, design, implementation, analysis of performance assessments as employed in both small-scale (e.g., classrooms), large-scale (e.g., statewide, national testing programs), professional (e.g., teacher assessment, professional certification) settings. prereq: 5221, [5262 or 8261 or 8251 or equiv]

EPSY 8225. Operational Measurement: Test Score Quality Assurance, Standard Setting, and Equating. (3 cr. ; Student Option; Spring Even Year)
Principles/practices of test score quality assurance, standard setting/equating. Operational testing programs. Focus on achievement tests. prereq: 5221, [8252 or eqiv]

EPSY 8226. Item Response Models: Theory and Applications. (3 cr. ; Student Option; Spring Even Year)
Item response theory. Application in education/ psychology/ social science. 1-, 2-, 3-paramete models for dichotomous/graded response models. Partial credit models for polytomous data. prereq: [5221 or Psy 5862 or equiv], [8252 or equiv]

EPSY 8227. Educational Accountability Testing. (; 3 cr. [max 4 cr.] ; Student Option; Spring Even Year)
Introduction to methods of test-based educational accountability. Topics covered include the meaning of student and school accountability in both a U.S. and international context; methods for aligning assessments for accountability; assessment challenges associated with accountability testing of special populations and international samples; and critiques of past and current test-based accountability efforts. The course uses a combination of lecture, group discussion, and computer analysis sessions to acquaint students with the use of data in educational decision making for purposes of educational accountability at the individual student- and school-levels. Students will also become familiar with current areas of research in educational accountability.

EPSY 8251. Statistical Methods in Education I. (3 cr. ; Student Option; Every Fall, Spring & Summer)
Statistical Methods in Education I is the first course in an entry-level, doctoral sequence for students in education. This course covers estimation and hypothesis testing with a particular focus on ANOVA and an introduction to multiple linear regression. Prepares students for EPSY 8252/8262. prereq: [EPSY 5261 or equiv] or undergrad statistics course

EPSY 8252. Statistical Methods in Education II. (3 cr. ; Student Option; Every Fall & Spring)
Statistical Methods in Education II is the second course in an entry-level, doctoral sequence for students in education. This course focuses on multiple linear regression and provides an introduction to linear mixed models. prereq: [8251, 8261 or equiv]

EPSY 8264. Advanced Multiple Regression Analysis. (3 cr. ; Student Option; Every Fall)
General linear model used as context for regression. Matrix algebra, multiple regression, path analysis, polynomial regression, standardized regression, stepwise solutions, analysis of variance, weighted least squares, logistic regression. prereq: [8252 or equiv], regression/ANOVA course, familiarity with statistical analysis package

EPSY 8265. Factor Analysis. (3 cr. ; Student Option; Every Fall)
Factor analytic techniques/applications. Component, common factor, confirmatory

analysis. Factor extraction, estimating number of dimensions. Rotation, factor scores, hierarchical factor analysis. prereq: [8252 or equiv or instr consent]

EPSY 8266. Statistical Analysis Using Structural Equation Methods. (3 cr. ; Student Option; Periodic Spring)
Quantitative techniques using manifest/latent variable approaches for analysis of educational/social science data. Introduction to structural equation modeling approaches to multiple regression, factor analysis, path modeling. Developing, estimating, interpreting structural equation models. prereq: 8265, [8252 or equiv]

EPSY 8267. Applied Multivariate Analysis. (3 cr. ; Student Option; Spring Even Year)
Use/interpretation of results from several multivariate statistical techniques. Matrix algebra, variance/covariance, Hotelling's T2, GLM, MANOVA, MANCOVA, discriminant analysis, canonical correlations, dimensionality, principal components, latent composites, distance, hierarchical clustering. prereq: [8252 or equiv], familiarity with matrix algebra, knowledge of a computerized statistics package

EPSY 8268. Hierarchical Linear Modeling in Educational Research. (3 cr. ; Student Option; Every Fall)
Conceptual framework of hierarchical linear models for nested data, their application in educational research. Nature/effects of nested data, logic of hierarchical models, mixed-effects models. Estimation/hypothesis testing in these models, model-checking, nonlinear models. prereq: [8252 or equiv]

EPSY 8271. Statistics Education Research Seminar: Studies on Teaching and Learning Statistics. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Introduction to classic/current research related to teaching/learning of statistics. Research from psychology, education, and statistics. Students focus on a particular research question and review the literature related to that question.

EPSY 8282. Statistical Analysis of Longitudinal Data. (3 cr. ; Student Option; Every Fall)
Traditional/modern approaches to analyzing longitudinal data. Dependent t-test, repeated measures ANOVA/MANOVA. Linear mixed models, multilevel models, generalized models. prereq: [8252 or equiv]

EPSY 8283. Research Synthesis and Meta-Analysis. (3 cr. ; Student Option; Fall Even Year)
Meta-analysis is a methodology for conducting quantitative literature reviews in which the outcomes of empirical research studies are aggregated and their variation studied. This course will cover topics on problem formulation, sampling, variable coding, data analysis, and presentation of results in meta-analytic research. prereq: EPSY 8252 or equiv

EPSY 8290. Special Topics: Seminar in Psychological Foundations. (; 1-6 cr. [max 15 cr.] ; Student Option; Periodic Fall & Spring)
Students formulate research designs. Learning and cognition, social psychology, measurement, and statistics. prereq: instr consent

EPSY 8296. Quantitative Methods in Education Internship. (; 1-3 cr. [max 9 cr.] ; S-N only; Periodic Fall, Spring & Summer)
Practical experience in applying concepts and skills in measurement, statistics, and evaluation in a real-world setting under supervision of a research professional. prereq: EPsy MA or PhD student, QME track

EPSY 8300. Special Topics in Educational Psychology. (; 1-4 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Issues or related coursework in areas not normally available through regular curriculum offerings.

EPSY 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

EPSY 8400. Topics: Counseling and Student Personnel Psychology. (; 1-3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Current issues in counseling and student personnel psychology, or related coursework in areas not normally available through regular curriculum offerings.

EPSY 8411. Advanced Counseling Research. (; 4 cr. ; A-F or Audit; Every Fall)
Focus on critically reviewing counseling research, qualitatively and quantitatively integrating research, and designing valid research. prereq: Ed psy PhD student with CSPP subprog or instr consent

EPSY 8412. Seminar: Advanced Counseling Theory and Ethics. (; 4 cr. ; A-F or Audit; Every Spring)
Comparative analysis of theoretical models and methods used in contemporary counseling and psychotherapy; ethical standards and models of ethical decision making for professional roles. prereq: Ed psy PhD student with CSPP subprog or instr consent

EPSY 8413. Personality Assessment of Adolescents and Adults. (; 3 cr. ; A-F only; Every Spring)
Assessment interviews, objective personality assessments (e.g., MMPI-2), projective tests (e.g., Thematic Apperception Test), and assessment report writing. prereq: [8407 or PSY 5604H or PSY 8111 or PSY 8112], doctoral student, instr consent

EPSY 8431. Master's Research Seminar: CSPP. (3 cr. [max 4 cr.] ; A-F or Audit; Every Spring)
Survey of research methods, data-based decision making, basic research design skills, and research simulation. prereq: 5261 or equiv, 5221 or equiv, EPsy MA student with CSPP subprog or instr consent

EPSY 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

EPSY 8501. Counseling Pre-Practicum. (; 3 cr. ; A-F or Audit; Every Fall)
Overview of basic helping skills through demonstration, in-class practice. prereq: [CSPP or genetic counseling] grad student

EPSY 8502. Field Placement in Counseling and Student Personnel Psychology. (; 2 cr. ; S-N or Audit; Every Fall & Spring)
Students participate under supervision in practitioner activities within a counseling work environment. prereq: 8501 or instr consent

EPSY 8509. Supervision Practicum: CSPP. (1-2 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Doctoral students meet weekly with master's prepracticum or practicum students for didactic supervision activities. Specific activities determined by master's prepracticum or practicum instructor. Doctoral students meet weekly with master's prepracticum or practicum instructor and other doctoral student supervisors for consultation/supervision. prereq: [Ed psy PhD student with CSPP subprog] or instr consent

EPSY 8512. Internship: CSPP. (; 1-12 cr. ; S-N only; Every Fall, Spring & Summer)
Supervised internship in counseling psychology. prereq: EdPsy PhD student with CSPP subprog

EPSY 8521. Practicum in Student Affairs and Student Development. (; 1-4 cr. [max 8 cr.] ; A-F or Audit; Every Fall & Spring)
Supervised practice in university and college student development offices. prereq: EdPsy MA or PhD student with CSPP subprog or instr consent

EPSY 8522. Counseling Practicum: Advanced. (; 3 cr. [max 12 cr.] ; A-F only; Every Fall & Spring)
Advanced skills practicum in counseling, counseling psychology, or student development. prereq: [Grad EPsy PhD student with CSPP subprog] or instr consent; instructor consent required after 2 repeats

EPSY 8600. Special Topics: Special Education Issues. (; 1-3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Current trends (e.g., schoolwide discipline, models of collaboration, and diversity) investigated by formulating research projects. Students write a media piece describing an issue and its impact on the community.

EPSY 8602. Advanced Topics in Special Education Research. (3 cr. [max 12 cr.] ; A-F only; Every Fall & Spring)
This course will offer sections on varying topics focused on research, policy, practice, and related issues in special education and disability services for advanced graduate seminars. The course is intended to allow enrolled students to conduct in-depth and focused review and analysis of scholarship in a contemporary area of special education, and to provide each student the opportunity to develop in-depth understanding of a specific topic within this area. This is a seminar course, with a combination of faculty-presented, student-presented, and group discussion content.

Course topics will include an overview of relevant theoretical models, research methods, empirical and other findings, and areas of emerging interest, scholarship, policy, and practice. prereq: Completion of EPsy 8701, 8702, and 8694 or equivalent coursework; doctoral Student in Special Education or a related academic area, or permission of instructor

EPSY 8612. Seminar: Students with Academic Difficulties. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Survey, analysis, and application of relevant theories and research related to current issues. Students in course develop skills in scholarly inquiry, writing, and debate.

EPSY 8651. Seminar on Social and Emotional Disabilities. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Review and critical analysis of current trends and future directions of education of students with social and emotional disabilities.

EPSY 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Doctoral Pre-Thesis Credits prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

EPSY 8694. Research in Special Education. (; 3 cr. ; Student Option; Every Fall & Spring)
Design and implementation of research related to the unique developmental characteristics of exceptional learners.

EPSY 8701. Doctoral Core Seminar: Special Education I. (; 3 cr. [max 6 cr.] ; A-F or Audit; Every Fall)
Required for students with a family/life span focus on social development, behavioral interaction, and cultural interactions. prereq: EdPsy PhD student with spec ed subprog or instr consent

EPSY 8702. Doctoral Core Seminar: Special Education II. (; 3 cr. [max 6 cr.] ; A-F or Audit; Every Spring)
Required for students focusing on communication/language/academics. prereq: 8701 or instr consent

EPSY 8706. Single Case Designs in Intervention Research. (; 3 cr. ; Student Option; Every Fall)
Design and analysis of single-case experiments to examine effects of interventions on individual behavior in school, home, and community.

EPSY 8707. Principles of Behavior Analysis and Learning. (; 3 cr. ; A-F only; Every Fall)
Historical development of behavioral science. Thinking about learning/behavior, applying principles to common human experiences. Scholarly leadership skills. prereq: [Grad student, foundational course in [learning or psychology]] or instr consent

EPSY 8708. Functional Behavior Assessment. (; 3 cr. ; A-F only; Every Spring)
Applications of principles of behavior. Historical/contemporary approaches. Functional analysis. Treatment of challenging behavior/learning problems. prereq: [Grad student, one [learning or psychology] course] or instr consent

EPSY 8709. Sp Ed Issues - Language & Early Literacy Dev., Assmnt, & Intervention for Young Children. (3 cr. ; A-F only; Fall Even Year)
This seminar course will address contemporary issues in theory, assessment, and interventions to promote language and early literacy development for young children (typically, those not yet age-eligible to enroll in kindergarten) at risk for later reading delays. The course will review and analyze relevant theoretical models, basic research related to these theories, and applied research in assessment and intervention, particularly research conducted in the past five years as well as emerging issues of research and practice.

EPSY 8772. Seminar in Early Intervention. (; 2 cr. ; Student Option; Every Fall & Spring)
Explores research from diverse disciplines related to education of infants, toddlers, and preschool children with disabilities and their families. Discusses practical application of this research.

EPSY 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

EPSY 8800. Special Topics in School Psychology. (; 1-4 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Issues or related coursework in areas not normally available through regular curriculum offerings.

EPSY 8811. Assessment in School Psychology I: Foundations of Academic Assessment. (; 3 cr. ; A-F or Audit; Every Fall)
Theories and models of psychoeducational assessment of children and adolescents within home, school, and community. Conceptual and empirical foundations of eco-behavioral assessment that lead to efficient but comprehensive assessment of children presented from problem-solving perspective. prereq: Grad ed psy major with school psy subprog or instr consent

EPSY 8812. Assessment in School Psychology II: Intellectual and Social-Emotional Domains. (; 3 cr. ; A-F or Audit; Every Fall)
Builds on EPsy 8811. Emphasizes gathering data on a child's intellectual and social-emotional functioning and educational progress. prereq: Grad ed psy major with school psy subprog or instr consent

EPSY 8813. Introductory Practicum in School Psychology. (; 2 cr. [max 4 cr.] ; A-F only; Every Fall & Spring)
Students complete a variety of learning activities intended to foster familiarity with the school environment and role of the school psychologist including school observations, and formal and informal assessment techniques. All measures complement other facets of assessment presented in EPSY 8811 and 8812.

EPSY 8815. Behavioral and Social Emotional Prevention and Intervention. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Theories and research-based practices underlying prevention and intervention practices to support students? behavioral, social, and emotional development. Applied projects and assignments in practicum placements. prereq: 8821, 8811, 8812

EPSY 8816. Academic Prevention and Intervention. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Theories and research-based approaches to prevention, instruction, and intervention practices to support students? cognitive and academic development in core curricular domains. Applied projects and assignments in practicum placements.

EPSY 8817. Problem Analysis and Consultation in School Psychology. (; 3 cr. ; A-F or Audit; Every Spring)
Practical application of problem analysis and consultation models with school staff, parents, and students. Theories, approaches, and barriers to research-based indirect services in school psychology. Applied projects and assignments in practicum placements.

EPSY 8818. Intermediate Practicum in School Psychology. (; 2 cr. [max 4 cr.] ; A-F only; Every Fall & Spring)
Students complete a variety of learning activities intended to foster familiarity with the role of the school psychologist including formal and informal assessment techniques, academic and social-emotional interventions, and consultation. All interventions and consultation activities are linked to didactic portions of EPSY 8815, 8816, 8817. prereq: concurrent registration is required (or allowed) in 8815 or concurrent registration is required (or allowed) in 8816

EPSY 8819. Emotion & Childhood Psychopathology. (3 cr. ; A-F only; Every Spring)
This seminar is designed to provide an overview of historical and current perspectives on emotion and childhood psychopathology, including current diagnostic and classification systems, with emphasis on specific disorders. The course will focus on disorders that are typically observed by psychologists working in schools and other applied settings.

EPSY 8821. Issues in School Psychology. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
School psychology as professional field of specialization in psychology/education. Historical, theoretical, and research basis of school psychology. How school systems operate. Common roles/functions of school psychologists. In-class discussion, didactic/ field-based assignments. prereq: EPsy grad student with SchlPsy subprog

EPSY 8822. Research in School Psychology. (3 cr. [max 12 cr.] ; A-F only; Every Fall & Spring)
Integrative, developmental series of discussions/activities about research in school psychology. Instruction/discussion regarding consumption, synthesis, conduct, dissemination of school psychology research.

EPSY 8823. Ethics and Professional Standards in School Psychology. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Ethics, law, and current educational issues applied to study/practice of school psychology. Ethical principles, state/federal laws governing educational practices. How mandates are applied to work of school psychologists in general/special populations (e.g., special education, ESL, ethnic/racial minorities). Students apply learning as researchers and practicing school psychologists in schools. prereq: 8821

EPSY 8831. Comprehensive School Practicum in School Psychology. (; 3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
Supervised school field placement requiring assessment, consultation, prevention, and intervention activities.

EPSY 8832. Advanced Practicum in School Psychology. (; 3 cr. [max 6 cr.] ; A-F only; Every Fall, Spring & Summer)
Supervised field placement individualized to student interests and training goals. May require variety of assessment, consultation, prevention, and intervention activities.

EPSY 8841. Practicum: Instruction and Supervision in School Psychology. (3 cr. [max 6 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Didactic training/supervised experience teaching. Knowledge/skills in strategies for effective classroom instruction/supervision in individual/small group instruction. Construct teaching portfolio. prereq: Grad ed psy major with school psy subprog or instr consent

EPSY 8842. Internship: School Psychological Services. (; 1-10 cr. [max 99 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Advanced field placement. Full-time supervised experience for one year or part-time for no more than two years. prereq: Grad ed psy major with school psy subprog, instr consent

EPSY 8843. Internship - School Psychology. (1 cr. [max 4 cr.] ; S-N only; Every Fall & Spring)
Advanced field placement. Full-time supervised experience for one year or part-time for no more than two years. prereq: instr consent

EPSY 8849. Assessment in Early Childhood. (3 cr. ; A-F or Audit; Spring Even Year)
Training psychologists/researchers in use of various assessment tools, including observational assessment strategies, for children birth-age 7. Intended primarily for graduate level practitioners-in-training interested in applied information on assessment/intervention services. prereq: [8811, 8812] or equivalent in related programs

EPSY 8850. Doctoral Seminar in School Psychology: Research, Training, Practice, Policy Issues, and Action Plans. (; 3 cr. ; A-F only; Periodic Fall & Spring)
Critical issues in school psychology, led by students or visiting professionals. Outside reading/research. Scientific findings/ implications for training, practice, policy, and research. Students create professional-development plan. prereq: [[Grad student in school psychology, coursework in school psychology] or advanced PhD student from related department], instr consent

EPSY 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

EPSY 8905. History and Systems of Psychology: Landmark Issues in Educational Psychology. (; 3 cr. ; Student Option; Spring Odd Year)
Critical issues in learning and cognition, statistics and measurement, counseling, school psychology, social psychology of education, and special education. prereq: Ed psy PhD student

EPSY 8993. Directed Study: Educational Psychology. (; 1-10 cr. [max 20 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Arranged independently with individual faculty members. prereq: instr consent

EPSY 8994. Research Problems: Educational Psychology. (; 1-6 cr. [max 18 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Research methodology, techniques, and literature. Students participate in formulating/ executing research proposal. prereq: instr consent

Educational/Human Development (EDHD)

EDHD 5100. International Topics for Graduate Students. (; 1-12 cr. ; Student Option; Every Fall, Spring & Summer)
Off-campus course. Topics from research exploration to academic/engagement activities. Delivered in international setting.Course requirements are determined by instructor(s) and reflect graduate-level rigor.

EDHD 5300. Special Topics: Ed & Human Dev. (; 1-6 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Special topics in education and human development.

EDHD 8300. Special Topics in Education and Human Development. (; 1-8 cr. ; A-F only; Periodic Fall, Spring & Summer)
Special topics in education and human development.

Electrical & Computer Eng (EE)

EE 5041. Industrial Assignment for Graduate Students. (1 cr. ; S-N only; Every Fall, Spring & Summer)
Optional industrial work assignment. Evaluation based on student's formal written report covering semester's work assignment. This course counts for 6 credits of Academic Progress for the semester in which it is taken. prereq: Consent of Advisor and Office of the DGS

EE 5121. Transistor Device Modeling for Circuit Simulation. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Basics of MOS, bipolar theory. Evolution of popular device models from early SPICE models to current industry standards. prereq: [3115, 3161, CSE grad student] or dept consent

EE 5141. Introduction to Microsystem Technology. (; 4 cr. ; Student Option; Every Spring)
Microelectromechanical systems composed of microsensors, microactuators, and electronics integrated onto common substrate. Design, fabrication, and operation principles. Labs on micromachining, photolithography, etching, thin film deposition, metallization, packaging, and device characterization. prereq: [3161, 3601, CSE grad student] or dept consent

EE 5163. Semiconductor Properties and Devices I. (; 3 cr. ; Student Option; Every Fall)
Principles/properties of semiconductor devices. Selected topics in semiconductor materials, statistics, and transport. Aspects of transport in p-n junctions, heterojunctions. prereq: [3161, 3601, CSE grad student] or dept consent

EE 5164. Semiconductor Properties and Devices II. (; 3 cr. ; Student Option; Every Spring)
Principles/properties of semiconductor devices. Charge control in different FETs, transport, modeling. Bipolar transistor models (Ebers-Moll, Gummel-Poon), heterostructure bipolar transistors. Special devices. prereq: 5163 or instr consent

EE 5171. Microelectronic Fabrication. (; 3 cr. [max 4 cr.] ; Student Option; Every Fall)
Fabrication of microelectronic devices. Silicon integrated circuits, GaAs devices. Lithography, oxidation, diffusion. Process integration of various technologies, including CMOS, double poly bipolar, and GaAs MESFET. prereq: CSE grad student or dept consent

EE 5173. Basic Microelectronics Laboratory. (; 1 cr. ; Student Option; Every Fall)
Students fabricate a polysilicon gate, single-layer metal, NMOS chip, performing 80 percent of processing, including photolithography, diffusion, oxidation, and etching. In-process measurement results are compared with final electrical test results. Simple circuits are used to estimate technology performance. prereq: [[5171 or concurrent registration is required (or allowed) in 5171], CSE grad student] or dept consent

EE 5181. Micro and Nanotechnology by Self Assembly. (; 3 cr. ; Student Option; Spring Odd Year)
Self-assembly process of micro and nano structures for realization of 1-, 2-, 3-dimensional micro- and nano-devices. Micro and nanoscale fabrication by electrostatic,

magnetic, surface tension, Capillary, intrinsic and extrinsic forces. Nanoscale lithographic patterning. Devices packaging, Self-healing process. prereq: EE 3161, Phys 1302

EE 5231. Linear Systems and Optimal Control. (; 3 cr. ; Student Option; Every Fall)
Properties and modeling of linear systems. Linear quadratic and linear-quadratic-Gaussian regulators. Maximum principle. prereq: [3015, CSE grad student] or instr consent

EE 5235. Robust Control System Design. (; 3 cr. ; Student Option; Every Spring)
Development of control system design ideas; frequency response techniques in design of single-input/single-output (and MI/MO) systems. Robust control concepts. CAD tools. prereq: CSE grad, 3015, 5231 or instr consent

EE 5239. Introduction to Nonlinear Optimization. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Nonlinear optimization. Analytical/ computational methods. Constrained optimization methods. Convex analysis, Lagrangian relaxation, non-differentiable optimization, applications in integer programming. Optimality conditions, Lagrange multiplier theory, duality theory. Control, communications, management science applications. prereq: [3025, Math 2373, Math 2374, CSE grad student] or dept consent

EE 5241. Optimal Control and Reinforcement Learning. (3 cr. ; Student Option; Every Fall)
(Prereq-CSE grad student or instructor consent) A wide variety of control problems such as "walk from home to school via the shortest path" or "maintain a constant temperature" can be modeled using optimization. This course will survey a variety of methods for modeling and solving optimal control problems. In particular, we will cover numerical optimal control, model predictive control, system identification, dynamic programming, and reinforcement learning. Examples from robotics and aerospace systems will be given.

EE 5251. Optimal Filtering and Estimation. (; 3 cr. ; Student Option; Every Fall)
Basic probability theory, stochastic processes. Gauss-Markov model. Batch/recursive least squares estimation. Filtering of linear/nonlinear systems. Continuous-time Kalman-Bucy filter. Unscented Kalman filter, particle filters. Applications. prereq: [[[MATH 2243, STAT 3021] or equiv], CSE grad student] or dept consent; 3025, 4231 recommended

EE 5271. Robot Vision. (3 cr. ; Student Option; Every Fall)
Modern visual perception for robotics that includes position and orientation, camera model and calibration, feature detection, multiple images, pose estimation, vision-based control, convolutional neural networks, reinforcement learning, deep Q-network, and visuomotor policy learning. [Math 2373 or equivalent; EE 1301 or equivalent basic programming course]

EE 5301. VLSI Design Automation I. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Basic graph/numerical algorithms. Algorithms for logic/high-level synthesis. Simulation algorithms at logic/circuit level. Physical-design algorithms. prereq: [2301, CSE grad student] or dept consent

EE 5302. VLSI Design Automation II. (; 3 cr. ; Student Option; Every Spring)
Basic algorithms, computational complexity. High-level synthesis. Test generation. Power estimation. Timing optimization. Current topics. prereq: [5301, CSE grad student] or dept consent

EE 5323. VLSI Design I. (; 3 cr. ; Student Option; Every Fall)
Combinational static CMOS circuits. Transmission gate networks. Clocking strategies, sequential circuits. CMOS process flows, design rules, structured layout techniques. Dynamic circuits, including Domino CMOS and DCVS. Performance analysis, design optimization, device sizing. prereq: [2301, 3115, CSE grad student] or dept consent

EE 5324. VLSI Design II. (; 3 cr. ; Student Option; Every Spring)
CMOS arithmetic logic units, high-speed carry chains, fast CMOS multipliers. High-speed performance parallel shifters. CMOS memory cells, array structures, read/write circuits. Design for testability, including scan design and built-in self test. VLSI case studies. prereq: [5323, CSE grad student] or dept consent

EE 5327. VLSI Design Laboratory. (; 3 cr. ; Student Option; Every Spring)
Complete design of an integrated circuit. Designs evaluated by computer simulation. prereq: [4301, [5323 or concurrent registration is required (or allowed) in 5323], CSE grad student] or dept consent

EE 5329. VLSI Digital Signal Processing Systems. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Programmable architectures for signal/ media processing. Data-flow representation. Architecture transformations. Low-power design. Architectures for two's complement/ redundant representation, carry-save, and canonic signed digit. Scheduling/allocation for high-level synthesis. prereq: [[5323 or concurrent registration is required (or allowed) in 5323], CSE grad student] or dept consent

EE 5333. Analog Integrated Circuit Design. (; 3 cr. ; Student Option; Every Fall)
Fundamental circuits for analog signal processing. Design issues associated with MOS/BJT devices. Design/testing of circuits. Selected topics (e.g., modeling of basic IC components, design of operational amplifier or comparator or analog sampled-data circuit filter). prereq: [3115, CSE grad student] or dept consent

EE 5334. CMOS VLSI Data Converter Design. (3 cr. ; Student Option; Spring Odd Year)
This course covers the design of modern CMOS VLSI data converters. After a brief introduction to sampling theory and quantization noise the course will focus on various Nyquist rate and oversampled converters. In particular, we will discuss flash, pipelined, successive approximation and sigma-delta converters. The course will involve a design project that will require the use of the Cadence design tools or equivalent analog/ digital VLSI design software.

EE 5340. Introduction to Quantum Computing and Physical Basics of Computing. (3 cr. ; Student Option; Every Spring)
Physics of computation will explore how physical principles and limits have been shaping paradigms of computing. A key goal of this course is to understand how (and to what extent) a paradigm shift in computing can help with emerging energy problems. Topics include physical limits of computing, coding and information theoretical foundations, computing with beyond-CMOS devices, reversible computing, quantum computing, stochastic computing. A previous course in computer architecture is suggested but not required.

EE 5351. Applied Parallel Programming. (3 cr. ; Student Option; Every Fall)
Parallel programming/architecture. Application development for many-core processors. Computational thinking, types of parallelism, programming models, mapping computations effectively to parallel hardware, efficient data structures, paradigms for efficient parallel algorithms, application case studies. prereq: [4363 or equivalent], programming experience (C/C++ preferred)

EE 5355. Algorithmic Techniques for Scalable Many-core Computing. (3 cr. ; Student Option; Spring Odd Year)
Algorithm techniques for enhancing the scalability of parallel software: scatter-to-gather, problem decomposition, binning, privatization, tiling, regularization, compaction, double-buffering, and data layout. These techniques address the most challenging problems in building scalable parallel software: limited parallelism, data contention, insufficient memory bandwidth, load balance, and communication latency. Programming assignments will be given to reinforce the understanding of the techniques. prereq: basic knowledge of CUDA, experience working in a Unix environment, and experience developing and running scientific codes written in C or C ++. Completion of EE 5351 is not required but highly recommended.

EE 5364. Advanced Computer Architecture. (; 3 cr. ; Student Option; Every Fall)
Instruction set architecture, processor microarchitecture. Memory and I/O systems. Interactions between computer software and hardware. Methodologies of computer design. prereq: [[4363 or CSci 4203], CSE grad student] or dept consent

EE 5371. Computer Systems Performance Measurement and Evaluation. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Tools/techniques for analyzing computer hardware, software, system performance. Benchmark programs, measurement tools,

performance metrics. Deterministic/probabilistic simulation techniques, random number generation/testing. Bottleneck analysis. prereq: [4363 or 5361 or CSci 4203 or 5201], [CSE grad student] or dept consent

EE 5373. Data Modeling Using R. (1 cr. ; A-F only; Periodic Fall & Spring)
Introduction to data modeling and the R language programming. Multi-factor linear regression modeling. Residual analysis and model quality evaluation. Response prediction. Training and testing. Integral lab. An introductory course in probability and statistics is suggested but not required; basic programming skills in some high-level programming language, such as C/C++, Java, Fortran, etc also suggested.

EE 5389. Introduction to Predictive Learning. (3 cr. ; Student Option; Fall Even Year)
Empirical inference and statistical learning. Classical statistical framework, model complexity control, Vapnik-Chervonenkis (VC) theoretical framework, philosophical perspective. Nonlinear methods. New types of inference. Application studies. prereq: EE 3025, STAT 3022 or equivalent; computer programming or MATLAB or similar environment is recommended.

EE 5393. Circuits, Computation, and Biology. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Connections between digital circuit design and synthetic/computational biology. Probabilistic, discrete-event simulation. Timing analysis. Information-Theoretic Analysis. Feedback in digital circuits/genetic regulatory systems. Synthesizing stochastic logic and probabilistic biochemistry.

EE 5501. Digital Communication. (; 3 cr. ; Student Option; Every Fall)
Theory/techniques of modern digital communications. Communication limits. Modulation/detection. Data transmission over channels with intersymbol interference. Optimal/suboptimal sequence detection. Equalization. Error correction coding. Trellis-coded modulation. Multiple access. prereq: [3025, 4501, CSE grad student] or dept consent

EE 5505. Wireless Communication. (; 3 cr. ; Student Option; Every Spring)
Introduction to wireless communication systems. Propagation modeling, digital communication over fading channels, diversity and spread spectrum techniques, radio mobile cellular systems design, performance evaluation. Current European, North American, and Japanese wireless networks. prereq: [4501, CSE grad student] or dept consent; 5501 recommended

EE 5531. Probability and Stochastic Processes. (; 3 cr. ; Student Option; Every Fall)
Probability, random variables and random processes. System response to random inputs. Gaussian, Markov and other processes for modeling and engineering applications. Correlation and spectral analysis. Estimation principles. Examples from digital communications and computer networks. prereq: [3025, CSE grad student] or dept consent

EE 5542. Adaptive Digital Signal Processing. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Design, application, and implementation of optimum/adaptive discrete-time FIR/IIR filters. Wiener, Kalman, and Least-Squares. Linear prediction. Lattice structure. LMS, RLS, and Levinson-Durbin algorithms. Channel equalization, system identification, biomedical/sensor array processing, spectrum estimation. Noise cancellation applications. prereq: [4541, 5531, CSE grad student] or dept consent

EE 5545. Digital Signal Processing Design. (; 3 cr. ; Student Option; Every Spring)
Real-time implementation of digital signal processing (DSP) algorithms, including filtering, sample-rate conversion, and FFT-based spectral analysis. Implementation on a modern DSP Platform. Processor architecture. Arithmetic operations. Real-time processing issues. Processor limitations. Integral laboratory. prereq: [4541, CSE grad student] or dept consent

EE 5549. Digital Signal Processing Structures for VLSI. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Pipelining. Parallel processing. Fast convolution. FIR, rank-order, IIR, lattice, adaptive digital filters. Scaling and roundoff noise. DCT. Viterbi coders. Lossless coders, video compression. prereq: [4541, CSE grad student] or dept consent

EE 5561. Image Processing and Applications: From linear filters to artificial intelligence. (; 3 cr. ; Student Option; Every Spring)
Image enhancement, denoising, segmentation, registration, and computational imaging. Sampling, quantization, morphological processing, 2D image transforms, linear filtering, sparsity and compression, statistical modeling, optimization methods, multiresolution techniques, artificial intelligence concepts, neural networks and their applications in classification and regression tasks in image processing. Emphasis is on the principles of image processing. Implementation of algorithms in Matlab/Python and using deep learning frameworks. prereq: [4541, 5581, CSE grad student] or instr consent

EE 5581. Information Theory and Coding. (; 3 cr. ; Student Option; Fall Even Year)
Source/channel models, codes for sources/channels. Entropy, mutual information, capacity, rate-distortion functions. Coding theorems. prereq: [5531, CSE grad student] or dept consent

EE 5583. Error Control Coding. (; 3 cr. ; Student Option; Periodic Spring)
Error-correcting codes. Concepts, properties, polynomial representation. BCH, Golay, Reed-Muller/Reed-Solomon codes. Convolutional codes. Iterative codes. prereq: [[3025, Math 2373] or equiv], [CSE grad student or dept consent]

EE 5585. Data Compression. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Source coding in digital communications and recording. Codes for lossless compression. Universal lossless codes. Lossless image compression. Scalar and vector quantizer design. Loss source coding theory. Differential coding, trellis codes, transform/subband coding. Analysis/synthesis schemes. prereq: CSE grad student or dept consent

EE 5601. Introduction to RF/Microwave Engineering. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Fundamentals of EM theory and transmission lines concepts. Transmission lines and network analysis. CAD tool. Lumped circuit component designs. Passive circuit components. Connectivity to central communication theme. prereq: [3601, CSE grad student] or dept consent

EE 5602. RF/Microwave Circuit Design. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Transmission lines, network analysis concepts. CAD tools for passive/active designs. Diode based circuit designs (detectors, frequency multipliers, mixers). Transistor based circuit design (amplifiers, oscillators, mixer/doubler). prereq: [5601 or equiv], [CSE grad student or instr consent]

EE 5607. Wireless Hardware System Design. (; 3 cr. ; Student Option; Every Spring)
Review of random processes, noise, modulation, and error probabilities. Basis antenna operation, power transfer between antennas, rf propagation phenomena, transmitters/receivers, transmission lines, effect of antenna performance on system performance, rf/microwave device technologies, small-signal amplifiers, mixers, power amplifiers, rf oscillators.

EE 5611. Plasma-Aided Manufacturing. (; 4 cr. ; A-F or Audit; Periodic Fall & Spring)
Manufacturing using plasma processes. Plasma properties as a processing medium. Plasma spraying, welding and microelectronics processing. Process control and system design; industrial speakers. Cross-disciplinary experience between heat transfer design issues and manufacturing technology. prereq: [[[ME 3321, ME 3322] or equiv], [upper div CSE or grad student]] or dept consent

EE 5613. RF/Microwave Circuit Design Laboratory. (; 2 cr. ; A-F only; Every Spring)
Scattering parameters, planar lumped circuits, transmission lines, RF/microwave substrate materials, matching networks/tuning elements, resonators, filters, combiners/dividers, couplers. Integral lab. prereq: [[5601 or concurrent registration is required (or allowed) in 5601], CSE grad student] or dept consent

EE 5616. Antenna Theory and Design. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Antenna performance parameters, vector potential/radiation integral, wire antenna structures, broadband antenna structures, microstrips/aperture theory, antenna measurements. prereq: [[5601 or concurrent registration is required (or allowed) in 5601], CSE grad student] or dept consent

EE 5621. Physical Optics. (; 3 cr. ; Student Option; Every Spring)
Physical optics principles, including Fourier analysis of optical systems/images, scalar diffraction theory, interferometry, and coherence theory. Diffractive optical elements, holography, astronomical imaging, optical information processing, microoptics. prereq: [3015, CSE grad student] or dept consent

EE 5622. Physical Optics Laboratory. (; 1 cr. ; Student Option; Every Spring)
Fundamental optical techniques. Diffraction and optical pattern recognition. Spatial/temporal coherence. Interferometry. Speckle. Coherent/incoherent imaging. Coherent image processing. Fiber Optics. prereq: [[5621 or concurrent registration is required (or allowed) in 5621], CSE grad student] or dept consent

EE 5624. Optical Electronics. (; 4 cr. ; Student Option; Every Fall)
Fundamentals of lasers, including propagation of Gaussian beams, optical resonators, and theory of laser oscillation. Polarization optics, electro-optic, acousto-optic modulation, nonlinear optics, phase conjugation. prereq: [[3601 or Phys 3002], CSE grad student] or dept consent

EE 5627. Optical Fiber Communication. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Components/systems aspects of optical fiber communication. Modes of optical fibers. Signal degradation/dispersion. Optical sources/detectors. Digital/analog transmissions systems. Direct/coherent detection. Optical amplifiers. Optical soliton propagation. prereq: [3015, 3601, CSE grad student] or dept consent

EE 5640. Introduction to Nano-Optics. (3 cr. ; Student Option; Every Fall)
This course will cover the physics and technology of nano-optics and plasmonics and their potential applications in biochemical sensing, super-resolution imaging, optical trapping, light emission, and spectroscopy. The following topics will be covered: - Maxwell's equations, E&M of metals - Fresnel's equations, light propagation in periodic media - Physics of surface plasmon waves - Metallic waveguides: metal-insulator-metal vs. insulator-metal-insulator - Optical antennas - Noble metal nanoparticles: Synthesis, optical properties, and applications - Optical biosensors based on surface plasmon resonance (SPR) - Surface enhanced Raman scattering (SERS) - Surface enhanced Infrared Absorption (SEIRA) - Super-resolution imaging and near-field optical microscopy - Light transmission through nano-apertures (extraordinary optical transmission) - Plasmonics at long wavelengths (infrared and terahertz) - Plasmonics in atomically thick materials Knowledge of Maxwell's equations, Matlab, or Mathematica coding is suggested but not required.

EE 5649. Infrared Devices and Technology. (3 cr. ; Student Option; Periodic Fall)
One of the most economically and scientifically important but relatively unknown device technologies is infrared detection, sensing and imaging. Today the application space is much larger than traditional military applications and includes weather and climate satellites, industrial process control, petrochemical analysis, pollution sensing, astronomy, and biomedical clinical diagnostics. This class covers the basic physics of infrared emission and absorption in solid-state materials, molecules, and the atmosphere. It also discusses detector technology (with particular emphasis on types of semiconductor and quantum-dot photon detectors, microbolometers, and thermoelectric detectors) and the infrared spectroscopy of molecules to show why the infrared is so important in the study of chemical, biological, and atmospheric systems. The class will also examine types of commonly used spectrometers: cavity, dispersive, and FTIR and sampling of important applications: passive and active standoff detection, satellite climate and atmospheric monitoring, industrial and petrochemical analysis, and LIDAR. Other topics will be introduced as time allows.

EE 5653. Physical Principles of Magnetic Materials. (; 3 cr. ; Student Option; Every Fall)
Physics of diamagnetism, paramagnetism, ferromagnetism, antiferromagnetism, ferrimagnetism. Ferromagnetic phenomena. Static/dynamic theory of micromagnetics, magneto-optics, and magnetization dynamics. Magnetic material applications. prereq: CSE grad student or dept consent

EE 5655. Magnetic Recording. (; 3 cr. ; Student Option; Periodic Spring)
Magnetic fundamentals, recording materials, idealized models of magnetic records/reproduction, analytic models of magnetic record heads, sinusoidal magnetic recording, digital magnetic recording, magnetic recording heads/media, digital recording systems. prereq: CSE grad student or dept consent

EE 5657. Physical Principles of Thin Film Technology. (; 4 cr. ; Student Option; Every Fall)
Fabrication, characterization, and application of thin film and nanostructured materials and devices. Focuses on vacuum deposition. Materials science. Hands-on, team-based labs.

EE 5670. Spintronic Devices. (3 cr. ; Student Option; Spring Odd Year)
Basic concepts and physical principles underlying spintronic devices; engineering designs and basic features of matured spintronic devices: GMR and MTJ sensor, MRAM, etc; new opportunities and engineering designs and challenges of spintronic devices: STT-RAM, spin torque oscillator and all spin logic, etc.

EE 5705. Electric Drives in Sustainable Energy Systems. (; 3 cr. ; Student Option; Periodic Spring)
Role of electric drives in wind-electric systems, inertial storage, elec/hybrid vehicles. AC machines for energy-efficient operation using d-q axis modeling. Vector-/direct-torque-controlled induction motor drives. Permanent-magnet and interior-permanent magnet ac motor drives. Sensorless drives. Voltage space-vector modulation technology. prereq: [4701, CSE grad student] or dept consent

EE 5707. Electric Drives in Sustainable Energy Systems Laboratory. (; 1 cr. ; Student Option; Periodic Spring)
Lab to accompany 5705. prereq: 5705 or concurrent registration is required (or allowed) in 5705

EE 5721. Power Generation Operation and Control. (; 3 cr. ; Student Option; Spring Odd Year)
Engineering aspects of power system operation. Economic analysis of generation plants & scheduling to minimize total cost of operation. Scheduling of hydro resources and thermal plants with limited fuel supplies. Loss analysis, secure operation. State estimation, optimal power flow. Power system organizations. prereq: [4721, CSE grad student] or dept consent

EE 5741. Advanced Power Electronics. (; 3 cr. ; Student Option; Periodic Spring)
Physics of solid-state power devices, passive components, magnetic optimization, advanced topologies. Unity power factor correction circuits, EMI issues, snubbers, soft switching in dc/ac converters. Practical considerations. Very low voltage output converters. Integrated computer simulations. prereq: CSE grad student] or dept consent

EE 5745. Wind Energy Essentials. (2 cr. ; Student Option; Every Fall)
Design, planning, development/operation of wind energy facilities. Wind turbine generator types, wind forecasting/assessment, wind farm project development, grid integration, wind turbine controls, blade aerodynamics/acoustics, mechanical/hydrostatic transmissions, materials/structural reliability, wind turbine foundations, radar interference, role of public policy in wind energy. prereq: CSE grad student or dept consent

EE 5811. Biological Instrumentation. (; 3 cr. ; Student Option; Spring Odd Year)
This course will cover the physics and technology of biological instruments. The operating principles of optical, electrical, and mechanical biosensors will be discussed, followed by transport and delivery of biomolecules to the sensors. Techniques to manufacture these sensing devices, along with microfluidic packaging, will be covered. Lectures will be complemented by lab demo sessions to give students hands-on experiences in microfluidic chip fabrication, microscopy, and particle trapping experiments.

EE 5940. Special Topics in Electrical Engineering I. (; 1-4 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Special topics in electrical and computer engineering. Topics vary.

EE 5960. Special Topics in Electrical Engineering III. (; 1-4 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Special topics in electrical and computer engineering. Topics vary.

EE 5980. Teaching, Grading, and Lab Instruction Seminar. (1 cr. ; No Grade Associated; Every Fall)
The purpose of this course is to provide guidance and instruction in teaching, grading,

and laboratory procedures. In addition, you will be provided with structured links to self-help resources, support from faculty, peers, and staff that will improve your effectiveness and efficiency while teaching and grading. The course is broken out into four components: - A pre-semester orientation and series of three workshops (4 hours) - A series of bi-weekly seminars spaced throughout the semester (approx. 4 hours) - A private teaching consultation by CEI (3 hours, lab TAs only) - A wrap-up discussion session (2 hours)

EE 5990. Curricular Practical Training. (; 1-2 cr. [max 6 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Industrial work assignment involving advanced electrical engineering technology. Review by faculty member. Final report covering work assignment. prereq: Grad student, instr consent

EE 8100. Advanced Topics in Electronics. (; 1-3 cr. [max 12 cr.] ; Student Option; Periodic Fall)
Topics vary according to needs and staff availability. prereq: instr consent

EE 8141. Advanced Heterojunction Transistors. (; 3 cr. ; Student Option; Periodic Fall)
Recent developments in device modeling with emphasis on bipolar junction transistors. High-level effects in base and collector regions and their interrelationship. prereq: 5664 or instr consent

EE 8161. Physics of Semiconductors. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Modern solid-state theory applied to specific semiconductor materials. Influence of band structure and scattering mechanisms upon semiconductor properties. Plasma effects in semiconductors. Mathematical treatments of generation-recombination kinetics, carrier injection, drift, and diffusion. Use of semiconductor properties in devices of current importance. prereq: instr consent

EE 8163. Quantum Electronics. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Quantum theory of light/laser systems. Planck's radiation law, Einstein's coefficients. Quantum mechanics of atom-radiation interaction. Quantized radiation field. Interaction of quantized field with atoms. Generation/amplification of light. Nonlinear optics. Specific laser systems. Semiconductor lasers. prereq: instr consent

EE 8190. Electronics Seminar. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Fall & Spring)
Current literature, individual assignments. prereq: instr consent

EE 8210. System Theory Seminar. (; 1 cr. [max 3 cr.] ; S-N or Audit; Periodic Fall & Spring)
Current literature, individual assignments.

EE 8213. Advanced System Theory. (; 3 cr. ; Student Option; Periodic Fall)
Generalized linear systems; applications, structural properties, computational approaches, classification, functional behavior, and synthesis. prereq: IT grad student, instr consent

EE 8215. Nonlinear Systems. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Current topics in stability analysis of nonlinear systems, design of controllers for nonlinear systems, discrete-time and stochastic nonlinear systems. prereq: instr consent

EE 8230. Control Theory Seminar. (; 1 cr. [max 3 cr.] ; S-N or Audit; Periodic Fall & Spring)
Current literature, individual assignments.

EE 8231. Optimization Theory. (; 3 cr. ; Student Option; Periodic Fall)
Introduction to optimization in engineering; approximation theory. Least squares estimation, optimal control theory, and computational approaches. prereq: instr consent

EE 8235. Advanced Control Topics. (; 3 cr. ; Student Option; Periodic Spring)
Adaptive/learning systems. Optimal/robust control/stabilization. Stability of dynamic systems.

EE 8243. Model Reduction and Approximation of Dynamical Systems. (3 cr. ; Student Option; Periodic Spring)
In this course, we will study analytical and data-driven methods for model reduction and approximation of dynamical systems. The focus will be on learning the relevant mathematics and tools for obtaining "lean" low-dimensional representations of dynamical systems, which can be used to facilitate analysis and design. Roughly half of the course will be devoted to the problem of model reduction: i.e., given a mathematical description of a system, reduce the number of degrees of freedom required to faithfully represent that system. The other half of the course will be devoted to data-driven approximation of dynamical systems: i.e., given empirical data generated by a dynamical system, determine a mathematical representation for the underlying system dynamics. Although these two general problems are distinct, they are closely related and will be studied in parallel throughout the term.

EE 8300. Advanced Topics in Computers. (; 1-3 cr. [max 12 cr.] ; Student Option; Periodic Fall)
Topics vary according to needs and staff availability. prereq: instr consent

EE 8310. Advanced Topics in VLSI. (; 1-3 cr. [max 12 cr.] ; Student Option; Periodic Fall)
Topics vary according to needs and staff availability. prereq: instr consent

EE 8320. Advanced Topics in Design Automation. (; 1-3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall)
State-of-the-art automated design tools for electronic system design. Topics vary. prereq: Grad student or instr consent

EE 8331. CMOS Data Converters: A/D and D/A. (; 3 cr. ; Student Option; Every Fall & Spring)
Data converters, low power low voltage analog circuits. Basic background in design of CMOS analog-to-digital and digital-to-analog converters. Special circuit design techniques for low power design. Students design/test several design problems. prereq: 5333 or instr consent

EE 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

EE 8337. Analog Circuits for Wire/Wireless Communications. (; 3 cr. ; A-F or Audit; Every Spring)
Basic background, advanced design concepts necessary to design integrated CMOS RF circuits. Emphasizes CMOS and RF. Where appropriate, mention is made of bipolar circuits and applications to other communications areas. prereq: 5333

EE 8350. Advanced Verification Methodologies for VLSI Systems. (3 cr. ; Student Option; Every Fall)
Object-oriented programming in SystemVerilog. Randomization techniques, threads, interprocess communication, and functional coverage determination. Advanced interfaces and assertion-based verification. UVM tests, components, agents, environments, factory pattern, transactions, and sequences. Formal and semi-formal verification methods. Other advanced verification techniques of current research interest. Prerequisites: EE 5327 VLSI Design Lab or equivalent

EE 8351. Design Automation Techniques for Variation-Aware Computing. (3 cr. ; Student Option; Fall Even Year)
High-performance chip design can only be performed with the assistance of design automation tools that comprehend the needs of the designer and deliver solutions that can correctly analyze and optimize these systems. The objective of this class is to provide a view of this emerging universe and acquaint students with new research in this area. Specific topics to be covered include 1) Overview of technology trends and emerging systems 2) Variation-aware design and 3) Design automation issues. Prerequisites: CSE grad student. Some background in VLSI design and/or design automation is suggested but not required. Such prior exposure will make the experience in the class much more meaningful.

EE 8360. Computer Systems Seminar. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Fall & Spring)
Current literature, individual assignments.

EE 8367. Parallel Computer Organization. (; 3 cr. ; Student Option; Every Spring)
Design/implementation of multiprocessor systems. Parallel machine organization, system design. Differences between parallel, uniprocessor machines. Programming models. Synchronization/communication. Topologies, message routing strategies. Performance optimization techniques. Compiler, system software issues. prereq: 5364 or CSci 5204

EE 8370. Computer Aided Design Seminar. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Fall & Spring)

Current literature, individual assignments. prereq: [EE or CompE or CSci] grad major, instr consent

EE 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

EE 8500. Seminar: Communications. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Fall & Spring)
Current literature, individual assignments.

EE 8510. Advanced Topics in Communications. (; 1-3 cr. [max 12 cr.] ; Student Option; Periodic Fall)
Topics vary according to needs and staff availability. prereq: instr consent

EE 8520. Advanced Topics in Signal Processing. (; 1-3 cr. [max 12 cr.] ; Student Option; Every Spring)
Topics vary according to needs and staff availability. prereq: instr consent

EE 8551. Multirate Signal Processing and Applications. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Multirate discrete-time systems with applications in modern signal and data processing problems. Hilbert Spaces and Linear Operators; Reisz Bases and Frames; Vector Space Representation of Sampling, Interpolation, Time-frequency analysis and wavelets; Filterbanks and Polyphase Structures; Sparsity and redundancy with applications in linear and nonlinear approximation, super-resolution, blind-source separation. prereq: [CSE grad student] or dept consent

EE 8581. Detection and Estimation Theory. (; 3 cr. ; Student Option; Periodic Spring)
Risk theory approach to detection and estimation, random process representation, signal parameter estimation. Waveform estimation; detection of phase, frequency, and delay in signals. Applications to communications and radar-sonar signal design and processing. prereq: 5531 or instr consent

EE 8591. Predictive Learning from Data. (; 3 cr. ; Student Option; Fall Even Year)
Methods for estimating dependencies from data have been traditionally explored in such diverse fields as: statistics (multivariate regression and classification), engineering (pattern recognition, system identification), computer science (artificial intelligence, machine learning, data mining) and bioinformatics. Recent interest in learning methods is triggered by the widespread use of digital technology and availability of data. Unfortunately, developments in each field are seldom related to other fields. This course is concerned with estimation of predictive data-analytic models that are estimated using past data, but are used for prediction or decision making with new data. This course will first present general conceptual framework for learning predictive models from data, using Vapnik-Chervonenkis (VC) theoretical framework, and then discuss various methods developed in statistics, pattern recognition and machine learning. Course descriptions will emphasize methodological aspects of machine learning, rather than development of ?new? algorithms. prereq: CSE grad student or instr consent

EE 8601. Advanced Electromagnetic Theory. (; 3 cr. ; A-F or Audit; Periodic Fall)
Aspects of electromagnetic theory. Review of introductory material. Scattering theory, geometric theory of diffraction, integral equation methods, Green's functions. prereq: 4601 or equiv

EE 8610. Seminar: Electronics, Fields, and Photonics. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Fall & Spring)
Students are assigned readings from current literature and make individual presentations to class. From time to time outside speakers present research papers. prereq: EE grad major or instr consent

EE 8611. Plasma Physics. (; 3 cr. ; Student Option; Periodic Fall)
Plasma theory and charged particle transport phenomena: collision processes, orbit theory, kinetic theory, Boltzmann transport equation, moment (continuity) equations, magnetohydrodynamics, transport properties. Applications of plasma theory to modeling of dc, rf, and microwave discharges. prereq: instr consent

EE 8620. Advanced Topics in Magnetics. (; 1-3 cr. [max 12 cr.] ; Student Option; Periodic Fall)
Topics vary according to needs and staff availability. prereq: 5653 or instr consent

EE 8630. Advanced Topics in Electromagnetics. (; 1-3 cr. [max 12 cr.] ; Student Option;)
Topics vary according to needs and staff availability.

EE 8660. Seminar: Magnetics. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Fall & Spring)
Current literature, individual assignments.

EE 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

EE 8725. Advanced Power System Analysis and Economics. (; 3 cr. ; Student Option; Periodic Fall)
Solving sets of equations that involve large sparse matrices. Sparse matrix storage, ordering schemes, application to power flow, short circuit calculation, optimal power flow, and state estimation. prereq: 4721, CSE grad student or instr consent

EE 8741. Power Electronics in Power Systems. (; 3 cr. ; Student Option; Periodic Fall)
Impact of power electronics loads on power quality. Passive and active filters. Active input current wave shaping. HVDC transmission. Static VAR control, energy storage systems. Interconnecting photovoltaic and wind generators. Static phase shifters and circuit breakers for flexible AC transmission (FACTS). prereq: 4741, IT grad student or instr consent

EE 8744. Modeling, Analysis, and Control of Renewable Energy Systems. (3 cr. ; Student Option; Every Fall)
The electrical power system has been widely recognized as the most important engineering achievement of the 20th century. High power quality and availability are maintained in the bulk power system mainly by enforcing hierarchical operational practices, central decision making, and topological redundancy. However, this status quo is being challenged by changing generation, consumption and operational landscapes. Particularly, increased renewable generation, supply scarcity, the impetus to improve resiliency to extenuating weather impacts, and expanding electricity access call for the development of transformative architectural and operational paradigms. Recognizing these developments, this course will present enabling modeling, analysis, and control methods that will be integral to architect next-generation renewable-based power systems. These methods will be developed adopting a bottom-up approach by leveraging recent theoretical advances in circuit theory, nonlinear systems, complex networks, and stochastic processes.

EE 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

EE 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Thesis credit.

EE 8920. Teaching Experience in Electrical and Computer Engineering. (1 cr. [max 3 cr.] ; S-N only; Every Spring)
Coteach class under guidance of faculty mentor. Students directly teach approximately half of the classes. Feedback to improve teaching effectiveness. Meet regularly with peers and instructor to discuss teaching concerns/issues. prereq: PhD candidate in electrical engineering, passed written preliminary exam

EE 8925. Ethics in Electrical and Computer Engineering. (; 1 cr. ; S-N or Audit; Every Fall)
Topics on issues such as data integrity, professional conduct, authorship, plagiarism, patents, copyrights, conflicts, and disclosures. Students study cases, present findings, and write report. prereq: Grad student in electrical engineering

EE 8940. Special Investigations. (; 1-3 cr. ; Student Option; Every Fall, Spring & Summer)
Studies of approved theoretical or experimental topics. prereq: 1-3 cr [may be repeated for cr]; IT grad student or instr consent

EE 8950. Advanced Topics in Electrical and Computer Engineering. (; 3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)

Topics vary according to needs and staff availability. prereq: Cr ar [may be repeated for cr]; instr consent

EE 8965. Plan C Project I. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Project topics arranged between student and adviser. Written reports. prereq: Grad EE major

EE 8967. Plan C Project II. (; 1-3 cr. ; Student Option; Every Fall, Spring & Summer)
Project topics arranged between student and adviser. Written reports. prereq: EE grad student

EE 8970. Graduate Seminar I. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Fall)
Recent developments in electrical engineering, related disciplines. prereq: Grad student

EE 8980. Graduate Seminar II. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Spring)
Recent developments in electrical engineering, related disciplines.

Emergency Medicine (EMMD)

EMMD 7504. Emergency Medicine. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This is the P/N version of the required Emergency Medicine course. The student will have the opportunity to work with Emergency Medicine faculty and residents who for direction. Under their supervision, the student is expected to act as the primary physician for Emergency Department (ED) patients, including initial assessment, performance of minor procedures, interpretation of lab and x-ray, and preparation for admission to inpatient services. The student will also have the opportunity to observe critical resuscitations.

EMMD 7512. Bedside Ultrasound. (4 cr. [max 8 cr.] ; H-N only; Every Fall, Spring & Summer)
This four week elective will introduce students to bedside ultrasound. Students will learn basics of ultrasound and will perform clinical ultrasounds.

EMMD 7515. RPAP-Emergency Medicine. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)

EMMD 7521. Emergency Medicine Research. (; 4-8 cr. [max 16 cr.] ; P-N only; Every Fall, Spring & Summer)
An introduction to Emergency Medicine Research. The student initiates or participates in a research project under the direct supervision of emergency medicine clinician-researchers. Didactic research conferences also are available.

EMMD 7530. Special Elective in EMS. (4 cr. ; H-N only; Every Fall, Spring & Summer)
This four-week rotation within the Allina Emergency Medical Services is designed to give students first-hand experience in the complex EMS system. Students will observe and in some cases participate in medical direction, audit and review process, emergency preparedness and daily operations of this major urban medical system.

EMMD 7571. Clinical Toxicology and Emergency Medicine. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
Students are involved in initial stages of providing critical care to patients with serious, sometimes life-threatening medical problems. Fundamentals of clinical toxicology: drug overdoses, acute alcohol intoxication and withdrawal syndromes, antidotes, toxic inhalations, environmental toxins, indications for hemoperfusion/dialysis, street drug problems, pediatric poisonings.

EMMD 7600. Acting Internship Advanced Emergency Medicine: Career Track. (; 2-4 cr. ; H-N only; Every Fall, Spring & Summer)
This course is designed for medical students interested in pursuing a career in Emergency Medicine. Students will rotate at a Level I Trauma Center.

Endodontics (ENDO)

ENDO 5300. Endodontics Orientation. (; 2 cr. ; A-F or Audit; Every Summer)
Clinic policies/procedures. Anatomy, access, evaluation, diagnosis. Pulp biology/ microbiology. Etiology/cracks. Instrumentation. Obturation. Management of pain. Lab.

ENDO 5304. Advanced Clinical Endodontics. (; 1-6 cr. ; A-F or Audit; Every Fall & Summer)
Diagnosis/treatment of clinical cases. Complex cases, new/unique techniques.

ENDO 5305. Advanced Clinical Endodontics. (; 1-6 cr. ; A-F or Audit; Every Fall)
Diagnosis/treatment of clinical cases. Complex cases, new techniques. prereq: 5304

ENDO 5306. Advanced Clinical Endodontics. (; 1-6 cr. ; A-F or Audit; Every Spring)
Diagnosis/treatment of clinical cases. Complex cases, new techniques.

ENDO 5307. Advanced Clinical Endodontics. (; 1-6 cr. ; A-F or Audit; Every Summer)
Diagnosis/treatment of clinical cases. Complex cases, new techniques. prereq: 5306

ENDO 5308. Advanced Clinical Endodontics. (; 1-6 cr. ; A-F or Audit; Every Fall)
Diagnosis/treatment of clinical cases. Complex cases, new techniques. prereq: 5307, dept consent

ENDO 5309. Advanced Clinical Endodontics. (; 1-6 cr. ; A-F or Audit; Every Spring)
Diagnosis/treatment of clinical cases. Complex cases, new techniques. prereq: 5308

ENDO 5310. Advanced Clinical Endodontics. (; 1-6 cr. ; A-F or Audit; Every Summer)
Diagnosis/treatment of clinical cases. Complex cases, new techniques. prereq: 5309

ENDO 5311. Advanced Endodontic Emergency. (; 1 cr. ; S-N or Audit; Every Summer)
Each student is assigned weekly periods (8 hours/week) and is responsible for all emergencies in the endodontic clinic during this time. prereq: dept consent

ENDO 5312. Advanced Endodontic Emergency. (; 1 cr. ; S-N or Audit; Every Fall)
Students assigned 8 hrs/wk), are responsible for emergencies in clinic. prereq: 5311

ENDO 5313. Advanced Endodontic Emergency. (; 1 cr. [max 2 cr.] ; S-N or Audit; Every Spring)
Students assigned 8 hrs/wk), are responsible for emergencies in clinic. prereq: 5312

ENDO 5314. Advanced Endodontic Emergency. (; 1 cr. ; S-N or Audit; Every Summer)
Students assigned 8 hrs/wk), are responsible for emergencies in clinic. prereq: 5313

ENDO 5315. Advanced Endodontic Emergency. (; 1 cr. ; S-N or Audit; Every Fall)
Students assigned 8 hrs/wk, are responsible for emergencies in clinic. prereq: 5314, dept consent

ENDO 5316. Advanced Endodontic Emergency. (; 1 cr. ; S-N or Audit; Every Spring)
Students assigned 8 hrs/wk, are responsible for emergencies in clinic. prereq: 5315

ENDO 5317. Advanced Endodontic Emergency. (; 1 cr. ; S-N or Audit; Every Summer)
Students assigned 8 hrs/wk, are responsible for emergencies in clinic. prereq: 5316

ENDO 5329. Clinical Seminar I. (; 1 cr. ; A-F or Audit; Every Fall)
Oral/visual presentation of endodontic cases with follow up. Presentation of surgery cases before surgery. prereq: dept consent

ENDO 5330. Review of Cases. (; 1-2 cr. ; A-F or Audit; Every Spring & Summer)
Oral/visual presentation of endodontic cases with follow up. Presentation of cases before surgery. prereq: 5329

ENDO 5331. Review of Cases. (; 1 cr. ; A-F or Audit; Every Fall)
Oral/visual presentation of endodontic cases with follow up. Presentation of cases before surgery. prereq: 5330

ENDO 5332. Review of cases. (; 1 cr. ; A-F or Audit; Every Spring)
Oral and visual presentation of endodontic cases with follow up. Presentations of surgery cases before surgeries. prereq: dept consent

ENDO 5400. Advanced Endodontics for the General Dentist. (; 1 cr. ; S-N or Audit; Periodic Fall & Spring)
Advanced diagnosis/treatment of endodontics in clinic/office setting. Internship. prereq: dept consent

ENDO 5600. Endodontic Histopathology. (; 1 cr. [max 2 cr.] ; S-N or Audit; Periodic Spring & Summer)
Physiology of pulpal/periapical diseases. Normal histology of pulpal/periapical tissues. Histopathology of abnormal pulpal/periapical tissues. Differential diagnosis of periapical radiolucencies.

ENDO 8001. Research in Endodontics. (; 1-2 cr. ; Student Option; Every Fall)
Organized literature review in area of student's interest, selection of thesis project, and completion of research and thesis. prereq: dept consent

ENDO 8002. Research in Endodontics. (; 1-2 cr. ; Student Option; Every Spring & Summer)
Organized literature review in area of student's interest, selection of thesis project, and completion of research and thesis. prereq: dept consent

ENDO 8004. Research in Endodontics. (; 1-2 cr. ; Student Option; Every Fall)
Organized literature review in area of student's interest, selection of thesis project, and completion of research and thesis. prereq: dept consent

ENDO 8005. Research in Endodontics. (; 1-2 cr. ; A-F only; Every Spring)
Organized literature review in area of student's interest, selection of thesis project, and completion of research and thesis. prereq: dept consent

ENDO 8310. Literature Review. (; 2 cr. ; A-F or Audit; Every Fall)
Critical review of classic and current endodontic literature. prereq: dept consent

ENDO 8311. Literature Review. (; 2 cr. [max 4 cr.] ; A-F or Audit; Every Spring & Summer)
Critical review of classic/current endodontic literature. prereq: 8310

ENDO 8312. Literature Review. (; 2 cr. ; A-F or Audit; Every Fall)
Critical review of classic/current endodontic literature. prereq: 8311

ENDO 8313. Literature Review. (; 2 cr. ; A-F or Audit; Every Spring)
Critical review of classic/current endodontic literature. prereq: 8312

ENDO 8320. Advanced Endodontic Lecture. (; 1 cr. ; A-F or Audit; Every Fall)
Pulpal and periapical pathology, diagnosis, and treatment planning. prereq: dept consent

ENDO 8321. Advanced Endodontic Lecture. (; 1 cr. ; A-F or Audit; Every Spring & Summer)
Pulpal/periapical pathology, diagnosis, treatment planning. prereq: 8320

ENDO 8322. Advanced Endodontic Lecture. (; 1 cr. ; A-F or Audit; Every Fall)
Pulpal/periapical pathology, diagnosis, treatment planning. prereq: 8321

ENDO 8323. Advanced Endodontic Lecture. (; 1 cr. ; A-F or Audit; Every Spring)
Pulpal/periapical pathology, diagnosis, treatment planning. prereq: 8322

ENDO 8335. Endodontics/Periodontics Seminar. (; 1 cr. ; S-N or Audit; Every Spring)
Discussions of endo-perio problems. prereq: dept consent

English as a Second Language (ESL)

ESL 5006. English for Business Interactions. (2 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
This course is designed for students who are currently in a graduate program in business or in a closely related graduate program. The goal of this course is to help students polish their English skills for effective and culturally appropriate communication in the world of business. The course covers topics such as email for business communication, successful group work, cultural values, communication styles, interviewing, networking, and delivering effective presentations. This course has two major objectives: 1) to help students improve their English skills for internship- or job-seeking purposes, and 2) to help students improve their language, communication, and teamwork skills for use in a professional context in the U.S. Prerequisites: Graduate student, a first language other than English

ESL 5008. Speaking for Professional Settings. (2 cr. ; Student Option; Every Fall & Spring)
This course is designed for graduate students who speak a first language other than English and are seeking to improve their English speaking skills for professional contexts. The goal of this course is to help students refine their English skills for effective and culturally appropriate communication in specific professional situations. The course covers topics such as small talk, networking, interviewing, and presentation skills. Students will increase their confidence to communicate in a variety of settings including informal exchanges, career fairs, conference presentations, and job interviews. Prerequisite: Graduate student, a first language other than English

ESL 5009. Advanced English Conversation Skills for Professionals. (2 cr. ; Student Option; Periodic Fall & Spring)
This hybrid course is designed for graduate students who speak a first language other than English and are seeking to improve their English conversation skills for informal, professional settings. The goal of this course is to build fluency and apply culturally appropriate strategies to be effective communicators in English with peers, professors, and colleagues in graduate and post-graduate work. Participants will increase their fluency and confidence to communicate in a variety of situations, and on a range of topics, by engaging in speaking practice outside of class such as informational interviews, peer networking, professional development events, and co-curricular activities. Prerequisites: Graduate student, a first language other than English

ESL 5302. Academic Writing. (; 4 cr. [max 8 cr.] ; Student Option; Every Fall & Spring)
This course is designed for graduate students who speak a first language other than English. The course focuses on foundational writing skills and emphasizes the writing process - developing ideas, drafting, revising, and editing. Guided textual analyses of discipline-specific readings are used to develop writing skills through the close examination of strategies employed by accomplished writers. Through ongoing, active participation, students learn to (1) match writing to audience and purpose, (2) produce different genres of academic writing, (3) incorporate discipline-specific source material into writing, and (4) critique their writing and that of others. Gains in writing skills culminate in students? ability to transfer acquired skills into discipline-specific writing. Through development of personal voice and an appreciation for the importance of the credibility of the writer, students also learn to recognize and avoid plagiarism. Problems with sentence structure, lexical grammar, and diction are addressed individually. Prerequisites: Graduate student, a first language other than English

ESL 5900. Special Topics in English Language. (; 1-5 cr. [max 15 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Topics vary. prereq: Non-native speaker of English

English: Literature (ENGL)

ENGL 5001. Ph.D. Colloquium: Introduction to Literary Theory and Literary Studies in the Modern University. (; 3 cr. ; Student Option; Every Fall)
Where and what is literary study vis-a-vis the history of the discipline, of the humanities, and of the university--all in the context of a graduate education. Literary theory focusing on key theoretical works that address the discipline, the humanities, and the university. Prerequisite: English grad student

ENGL 5020. Studies in Narrative. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Examine issues related to reading and understanding narrative in a variety of interpretive contexts. Topics may include "The 19th-century English (American, Anglophone) Novel," "Introduction to Narrative," or "Techniques of the Novel." Topics specified in the Class Schedule.

ENGL 5040. Theories of Film. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall)
Advanced topics regarding film in a variety of interpretive contexts, from the range and historic development of American, English, and Anglophone film (e.g., "Fascism and Film," "Queer Cinemas"). Topics and viewing times announced in Class Schedule. prereq: Grad student or instr consent

ENGL 5090. Readings in Special Subjects. (; 1-4 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
General background preparation for advanced study. Diverse selection of literatures written in English, usually bridging national cultures and time periods. Readings specified in Class Schedule.

ENGL 5110. Medieval Literatures and Cultures: Intro to Medieval Studies. (; 3 cr. [max 9 cr.] ; Student Option; Every Spring)
Major and representative works of the Middle Ages. Topics specified in the Class Schedule.

ENGL 5121. Readings in Early Modern Literature and Culture. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Topical readings in early modern poetry, prose, fiction, and drama. Attention to relevant scholarship or criticism. Preparation for work in other courses or seminars. prereq: Grad student or instr consent

ENGL 5140. Readings in 18th Century Literature and Culture. (; 3 cr. ; Student Option; Every Spring)
Literature written in English, 1660-1798. Topics may include British literature of Reformation and 18th century, 18-century American literature, a genre (e.g., 18th-century novel). prereq: Grad student or instr consent

ENGL 5150. Readings in 19th-Century Literature and Culture. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Topics may include British Romantic or Victorian literatures, American literature, important writers from a particular literary school, a genre (e.g., the novel). Readings.

ENGL 5170. Readings in 20th-Century Literature and Culture. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall)
British, Irish, or American literatures, or topics involving literatures of two nations. Focuses either on a few important writers from a particular literary school or on a genre (e.g., drama). Topics specified in Class Schedule.

ENGL 5300. Readings in American Minority Literature. (; 3 cr. [max 9 cr.] ; Student Option; Every Fall)
Contextual readings of 19th-/20th-century American minority writers. Topics specified in Class Schedule.

ENGL 5501. Origins of Cultural Studies. (3 cr. ; Student Option; Periodic Fall & Spring)
Intellectual map of the creation of cultural studies as a unique approach to studying social meanings. Key figures and concepts, including nineteenth- and early twentieth century precursors.

ENGL 5510. Readings in Criticism and Theory. (; 3 cr. [max 9 cr.] ; Student Option; Spring Odd Year)
Major works of classical criticism in the English critical tradition from Renaissance to 1920. Leading theories of criticism from 1920 to present. Theories of fiction, narratology. Feminist criticisms. Marxist criticisms. Psychoanalytic criticisms. Theories of postmodernism.

ENGL 5593. The African-American Novel. (3 cr. ; Student Option; Every Spring)
Explore African American novelistic traditions. Plot patterns, character types, settings, symbols, themes, mythologies. Creative perspectives of authors themselves. Analytical frameworks from contemporary literary scholarship.

ENGL 5701. Great River Review. (4 cr. ; Student Option; Every Spring)
Students will be assigned roles, both editorial and managerial, to assist in production of The Great River Review journal. They will explore and present on the history of the small magazine in American literature and meet with Twin Cities publishing professionals.

ENGL 5790. Topics in Rhetoric, Composition, and Language. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Topics specified in Class Schedule. prereq: Grad student or instr consent

ENGL 5800. Practicum in the Teaching of English. (; 1-3 cr. ; Student Option; Every Fall)
Discussion of and practice in recitation, lecture, small-groups, tutoring, individual conferences, and evaluation of writing/reading. Emphasizes theory informing effective course design/teaching for different disciplinary goals. Topics vary. See Class Schedule. prereq: Grad student or instr consent

ENGL 5805. Writing for Publication. (; 3 cr. ; Student Option; Fall Even Year)
Conference presentations, book reviews, revision of seminar papers for journal publication, and preparation of a scholarly monograph. Style, goals, and politics of journal and university press editors/readers. Electronic publication. Professional concerns. prereq: Grad student or instr consent

ENGL 5992. Directed Readings, Study, or Research. (1-3 cr. [max 45 cr.] ; Student Option; Every Fall, Spring & Summer)
TBD Prereq-Grad student or instr consent.

ENGL 8090. Seminar in Special Subjects. (; 3 cr. [max 12 cr.] ; Student Option; Every Fall)
Sample topics: literature of World War II, writings of the Holocaust, literature of English Civil War, advanced versification.

ENGL 8110. Seminar: Medieval Literature and Culture. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Sample topics: Chaucer; "Piers Plowman"; Middle English literature, 1300-1475; medieval literary theory; literature/class in 14th-century; texts/heresies in late Middle Ages.

ENGL 8120. Seminar in Early Modern Literature and Culture. (; 3 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
British writers/topics, from Reformation to French Revolution. In first half of period (which divides at 1640), a typical topic is Spenser and epic tradition; in second half, women historians before Wollstonecraft.

ENGL 8140. Seminar in 18th Century Literature and Culture. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Advanced study of literature written in English, 1660-1798. Topics may include British literature of Reformation and 18th century, 18th-century American literature, a genre (e.g., 18th-century novel). prereq: Grad student or instr consent

ENGL 8150. Seminar in Shakespeare. (; 3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Perspectives/works vary with offering and instructor. Recent topics include Global Shakespeare, Shakespearian Comedy, Shakespeare and Performance.

ENGL 8170. Seminar in 19th-Century British Literature and Culture. (; 3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Advanced study in 19th-century British literature/culture. Sample topics: Romantic poetry, Victorian poetry, Englishness in Victorian novel, Victorian cultural criticism, text/image in 19th-century British culture. Topics specified in Class Schedule.

ENGL 8180. Seminar in 20th-Century British Literature and Culture. (; 3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall)
Sample topics: modernism, Bloomsbury Group, working-class/immigrant literature. Topics specified in Class Schedule.

ENGL 8190. Seminar in 20th-Century Anglophone Literatures and Cultures. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Topics in Anglophone literatures of Canada, Africa, the Caribbean, India and Pakistan, and the Pacific. Sample topics: Stuart Hall and Black Britain; Salman Rushdie and cosmopolitan literatures; national literatures and partitioned states. Topics specified in Class Schedule.

ENGL 8200. Seminar in American Literature. (; 3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
American literary history. Sample topics: first American novels, film, contemporary short stories and poetry, American Renaissance, Cold War fiction, history of the book. Topics specified in Class Schedule.

ENGL 8290. Topics, Figures, and Themes in American Literature. (; 3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Sample topics: Dickinson, 19th-century imperialism, Faulkner, San Francisco poets, humor, Chaplin, Hitchcock, and popular culture. Topics specified in Class Schedule.

ENGL 8300. Seminar in American Minority Literature. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall)
Sample topics: Harlem Renaissance, ethnic autobiographies, Black Arts movement. Topics specified in Class Schedule.

ENGL 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

ENGL 8400. Seminar in Post-Colonial Literature, Culture, and Theory. (; 3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Sample topics: Marxism and nationalism; modern India; feminism and decolonization; "the Empire Writes Back"; Islam and the West. Topics specified in Class Schedule.

ENGL 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
FTE Doctoral credits

ENGL 8510. Studies in Criticism and Theory. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)

Developments within critical theory that have affected literary criticism, by altering conceptions of its object ("literature") or by challenging conceptions of critical practice. Topics specified in Class Schedule.

ENGL 8520. Seminar: Cultural Theory and Practice. (; 3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Sample topics: semiotics applied to perspective paintings, numbers, and money; analysis of a particular set of cultural practices by applying various theories to them. Topics specified in Class Schedule.

ENGL 8530. Seminar in Feminist Criticism. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Brief history of feminist criticism, in-depth treatment of contemporary perspectives/issues. Topics specified in Class Schedule.

ENGL 8600. Seminar in Language, Rhetoric, Literacy, and Composition. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Students read/conduct research on theories/ literature relevant to cross-disciplinary fields committed to writing and to teaching writing.

ENGL 8610. Seminar in Language and Discourse Studies. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Current theoretical/methodological issues in discourse analysis. Social/psychological determinants of language choice (class, ethnicity, gender) in various English-speaking societies. Application to case studies, review of scholarship.

ENGL 8625. Dissertation Seminar: Preparing the Book List and Prospectus. (; 2 cr. ; Student Option; Every Spring)
Assembling book list, defining field of study, and articulating a rationale for list. How to conceptualize/develop dissertation prospectus. Students work with faculty instructor, advising committee, and peer writing group. prereq: Engl PhD student in [3rd or 4th yr], at least 12 cr completed

ENGL 8626. Dissertation Seminar: Writing the Dissertation. (; 2 cr. ; Student Option; Every Spring)
Conceptualizing dissertation (using model of Graduate School doctoral Dissertation Fellowship application). Producing dissertation draft chapter/proposal. Students work with instructor, advising committees, and peer writing groups. prereq: English PhD student, passed prelim exam

ENGL 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Doctoral Pre-Thesis Credits prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

ENGL 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

ENGL 8992. Directed Reading in Language, Literature, Culture, Rhetoric, Composition, or Creative Writing. (; 1-9 cr. [max 15 cr.] ; Student Option; Every Fall & Spring)
Directed Reading in Language, Literature, Culture, Rhetoric, Composition, or Creative Writing prereq: instr consent, dept consent

English: Creative Writing (ENGW)

ENGW 5102. Graduate Fiction Writing. (4 cr. [max 12 cr.] ; Student Option No Audit; Every Fall)
Advanced workshop for graduate students with considerable experience in writing fiction.

ENGW 5104. Graduate Poetry Writing. (4 cr. [max 8 cr.] ; Student Option No Audit; Every Fall)
Advanced workshop for graduate students with considerable experience in writing poetry. Students will explore new poetic possibilities while studying contemporary poetry and poetics.

ENGW 5106. Graduate Literary Nonfiction Writing. (4 cr. [max 12 cr.] ; Student Option No Audit; Every Fall)
Advanced workshop for graduate students with considerable experience in writing literary nonfiction.

ENGW 5130. Topics in Graduate Creative Writing. (; 4 cr. [max 16 cr.] ; Student Option; Periodic Fall & Spring)
Workshop. Might include work in more than one genre. prereq: instr consent

ENGW 5310. Reading as Writers. (; 4 cr. [max 12 cr.] ; Student Option No Audit; Periodic Fall & Spring)
Special topics in reading fiction, literary nonfiction, poetry. Topics specified in Class Schedule.

ENGW 5606W. Literary Aspects of Journalism. (WI; 3 cr. ; Student Option; Every Spring)
Journalism isn't fiction. Yet the relationship between what is true and what is artfully constructed toward a "larger truth" -- beyond the facts -- has a complex and intriguing history. This writing-intensive course explores that relationship through close readings of some the best writers of long-form nonfiction, starting with the birth of the novel from journalistic roots in the 18th century and ending with postmodern forms that challenge the notion of what we can ever know. Discover the literary devices used by Stephen Crane's reported street scenes or Nellie Bly's first-hand investigations into conditions for the mentally ill in the 19th century, and, later, Truman Capote's nonfiction novel about a Kansas farm family's murder. Readings include works by pivotal 20th-century writers such as John Hersey, Joseph Mitchell, Lillian Ross, Michael Herr, Norman Mailer, Gay Talese, Joan Didion, Tom Wolfe, and Hunter S. Thompson, and will trace how their pioneering methods influenced contemporary journalism as well as the documentary films of Errol Morris and contemporary nonfiction writers expanding into new forms.

ENGW 5701. Great River Review. (4 cr. ; Student Option; Every Spring)
Students will be assigned roles, both editorial and managerial, to assist in production of The Great River Review journal. They will explore and present on the history of the small magazine in American literature and meet with Twin Cities publishing professionals.

ENGW 5993. Directed Study in Writing. (1-4 cr. [max 18 cr.] ; Student Option; Every Fall & Spring)
Projects in writing poetry, fiction, drama, and nonfiction, or study of ways to improve writing. Prereq-instr consent, dept consent, college consent.

ENGW 8101. Reading Across Genres. (4 cr. ; Student Option No Audit; Every Fall)
Contemporary writing in fiction, poetry, creative nonfiction. Primarily reading course rather than writing course. prereq: Students may not audit this course

ENGW 8110. Seminar: Writing of Fiction. (; 4 cr. [max 16 cr.] ; Student Option; Every Spring)
Focuses on full-length book (e.g., novel, short story collection). Assignments in common. Individual project. prereq: dept consent

ENGW 8120. Seminar: Writing of Poetry. (; 4 cr. [max 8 cr.] ; Student Option; Every Spring)
Focuses on exploration and practice of various styles. Assignments in common and individual project. prereq: dept consent

ENGW 8130. Seminar: Writing of Literary Nonfiction. (; 4 cr. [max 12 cr.] ; Student Option; Every Spring)
Advanced workshop. Assignments in common and individual projects. prereq: dept consent

ENGW 8140. Thesis Seminar: Poetry. (; 4 cr. [max 12 cr.] ; Student Option; Every Fall)
For students working on their creative project. prereq: Creative writing MFA student, instr consent

ENGW 8150. Thesis Seminar: Fiction. (; 4 cr. [max 8 cr.] ; Student Option; Every Fall)
Students work on creative project. prereq: Creative writing MFA student, instr consent

ENGW 8160. Thesis Seminar: Nonfiction. (; 4 cr. [max 8 cr.] ; Student Option; Every Fall)
Students work on their creative project. prereq: Creative writing MFA student, instr consent

ENGW 8170. MFA Practicum: EngW 1101W. (1-3 cr. [max 6 cr.] ; S-N only; Every Fall & Spring)
Teaching Practicum for Teaching Assistants assigned to EngW 1101W. prereq: Creative writing MFA student, instr consent

ENGW 8180. Thesis Seminar: Multi-Genre. (; 4 cr. ; A-F only; Every Fall)
Thesis preparation course for advanced graduate students in the creative writing MFA program. prereq: MFA creative writing program grad student

ENGW 8310. Topics in Creative Writing. (; 4 cr. [max 8 cr.] ; Student Option; Periodic Fall & Spring)
Special topics in fiction, literary nonfiction, poetry. Topics specified in Class Schedule. prereq: [English or creative writing] grad major or dept consent

ENGW 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

ENGW 8990. MFA Creative Thesis. (; 2-8 cr. [max 48 cr.] ; Student Option; Every Fall & Spring)
For students working on their creative project. prereq: 8140, 8150, 8160, creative writing MFA student, instr consent

Entomology (ENT)

ENT 5001. Entomology Orientation. (; 1 cr. [max 2 cr.] ; S-N only; Every Fall)
Class will comprise short lectures and visits to laboratories for first-hand exposure to entomological research at the University of Minnesota. Lectures will represent different research areas related to basic and applied entomology. Students will acquire an understanding of the diversity and significance of different areas of entomological research at the University of Minnesota. Students will also learn about techniques used by entomologists for answering questions related to insects and their associations with humans and the environment.

ENT 5011. Insect Structure and Function. (4 cr. ; A-F or Audit; Every Spring)
Comparative study of insect structures/ functions from evolutionary perspective. Introduction to physiology of digestion, respiration, other organ systems.

ENT 5021. Insect Biodiversity and Evolution. (4 cr. ; Student Option; Every Fall)
Insects are the most diverse group of organisms on Earth with almost 1 million described species. Millions more remain to be described, especially in tropical regions of the world. Insects come in a remarkable array of sizes, colors, and shapes. Taxonomists use this morphological complexity as the primary means of identifying insects, but also for inferring evolutionary relationships. In this course, we will learn how to identify insects, explore methods of collection and curation of insects, discuss their evolutionary relationships, see how insects fit in the natural world, and discuss exciting new efforts to inventory, describe, and conserve the remarkable diversity of insects.

ENT 5041. Insect Ecology. (3 cr. ; Student Option; Fall Even Year)
Synthetic analysis of the causes of insect diversity and of fluctuations in insect abundance. Focus on abiotic, biotic, and evolutionary mechanisms influencing insect populations and communities. prereq: Biol 5041 or EBB 5122 or instr consent

ENT 5051. Scientific Illustration of Insects. (; 3 cr. ; Student Option; Spring Even Year)
Techniques for preparing and observing insects for subsequent illustration. Traditional illustration techniques using the drawing tube and ocular grid on the microscope, including pencil sketching and pen and ink line drawing. Other ?traditional? rendering methods will include line and ink, stippling, cross-hatching, color illustration. Major emphasis will be in computer-assisted techniques of scientific illustration using Adobe Illustrator and Adobe Photoshop, including instruction on preparing full body, true-to-life, color illustrations of insects on the computer.

ENT 5061. Insect Molecular Science. (; 2 cr. ; Student Option; Periodic Fall & Spring)
Molecular genetic techniques and their applications. Emphasizes insect species other than Drosophila. Application of genetic techniques to physiological processes. prereq: [5011, basic genetics course] or instr consent

ENT 5121. Applied Experimental Design. (; 4 cr. ; Student Option; Periodic Fall)
Principles of sampling methodologies, experimental design, and statistical analyses. Methods/procedures in generating scientific hypotheses. Organizing, initiating, conducting, and analyzing scientific experiments using experimental designs and statistical procedures. Offered with AGRO 5121. prereq: Stat 5021 or equiv or instr consent

ENT 5126. Spatial and Temporal Analysis of Ecological Data. (3 cr. [max 6 cr.] ; A-F or Audit; Spring Even Year)
This course covers linear models (regression and ANOVA) and extensions to temporal data and spatial point processes, lattice/areal data, and geostatistics. The course bridges sufficient theory to understand why contending with spatiotemporal dependence is important with enough application to make students confident in their own data analyses.

ENT 5211. Insect Pest Management. (3 cr. ; Student Option; Every Spring)
Insect Pest Management is designed for graduate students in any major or minor. The course will emphasize principles of insect pest management and draw from examples related to agricultural, horticultural and landscape, and urban systems. Conventional (nonorganic) and organic approaches, the use of social media and modern technology, and economic, environmental, and social consequences of diverse tactics (chemical, cultural, biological, genetic, etc.) will be covered by the instructor and, on occasion, by guest lecturers. Student debates on pesticide-pollinator and genetic engineering issues will provide real-world context and insights on complexities of insect pest prevention and management.

ENT 5275. Insect-transmitted diseases of humans. (3 cr. ; Student Option; Every Spring)
What?s so attractive about human blood? How have human interactions with insects evolved? Insects and ticks transmit viral, bacterial, protozoan and filarial diseases to humans, particularly in tropical countries. Zika, most recently, and also dengue and other mosquito-borne viruses pose an emerging challenge in the southern US as climate change increases the range of important vector species. Lyme disease and other tick-borne diseases are increasing in the US, and pose challenges in diagnosis and treatment. This course covers contemporary topics in "Medical Entomology" that will provide an overview of arthropod-borne disease and its impacts on global health from the perspective of insect vectors and microbial pathogens. Students will explore historical, contemporary and epidemiologic stories demonstrating exposure and control strategies via lecture, student discussions, laboratory demonstrations, and critical review of current best practices in medical entomology. This course is designed for upper division undergraduate and graduate students in any major or minor.

ENT 5341. Biological Control of Insects and Weeds. (; 3 cr. ; Student Option; Every Spring)
Biological control is the suppression of pests and weeds using living organisms. It involves fascinating interactions between organisms such as plants and herbivores, and insects and the predators and parasitoids that attack them. These interactions can provide spectacular protection from invasive species but risks to the environment are possible as well so biological control interventions must be undertaken with great care. We will explore these interactions and interventions in depth in this class. The class is online.

ENT 5481. Invertebrate Neurobiology. (; 2 cr. [max 3 cr.] ; Student Option; Every Spring)
The study of invertebrate animals, such as honey bees, sea slugs, and fruit flies, have been instrumental in informing us humans about how our own brains operate. In addition, the ability of some invertebrate animals to sense certain stimuli beyond what humans can detect, has enabled scientists to build smart machines and robots with extraordinary capabilities. Since 80% of the world?s species are insects, understanding the basics of how their nervous systems function will enable societies to better manage their health (e.g., helping insect pollinators) or combat their destruction (e.g., preventing locust plagues). Invertebrate Neurobiology is a course that will explore the underlying neural mechanisms that enable animals to solve or respond to particular problems encountered in their natural environments. Many of the invertebrate animals presented will not only exhibit interesting behaviors, but will reveal important and often conserved principles of neuroscience applicable to a host of animals, including us humans. This course is designed to be integrative ? including disciplines intersecting with animal behavior, entomology, evolution, ecology, neuroscience, psychology, and bioengineering. A major goal of this course is to widen one?s view of the importance of invertebrate animals in the field of neuroscience and gain an appreciation of the translational impact that this knowledge can have and will continue to have on our society and daily lives. Students will also be introduced to important concepts in neurobiology and learn how small neural networks operate.

ENT 5900. Basic Entomology. (; 1-6 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
For graduate students who need to make up certain deficiencies in their biological science background. prereq: instr consent

ENT 5910. Special Problems in Entomology. (; 1-6 cr. [max 10 cr.] ; Student Option; Every Fall & Spring)
Individual field, lab, or library studies in various aspects of entomology. prereq: instr consent

ENT 5920. Special Lectures in Entomology. (; 1-4 cr. [max 12 cr.] ; S-N only; Every Fall & Spring)
Lectures or labs in special fields of entomological research. Given by visiting scholar or regular staff member.

ENT 5927. Data Management for Biologists. (; 2 cr. ; A-F only; Periodic Fall & Spring)
This course is focused on providing hands-on experience in organizing, managing, curating, and accessing data. It is conceived as a topic-driven weekly seminar (12 sessions at ~2h each), combining small amounts of lecture with problem solving and hands-on exercises. The course is taught for the requisite number of hours (1400) for a 2-credit course. The longer course sessions allow for short lectures followed by hands-on activities. Students will encounter the data life cycle from generation to preservation. Students will be expected to complete assignments using their own data or other available datasets.

ENT 8006. Supervised Laboratory or Extension Teaching Experience. (; 1-3 cr. ; S-N only; Every Fall, Spring & Summer)
Training/experience conducting lab or extension based educational activities in Entomology. Students select a faculty member to serve as their sponsor, and develop lecture outlines or instructional aids such as web sites, web-based training sites, print materials, demonstration aids, and demonstration projects. Students prepare/conduct lab or extension presentations. Overviews of web-based instructional aids. prereq: instr consent

ENT 8051. Toxicology. (; 2 cr. ; Student Option; Periodic Fall)
Chemistry, mode of action of conventional insecticides. Insect growth regulators, microbial pesticides. Transgenic viruses, genetically modified plants. Offered alternate years. prereq: [5011, [organic, inorganic] chem courses, biochem course] or instr consent

ENT 8200. Colloquium in Social Insects. (; 1-3 cr. ; Student Option; Periodic Spring)
Current research on bees, wasps, ants, and termites. Student critiques and research reports. prereq: 3020 or 3200

ENT 8210. Colloquium in Insect Evolution. (; 1-3 cr. ; Student Option; Periodic Fall)
Research issues in systematics and evolution. Comparative biology, biogeography, and molecular evolution. Students may re-enroll as topics alternate. Students critique papers from primary literature. prereq: 5371 or instr consent

ENT 8240. Colloquium in Insect Ecology. (; 1-2 cr. ; Student Option; Every Fall & Spring)
Advanced topics. prereq: 5041 or 5045 or instr consent

ENT 8300. Graduate Seminar. (1-2 cr. ; S-N or Audit; Every Fall & Spring)
Oral and written reports on and discussion by students of selected topics from current literature. prereq: instr consent

ENT 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

ENT 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

ENT 8594. Graduate Research in Entomology. (; 1-16 cr. [max 96 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
An opportunity in which a student designs and carries out a directed research project under the direction of a faculty member. Directed research may be taken for variable credit and special permission is needed for enrollment. Students enrolling in a directed research will be required to use the University-wide on-line directed research contract process in order to enroll. Prereq: department consent, instructor consent, no more than 6 credits of directed research counts towards CFANS major requirements.

ENT 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

ENT 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; minimum of 10 cr required [Plan A only]

ENT 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Entrepreneurship (ENTR)

ENTR 6021. Developing New Ventures. (; 2 cr. [max 4 cr.] ; A-F only; Every Fall)
This seven-week course is for students interested in learning how to design and pitch a new venture (ventures can include for-profit startups, nonprofit startups, or internal corporate product/service development initiatives). Students work in teams to develop and write a business proposal for their ? own? venture and consider the practical aspects associated with securing buy-in. Students will engage in all aspects of the proposal development process including designing, testing, validating, pitching, advancing/defending, iterating, and effectively implementing the proposal. Students will also have the opportunity to observe, analyze, and learn from the development and implementation efforts of others.

ENTR 6023. Financing Business Ventures. (; 2 cr. [max 4 cr.] ; A-F only; Every Spring & Summer)
This course in entrepreneurship focuses on the financial aspects of new business ventures. Topics covered in the course include: How to (and how not to) Write a Funding Pitch, The Landscape of Entrepreneurial Finance, Bootstrapping, Getting Started with FFF and OPM, Creative Financing via Success Payments and Gainsharing, Rollups and Building Towards Exit via Acquisition, and Raising Serious Money via Venture Capital and Private Placements prereq: MBA student

ENTR 6025. Introduction to Entrepreneurship. (; 2 cr. [max 4 cr.] ; A-F only; Every Spring & Summer)
The course helps students develop insights on starting and sustaining a successful venture. The course focus is on opportunity identification and evaluation: Where do new venture ideas come from? How do you recognize a good business idea? How can a so-so idea be improved to be a good opportunity? Students will focus on five characteristics of a good entrepreneurial opportunity: Creating significant customer value, profit potential, profit durability, founder and team fit, and amenability to financing. prereq: MBA or Mgmt Sci MBA student

ENTR 6036. Managing the Growing Business. (; 2 cr. ; A-F only; Every Spring & Summer)
Challenges posed by rapid growth/change in independent startups. Infrastructure development, radical changes in strategy, continuous needs for substantial additional resources. Emphasizes analysis of factors accelerating/impeding growth and review/ creation of growth strategies. Integration of concepts from strategy, operations, marketing, finance, and human resource management. prereq: MBA or Mgmt Sci MBA student

ENTR 6037. Corporate Venturing. (; 2 cr. ; A-F or Audit; Every Fall & Summer)
Entrepreneurial role of top management in maintaining/increasing stakeholder value through formation/acquisition of new businesses, products, or markets within established corporations. Strategic role of corporate venturing. Cases, guest speakers, group projects. prereq: MBA or Mgmt Sci MBA student

ENTR 6041. Initiating New Product Design and Business Development. (4 cr. ; A-F only; Every Fall)
In this course students work on product development projects sponsored by client companies and/or entrepreneurs. Projects run all year, but students may enroll for either or both terms. Coursework includes a series of assignments concerned with identifying, researching, and specifying the market and technical parameters for a new

product. Assignments feed into a series of deliverables that are presented to the client. Market research emphasizes interviews with prospective customers and experts as well as business model development. Technical solutions are developed through rapid prototyping and concept rendering. Project work iterates between attention to market and technical considerations. Fall & Spring terms offer similar content, although project scope narrows in the Spring term. prereq: MBA student or non-MBA with instructor + MBA program permission. Old:

ENTR 6042. Implementing New Product Design and Business Development. (4 cr. [max 8 cr.] ; A-F only; Every Spring)
Implementation of product development projects begun in the Fall term in Entr 6041. In this course students work on product development projects sponsored by client companies and/or entrepreneurs. Projects run all year, but students may enroll for either or both terms. Coursework includes a series of assignments concerned with identifying, researching, and specifying the market and technical parameters for a new product. Assignments feed into a series of deliverables that are presented to the client. Market research emphasizes interviews with prospective customers and experts as well as business model development. Technical solutions are developed through rapid prototyping and concept rendering. Project work iterates between attention to market and technical considerations. Fall & Spring terms offer similar content, although project scope narrows in the Spring term. prereq: MBA student or non-MBA with instructor + MBA program permission.

ENTR 6087. New Product Design and Business Development. (; 6 cr. ; A-F only; Periodic Fall, Spring & Summer)
Nine month project course in designing new products and business plans through prototype stage. Teams of CSOM and CSE students work with personnel from sponsoring organizations. Weekly lectures and team meetings. Formal design reviews and presentations. prereq: Grad student in CSOM or CSE or instr consent

Environment Sci, Policy, Mgmt (ESPM)

ESPM 5014. Tribal and Indigenous Natural Resource Management. (3 cr. ; Student Option; Every Fall)
This course is designed to develop and refine your understanding of tribal and Indigenous natural resource management, tribal and Indigenous perspectives, and responsibilities natural resource managers have for tribal and Indigenous communities. This course includes one eight-hour weekend field session.

ESPM 5015. Invasive Plants and Animals: Ecology and Management. (3 cr. ; Student Option; Fall Odd Year)
Overview of invasive plants/animals in North America and around the world. A range of taxa are covered along with their impact and approaches to control. Readings, discussions, and lectures from experts on topics such as invasion theory and real-world management.

ESPM 5031. Applied Global Positioning Systems for Geographic Information Systems. (; 3 cr. ; A-F or Audit; Every Spring)
GPS principles, operations, techniques to improve accuracy. Datum, projections, and coordinate systems. Differential correction, accuracy assessments discussed/applied in lab exercises. Code/carrier phase GPS used in exercises. GPS handheld units, PDA based ArcPad/GPS equipment. Transferring field data to/from desktop systems, integrating GPS data with GIS. prereq: Grad student or instr consent

ESPM 5061. Water Quality and Natural Resources. (; 3 cr. ; Student Option; Every Fall & Spring)
Recent literature in field. Complements 4061. Ecology of aquatic ecosystems, how they are valuable to society and changed by landscape management. Case studies, impaired waters, TMDL process, student engagement in simulating water quality decision making.

ESPM 5071. Ecological Restoration. (; 4 cr. ; Student Option; Every Fall)
Each ecosystem restoration is the product of a myriad of decisions made in response to existing site conditions (biotic and abiotic), anticipated effects from the surrounding landscape, predictions about future events, logistical realities, and, of course, desired conditions. During this course, you will learn about the ecological and social factors that affect ecosystem recovery and how people intervene to reverse ecosystem degradation. The course includes examples from ecosystems around the world, with emphasis on those found in the Midwestern US. Field trips. PREREQUISITES: This course presumes previous courses in basic ecology and plant science.

ESPM 5108. Ecology of Managed Systems. (; 4 cr. ; A-F or Audit; Every Fall)
Analysis of functioning of ecosystems primarily structured by managed plant communities. Managed forests, field-crop agroecosystems, rangelands, aquatic systems. Structure-function relations. Roles of biodiversity in productivity, resource-use efficiency, nutrient cycling, resilience. Emerging principles for design of sustainable managed ecosystems, provision of ecological services. prereq: Sr or grad student

ESPM 5111. Hydrology and Water Quality Field Methods. (3 cr. ; A-F or Audit; Every Spring)
Integrates water quality, surface/groundwater hydrology. Case studies, hands-on field data collection, calculations of hydrological/water quality parameters. Meteorological data, snow hydrology, stream gauging, well monitoring, automatic water samplers. Designing water quality sampling program. Geomorphology, interception, infiltration. prereq: Grad student or instr consent

ESPM 5202. Environmental Conflict Management, Leadership, and Planning. (; 3 cr. ; A-F or Audit; Every Spring)
Negotiation of natural resource management issues. Use of collaborative planning. Case study approach to conflict management, strategic planning, and building leadership qualities. Emphasizes analytical concepts, techniques, and skills.

ESPM 5211. Survey, Measurement, and Modeling for Environmental Analysis. (; 3 cr. ; Student Option; Every Spring)
Survey, measurement, and modeling concepts/methods for study of natural resources/environmental issues. Emphasizes survey design for data collection, estimation, and analysis for issues encompassing land, water, air, vegetation, wildlife, and human/social variables.

ESPM 5241. Natural Resource and Environmental Policy. (; 3 cr. ; Student Option; Every Spring)
Political processes at play in management of environment and how disagreements are addressed by different stakeholders, private-sector interests, government agencies and institutions, communities, and nonprofit organizations. prereq: Grad student or instr consent

ESPM 5242. Methods for Environmental and Natural Resource Policy Analysis. (; 3 cr. ; A-F only; Fall Even Year)
Methods, formal and informal, for analyzing environmental and natural resource policies. How to critically evaluate policies, using economic and non-economic decision-making criteria. Application of policy analysis principles/concepts to environmental/natural resource problems. Recognizing politically-charged environment in which decisions over use, management, and protection of these resources often occur. prereq: grad student

ESPM 5245. Sustainable Land Use Planning and Policy. (; 3 cr. ; A-F or Audit; Every Fall)
Planning theories, concepts, and constructs. Policies, processes, and tools for sustainable land use planning. Scientific/technical literature related to land use planning. Skills needed to participate in sustainable land use planning.

ESPM 5251. Natural Resources in Sustainable International Development. (; 3 cr. ; A-F or Audit; Every Fall)
International perspectives on resource use in developing countries. Integration of natural resource issues with social, economic, and policy considerations. Agriculture, forestry, agroforestry, non-timber forest products, water resources, certification, development issues. Latin American case studies. prereq: Grad student or instr consent

ESPM 5256. Natural Resource Law and the Management of Public Lands and Waters. (; 3 cr. ; A-F or Audit; Every Fall)
This course is intended to provide non-law students with an understanding of the role of the judiciary in the management of public lands and public waters. The course will examine Constitutional provisions affecting the management of public resources, the concept of property rights, major principles of water law, the role of the legal system in environmental review, the scope of legal authority granted

to administrative agencies, and limitations of private property rights to protect public lands and public waters. The class will introduce students to the concepts of legal reasoning including case synthesis and analysis. The class will be taught using a combination of lecture, guest lectures, written exercises and class participation. prereq: grad student

ESPM 5261. Economics and Natural Resources Management. (4 cr. ; A-F or Audit; Every Spring)
Microeconomic principles and their application to natural resource management problems. Economic and policy tools to address market failures. Discussion of regulatory and market-based instruments. Discounting and compounding concepts. Methods for conducting financial and economic analyses of natural resource management projects. Decision criteria when conducting benefit/cost analysis of natural resource projects. Methods for valuing non-market natural resource goods and services. Economics of managing renewable natural resources such as forests and fisheries. Land economics. Payments for environmental services. Planning and management problems. Case studies.

ESPM 5295. GIS in Environmental Science and Management. (4 cr. ; A-F or Audit; Every Fall)
Application of geographic information science and technologies (GIS) in complex environmental problems. Students gain experience in spatial data collection, database development, and spatial analysis, including GNSS and field attribute collection, image interpretation, and existing data fusion, raster/vector data integration and analysis, information extraction from LiDAR data, DEM conditioning and hydrologic analysis, neighborhood analysis, bulk processing and automation, and scripting. Problems vary depending on topics, often with extra-University partners. *Please note that students should have completed a semester-long, introductory lab/lecture GIS course at the graduate or undergraduate level before enrolling in this course, e.g., FNRM 5131. We do not require any given course because students come from varied universities and backgrounds. That said, we assume a knowledge commensurate with a comprehensive introductory course. Students seeking a first course are directed to FNRM 5131. If you have questions regarding your capabilities, please contact the instructor prior to enrolling.

ESPM 5402. Biometeorology. (; 3 cr. ; Student Option; Fall Even Year)
This course examines the interactions between the atmosphere and the Earth?s surface. We will discuss the principles of the surface energy and radiation balance, air motion in the atmospheric boundary layer, land surface parameterization for climate models, boundary layer budgets, and field research methods. The course aims to achieve exemplary learning through hands-on activities and examining recent field studies conducted in natural and managed ecosystems. prereq: MATH 1271, PHYS 1201, STAT 3011, [instr consent]

ESPM 5480. Topics in Natural Resources. (; 1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
Lectures by visiting scholar or regular staff member. Topics specified in class schedule.

ESPM 5555. Wetland Soils. (; 3 cr. ; A-F or Audit; Every Fall)
Morphology, chemistry, hydrology, formation of mineral/organic soils in wet environments. Soil morphological indicators of wet conditions, field techniques of identifying hydric soils for wetland delineations. Peatlands. Wetland benefits, preservation, regulation, mitigation. Field trips, lab, field hydric soil delineation project. prereq: SOIL 1125 or 2125 or equiv or instr consent; concurrent registration is required (or allowed) in SOIL 4511 recommended

ESPM 5575. Wetlands. (; 3 cr. ; Student Option; Every Spring)
Freshwater wetland classification, wetland biota, current/historic status of wetlands, value of wetlands. National, regional, Minnesota wetlands conservation strategies. Ecological principles used in wetland management. prereq: 3575, [sr or grad student or instr consent]

ESPM 5602. Regulations and Corporate Environmental Management. (; 3 cr. ; A-F only; Every Spring)
Concepts, major issues relating to industrial ecology and industry as they are influenced by current standards/regulations at local, state, and national levels. prereq: APEC 1101 or ECON 1101

ESPM 5603. Environmental Life Cycle Analysis. (; 3 cr. ; A-F only; Every Fall)
Concepts, major issues relating to inventory and subsequent analysis of production systems. Production system from holistic point of view, using term commonly used in industrial ecology: "the metabolic system." prereq: [Math 1142 or [Math 1271, Math 1282]], [Econ 1101 or ApEc 1101]

ESPM 5604. Environmental Management Systems and Strategy. (; 3 cr. ; A-F only; Every Fall)
Environmental problems such as climate change, ozone depletion, and loss of biodiversity.

ESPM 5605. Recycling: Extending Raw Materials Supplies. (; 3 cr. ; A-F only; Every Spring)
Principles of recycling. Role of recycling in raw materials utilization, energy, and the environment. Recycling processes for number of commonly recycled materials/products. Properties, environmental implications of recycling.

ESPM 5607. Industrial Biotechnology and the Environment. (; 3 cr. ; A-F only; Every Spring)
Biotechnology pertaining to biobased products development and their environmental impact. prereq: BIOL 1009, CHEM 1021

ESPM 5811. Environmental Interpretation. (; 3 cr. ; A-F or Audit; Every Spring)
This course is designed to be an introduction to the broad field of Environmental Interpretation, Communication Theory, Visitor Information Services (VIS), and Nonformal Education experience's found in parks, nature centers, camps, zoos, museums, arboretums, and free-choice learning environments. Students will understand the definitions, role and scope of interpretation, differences between audiences and/or users of interpretive services, and distinguish between interpretive techniques based on their advantages/disadvantages. Students can also qualify for the National Association for Interpretation's (NAI) Certified Interpretive Guide (CIG) program.

Experimental and Clinical Phar (ECP)

ECP 5220. Regulatory Issues in Drug Research. (2 cr. ; Student Option; Every Fall)
Regulatory issues encountered in conducting drug research trials. Performing different aspects of clinical trials. Lectures, readings, small group discussions, homework assignments. prereq: ECP grad student or Pharm.D. professional student or instr consent

ECP 5290. Clinical Clerkship. (1-8 cr. [max 16 cr.] ; Student Option; Every Fall)
Supervised study of pharmaceutical services at University of Minnesota Medical Center, Fairview or affiliated institutions. prereq: Grad experimental and clinical pharmacology

ECP 5620. Drug Metabolism and Disposition. (3 cr. ; A-F or Audit; Spring Odd Year)
Oxidatative/conjugative enzymes systems involved in human drug metabolism/disposition. Various in vitro models used to evaluate drug metabolism or chemical entity, pros/cons of each. Factors involved in conducting in vivo studies. Components used to predict in vivo drug disposition from in vivo studies. prereq: Grad student or instr consent

ECP 5982. Inter-Institutional Journal Club in Translational Research. (1 cr. [max 2 cr.] ; Student Option; Every Fall)
This course is structured as an inter-institutional journal club between universities of Minnesota, Pittsburgh, and Kentucky that is focused on translational research in clinical pharmacology. Articles will be discussed on topics such as precision medicine, pharmacokinetics, pharmacometrics, pharmacogenomics, and clinical biomarkers.

ECP 5983. Scientific Communications in Experimental and Clinical Pharmacology. (1 cr. ; Student Option; Spring Odd Year)
Introduction of professional development concepts in written and oral scientific communication through lectures, literature readings, and class participation.

ECP 5984. Scientific Communications in Experimental and Clinical Pharmacology II. (1 cr. ; Student Option; Spring Even Year)
Dissemination of advanced professional development concepts in written and oral scientific communication through lectures, literature readings, and class participation.

ECP 5993. Directed Study in Experimental and Clinical Pharmacology. (; 1-4 cr. [max 8 cr.] ; Student Option; Every Fall & Spring)
Student working with faculty member designs a directed study course, including a complete syllabus, appropriate time commitment, and workload for number of credits.

ECP 5994. Directed Research in Experimental and Clinical Pharmacology. (; 1-4 cr. ; Student Option; Every Fall & Spring)
Student works with faculty adviser to design a scientific research project.

ECP 8100. Seminar. (1 cr. [max 8 cr.] ; Student Option; Every Fall & Spring)
Selected topics in experimental/clinical pharmacology. prereq: ECP grad student or instr consent

ECP 8200. Research Problems. (; 1-8 cr. [max 16 cr.] ; Student Option; Every Fall, Spring & Summer)
Individually designed research experience directed at contemporary problems related to drug use. prereq: Grad SACP major (ECP Track) or instr consent

ECP 8210. Clinical Therapeutics. (; 3 cr. ; Student Option; Periodic Fall)
Topics in clinical pharmacology that illustrate continuum of pathophysiology of a disease state, its contemporary treatment, problems or controversial issues with treatment approaches, strategies to advance therapy. Lectures, readings. prereq: SACP grad major in ECP track or instr consent

ECP 8220. Experimental and Clinical Pharmacology. (; 3 cr. ; Student Option; Every Fall)
Theory of advanced methodologies, applications, and evaluation techniques used to determine efficacy/toxicity of new drug therapies. Techniques for collecting/evaluating data. prereq: SACP grad major (ECP track) or instr consent

ECP 8230. Principles of Clinical Pharmacology. (2 cr. ; A-F only; Every Fall)
Factors determining drug exposure, drug-receptor pharmacology, drug response. Personalized medicine including drug interactions, obesity, age (geriatrics/pediatrics), critical illness, therapeutic evaluation, drug development. prereq: Grad student in Experimental and Clinical Pharmacology or instr consent

ECP 8290. Clinical Clerkship. (; 2 cr. ; Student Option; Periodic Fall & Spring)
Supervised study of pharmaceutical services at Fairview-University Medical Center or affiliated institutions. prereq: Grad SACP major in ECP track or instr consent

ECP 8333. FTE: Master's. (1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
FTE: master's. Prereq-Master's student, adviser and DGS consent.

ECP 8444. FTE: Doctoral. (1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
FTE: doctoral. Prereq-Doctoral student, adviser and DGS consent.

ECP 8500. Advances in Pharmacometrics Modeling and Simulation. (; 1 cr. [max 6 cr.] ; S-N only; Every Fall & Spring)
Modeling/simulation at interface between physiological/pharmacological processes. Current literature, discussion groups. Computer applications using relevant software programs. prereq: Grad student in ECP or PHM or instr consent

ECP 8501. Pharmacometrics. (; 2 cr. ; Student Option; Periodic Fall & Spring)
Theory/application of contemporary methods for analysis of concentration-time data and exposure-response relationships. prereq: ECP grad major or PHM grad major or instr consent

ECP 8502. Introductory Population Pharmacokinetic Methods. (; 2 cr. ; Student Option; Periodic Fall, Spring & Summer)
Theoretical background for using mixed effects model in population analysis. Building fixed/random effects into a pharmacostatistical model. Project allows students to become familiar with a contemporary population pharmacokinetic analysis program.

ECP 8503. Intermediate Population PK/PD Methods. (2 cr. ; A-F or Audit; Periodic Fall & Spring)
This course will present the theory and hands-on application of intermediate population methods using nonlinear mixed-effects model applied to pharmacologic systems.

ECP 8504. Modeling Biologics. (2 cr. ; A-F only; Periodic Fall & Spring)
This course will develop computer skills to apply nonlinear regression models to describe the pharmacokinetics and pharmacodynamics of biologics. prereq: A course in basic pharmacokinetics; enrollment in the Experimental & Clinical Pharmacology or Pharmaceutics graduate program, or instructor consent

ECP 8505. Application of physiological-based pharmacokinetic modeling(PBPK) to model-informed drug development. (2 cr. ; A-F only; Periodic Fall & Spring)
Theory/implementation of contemporary methods for analysis and simulation of PBPK to support model-informed drug development.

ECP 8506. Clinical Trial Simulation. (; 2 cr. ; Student Option; Every Spring)
Theory/application of contemporary methods of using simulations to design more efficient/informative clinical trials. prereq: ECP grad or instr consent

ECP 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Doctoral pre-thesis credits. prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

ECP 8776. Project Credits: Master's Plan B. (1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Project credits: master's Plan B prereq: Max 18 cr per semester or summer; 10 cr total required (Plan B only)

ECP 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Thesis credits: master's. prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

ECP 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Thesis credit: doctoral. prereq: Max 18 cr per semester or summer; 24 cr required

ECP 8900. Advanced Topics in Experimental and Clinical Pharmacology. (; 1-4 cr. [max 8 cr.] ; Student Option; Every Fall & Spring)
Topic varies depending on faculty teaching course. prereq: ECP grad program or instr consent

ECP 8940. Advanced Topics: Regulatory Science and Affairs. (1 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
This course will introduce students to the roles and responsibilities of key partners in ensuring regulatory compliance in a variety of settings. It will cover animal and human research as well as drug development. Speakers will delve into how research and development regulations are communicated, applied, and enforced in both academic Institutions and in Industry settings. The goal of this course is to provide an overview of how regulations shape key roles and enlighten students as to potential career paths in the field of regulatory science.

ECP 8982. Inter-Institutional Journal Club in Translational Research. (1 cr. [max 2 cr.] ; Student Option; Every Fall)
This course is structured as an inter-institutional journal club between universities of Minnesota, Pittsburgh, and Kentucky that is focused on translational research in clinical pharmacology. Articles will be discussed on topics such as precision medicine, pharmacokinetics, pharmacometrics, pharmacogenomics, and clinical biomarkers.

ECP 8983. Scientific Communications in Experimental and Clinical Pharmacology. (1 cr. ; Student Option; Every Spring)
Introduction of professional development concepts in written and oral scientific communication through lectures, literature readings, and class participation.

ECP 8984. Interpersonal Communications in Experimental and Clinical Pharmacology. (1 cr. ; A-F only; Spring Even Year)
The course emphasizes on developing basic skills for critical evaluation of scientific communication and provides opportunities for practicing these principles. The objectives of the course are to 1) Provide a systematic review of the principles and practice of the various modes and forms of scientific communication including scientific papers, technical reports, presentations, and proposal writing and 2) Identify the different objectives of these communication modes, and understand

key steps and ingredients for effective scientific communication.

ECP 8992. Directed Readings in Experimental and Clinical Pharmacology. (; 1-2 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
tbd

ECP 8993. Directed Study in Experimental and Clinical Pharmacology. (; 1-4 cr. ; Student Option; Every Fall & Spring)

ECP 8994. Directed Research in Experimental and Clinical Pharmacology. (1-4 cr. [max 8 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed research in experimental and clinical pharmacology. prereq: [Grad ECP, adviser, DGS] consent

Family Med & Community Health (FMCH)

FMCH 5345. Curriculum Design and Teaching Strategies for Medical Education I. (; 3 cr. ; A-F or Audit; Every Spring)
Identifying/developing course goals. Developing course, teacher, learner evaluations. Students must also take 5346, which follows immediately after 5345. prereq: concurrent entollment in 5346, instr consent

FMCH 5346. Curriculum Design and Teaching Strategies for Medical Education II. (; 1 cr. ; A-F or Audit; Summer Even Year)
Taken with 5345. Practicum of lecture, demonstration, small-group discussion, clinical teaching, and computer-assisted instruction. Academic ethics, policies, copyright issues, tenure, academic freedom, problem-based learning. prereq: concurrent registration is required (or allowed) in 5345, instr consent

FMCH 5564. Family Practice Seminar. (; 1 cr. [max 9 cr.] ; O-N or Audit; Every Fall & Spring)
Knowledge, skills, and attitudes in biomedical and behavioral sciences that form foundation for academic discipline of family medicine; medical decision making, common problems and procedures, family theory and assessment, clinical pharmacy, human sexuality. prereq: MD or DO degree

FMCH 5651. Principles of Geriatrics II. (; 1 cr. [max 5 cr.] ; P-N or Audit; Periodic Fall)
Second in two-course sequence. Survey of major topics in geriatric medicine. Epidemiology, etiology, diagnosis, and treatment of major geriatric syndromes and illnesses. prereq: Medical School or dental school or GNP school graduate

FMCH 5950. Clinical Issues in Human Sexuality. (; 2 cr. ; O-N or Audit; Every Fall & Spring)
Assessment and treatment techniques pertaining to common sexual problems. prereq: Enrollment in health sci grad programs in CSPP, Psy, PubH, SW or FSoS or instr consent

FMCH 5955. Directed Study. (; 1-10 cr. ; O-N or Audit; Every Fall, Spring & Summer)
Studies on special topics as arranged between student and faculty. prereq: instr consent; qualified students may arrange for work on a tutorial basis

FMCH 7200. Introduction to Residency in Family Medicine. (2 cr. ; P-N only; Every Fall, Spring & Summer)
This 2-week elective is offered at all of the University of Minnesota-affiliated Twin Cities residency programs in Family Medicine, and select other local programs. This elective provides students the opportunity to experience the full spectrum of Family Medicine and Community Health at that program. All efforts will be made to place the student at the program of their choice. The student will work with Family Medicine faculty physicians and residents in all the facets of Family Medicine care including: office, inpatient hospital service, labor and delivery, overnight call, procedures and, where applicable, nursing home rounds or home visits.

FMCH 7500. Acting Intern Family Medicine. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This elective is offered at all the University of Minnesota-affiliated Twin Cities Residency Programs in Family Medicine and selected other local programs. This elective provides students the opportunity to experience the full spectrum of Family Medicine. All efforts will be made to place the student at the program of their choice. The student will work with Family Medicine faculty physicians and Family Medicine residents in all the facets of Family Medicine care including: office, inpatient hospital service, labor and delivery, overnight call, procedures and, where applicable, nursing home rounds or home visits. Students are expected to take both inpatient medicine and obstetrical call at a frequency of approximately one night per week, work may include evenings and weekends.

FMCH 7501. Rural Physician Associate Program (RPAP). (; 2-6 cr. [max 18 cr.] ; H-N or Audit; Every Fall, Spring & Summer)
Community-based elective with extensive primary care experience in a rural setting. Intended for the student with an interest in rural Minnesota primary care. Each student works with family physicians and local and/or visiting specialists. Problem-based learning, hands-on clinical experience and one-to-one teaching. Scholarships are available. prereq: Med 7500, Obst 7500, USMLE Step 1 Passing Score

FMCH 7502. Rural Physician Associate Program (RPAP): Orthopaedic Surgery. (; 2-4 cr. ; P-N or Audit; Every Fall, Spring & Summer)
Community-based elective with extensive orthopaedic surgery experience in a rural setting. prereq: 7501, RPAP student

FMCH 7503. Preceptorship in Family Medicine Obstetrics. (; 2 cr. ; P-N only; Every Fall, Spring & Summer)
This course provides an overview of family medicine obstetrics, or maternity care. The student is given the opportunity to participate in the care of the pregnant woman both in the clinic and in the hospital. The student is assigned to call one time per week. Additionally, the student will be given time to research one topic of interest and complete a one-page summary.

FMCH 7504. Rural Physician Associate Program (RPAP): Surgery. (; 6 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Community-based elective with extensive primary care (surgery) experience in a rural setting. Each student works with family physicians and local or visiting specialists. Problem-based learning, hands-on clinical experience, one-to-one teaching. prereq: Med 7500, Obst 7500, USMLE Step 1 Passing Score

FMCH 7505. Rural Physician Associate Program (RPAP): Obstetrics and Gynecology. (; 6 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Community-based elective with extensive obstetrics/gynecology experience in a rural setting. Each student works with family physicians and local or visiting specialists. Problem-based learning, hands-on clinical experience, one-to-one teaching. prereq: 7501

FMCH 7506. Rural Physician Associate Program (RPAP): Pediatrics. (; 6 cr. ; H-N or Audit; Every Fall & Spring)
Community-based elective with extensive pediatrics experience in a rural setting. prereq: 7501

FMCH 7507. Rural Physician Associate Program (RPAP): Otolaryngology. (; 2-4 cr. ; P-N or Audit; Every Spring)
Community-based elective with extensive otolaryngology experience in a rural setting.

FMCH 7508. Rural Physician Associate Program (RPAP): Urology. (; 2-4 cr. ; P-N or Audit; Every Fall, Spring & Summer)
Community-based elective with extensive urology experience in a rural setting.

FMCH 7509. Rural Physician Associate Program (RPAP): Primary Care Clerkship I. (; 4 cr. ; H-N or Audit; Every Fall & Spring)
Community-based elective with extensive primary care experience in a rural setting. prereq: 7501

FMCH 7510. Rural Physician Associate Program (RPAP): Primary Care Clerkship II. (; 4 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Community-based elective with extensive primary care experience in a rural setting. prereq: 7509

FMCH 7511. Urban Community Ambulatory Medicine (UCAM). (; 4 cr. ; P-N only; Every Fall, Spring & Summer)
UCAM provides 12 weeks of ambulatory continuity experience in an underserved urban community Family Medicine Clinic. UCAM expands the Family Medicine Clerkship exposure to patient diversity, low income, multicultural urban medicine, and community health. Students are required to attend the Family Medicine Clerkship/Primary Care Selective seminars as well as 4 UCAM seminars. From a scheduling point of view,

UCAM combines the 8 weeks of Family Medicine Clerkship/Primary Care Selective with 4 extra weeks of elective credit. The principles of urban medicine will be blended throughout the 12 weeks, as will the project. Each student will participate in a community health project and complete a journal about his/her experience. The community health project ideally combines the EBM focus of the Family Medicine clerkship project with a longitudinal project. Prereq: FMCH 7600 and FMCH 7700

FMCH 7512. Urban Community Ambulatory Medicine (UCAM). (; 4 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Expands primary-care clerkship (PCC) into 16 weeks of primary care experience in one underserved urban clinic. Students attend PCC seminars during first eight weeks, followed by weekly seminars covering patient diversity, indigenous medicine, and community health. prereq: 7511, InMd 5508, InMd 7509

FMCH 7513. Rural Physician Associate Program (RPAP): Orthopaedic SurgeryRSU. (; 2-4 cr. ; P-N or Audit; Periodic Fall & Spring)
Community-based elective with extensive orthopaedic surgery experience in a rural setting. prereq: Accepted into RPAP

FMCH 7515. RPAP: Emergency Medicine. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
tbd

FMCH 7516. Research in Human Sexuality. (; 2-4 cr. [max 8 cr.] ; P-N only; Every Fall, Spring & Summer)
This elective consists of clinical and/or laboratory research related to human sexuality in areas such as incest, rape, gender dysphoria, compulsive sexual behavior, sex offenses, and sexual dysfunction. It is adaptable to the specific interests of the student and faculty.

FMCH 7519. Clinical Practice of Occupational Medicine. (2-4 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Students perform complete occupational health history, set up basic problem-solving approahces to occupational health problems.

FMCH 7520. Rural Rotation in Family Medicine. (; 4 cr. ; P-N only; Every Fall, Spring & Summer)
This course is intended for students interested in observing and participating in Family Medicine in the rural setting. Students participate in patient care in the patient's home, in long-term facilities, in the doctor's office and in the hospital. Students observe close interrelationships between practicing physicians and the community.

FMCH 7521. Topics in Immigrant Health. (; 4 cr. ; P-N only; Every Spring)
Course is designed to offer an intensive multidimensional exploration of immigrant health using clinical, multimedia, academic and on-line learning. The course will include an individualized in-depth project and an individualized learning plan will be developed between each student and the course director after assessing the student's experience, background and interest. This course will combine clinical experiences at a variety of sites which serve immigrant patients with text-based and web-based reading, on-line research, group and individual community visits and on-line and class discussions to provide students with an opportunity to study in-depth the issues that communities and methods by which those barriers are being overcome.

FMCH 7524. Rotation in Palliative Medicine and Hospice. (; 2 cr. ; P-N only; Every Fall, Spring & Summer)
Introduces students to the field of palliative care and hospice medicine. Students will participate in patient care with hospice staff and palliative care physicians and other practitioners in the hospital, nursing home, clinic, and patient's homes. Students will directly work with interdisciplinary teams in their daily work, and spend time with practitioners in social work, nursing, spiritual health, music therapy, and physicians.

FMCH 7525. Cardiovascular Medicine. (; 2 cr. ; P-N only; Every Fall, Spring & Summer)
Students will participate in daily cardiology inpatient rounds. They will work 1:1 with the rounding cardiologist for the week. Responsibilities include the initial cardiology consultation and daily rounds on patients in the hospital.

FMCH 7527. Lesbian, Gay, Bisexual, and Transgender (LGBT) Health. (2 cr. ; P-N only; Every Fall)
In this course, students will gain an understanding of health risks experienced by LGBT individuals and will practice assessing sexual orientation, gender identity, sexual health, and discussing specific health concerns and treatment options in order to become comfortable working with this population. Students will also hear from LGBT individuals themselves about their healthcare experiences and how they wish to be treated. In addition, physicians who are LGB or transgender will talk about managing their professional and personal identities, as well as being ?out? in the community and identifying as an LGBT-friendly healthcare provider.

FMCH 7530. Preceptorship in Community Family Medicine. (; 2 cr. ; P-N only; Every Fall, Spring & Summer)
This course is intended for students interested in pursuing family medicine as a career, or for students wishing to acquire a broadly-based medical background before training in another specialty. The student will usually participate in inpatient and outpatient care in the family medicine clinic and in the hospital.

FMCH 7531. Introduction to Healthcare for the Underserved. (; 2-6 cr. ; H-N or Audit; Every Fall & Spring)
Introduces students to the health care needs and challenges faced by special population groups served by Family Medicine. These include immigrant and refugee populations, minority populations, and various other underserved groups. During this rotation based in a clinic serving one or more of these population groups, the student will become familiar with the unique health needs of a population and the resources and methods used to address those needs. Issues such as communication, education, and traditional healing beliefs and systems will be addressed. Typically, 2.5 days per week will be spent in direct patient care, 1 day is reserved for students to perform independent learning around the population to be studied while the remaining 1.5 days may be spent in a variety of non-direct patient care or community-based activities, depending on the clinic site.

FMCH 7535. Community Health in Family Medicine. (; 3-5 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Individually designed outpatient rotation. Combines clinical work in urban setting with a series of experiences in the community. prereq: At least two six-week rotations in medicine or pediatrics or obstetrics or surgery

FMCH 7537. Sports Medicine. (; 4 cr. ; H-N only; Every Fall & Spring)
Students will gain experience in the field of sports medicine including exposure to the disciplines of primary care sports medicine, orthopedic sports medicine, sports physical therapy, and athletic training.

FMCH 7538. Sports Medicine in Duluth. (; 2 cr. [max 4 cr.] ; H-N only; Every Fall, Spring & Summer)
This course is an opportunity for students interested in primary care or a musculo-skeletal specialty to develop an appreciation for the role of sports medicine in his/her practice. The student will work closely with full-time sports medicine physicians and allied health providers, including physical therapists and athletic trainers.

FMCH 7539. Sports Medicine (Virtual). (; 2 cr. ; P-N only; Periodic Fall, Spring & Summer)
This is a 2 week, independent study in topics relating to Sports Medicine. This online elective will include directed musculoskeletal exam review using EBM, case study review, and power point presentations on a variety of topics. This elective should be considered a supplement to, and not a replacement of FMCH 7537.

FMCH 7540. Sports Medicine: USA Soccer Cup. (; 2 cr. ; H-N only; Every Summer)
Course held immediately prior to the start of the USA Soccer Cup Tournaments every July. This course consists of didactic lectures and hands on workshops focusing on sports medicine topics with an emphasis on soccer.

FMCH 7551. Rural Community Ambulatory Medicine PCC. (12 cr. [max 24 cr.] ; H-N only; Every Fall, Spring & Summer)
Twelve-week course. Four weeks in a Twin Cities Family Residency clinic, eight weeks in a selected Rural Community. Exposure to patients from diverse backgrounds in an outpatient setting to rural medicine, delivery systems, and community health. Small-group seminars, one-day Hospice experience, project, final exam.

FMCH 7577. An Introduction to Complementary and Alternative Therapies. (; 3 cr. ; O-N or Audit; Periodic Fall & Spring)

Complementary therapies and their integration with allopathic treatments. Observation of complementary care providers in community. Examines culturally-based approaches to health care. Weekly seminars, special project, use of Internet. prereq: Internet access, basic e-mail skills; Nurs 5609 recommended

FMCH 7585. Sexual Health Concerns in Clinical Practice. (; 2 cr. ; P-N only; Every Fall, Spring & Summer)
This course requires a minimum commitment of 40 hours per week (some evening time possible) over a 2-4 week period. Students will have the opportunity for observation and practice of sex-related education and counseling through participation in intake and assessment sequences, individual and conjoint sessions, and group sex therapy. Each student will be supervised by a member of the Program in Human Sexuality staff. The student is expected to participate in several hours of staff conferences and seminars each week. Readings will be assigned.

FMCH 7595. Family Medicine Research. (; 2-8 cr. ; P-N only; Every Fall, Spring & Summer)
Academic research in collaboration with member of academic or clinical faculty. Identification of parameters/methodological components of family medicine research. Develops knowledge/skills essential for academic careers in family medicine.

FMCH 7599. Family Medicine Independent Study. (; 2-8 cr. ; P-N only; Every Fall, Spring & Summer)
This course is intended for a student intererested in pursuing a Family Medicine project that does not fit well in one of the other Family Medicine elective descriptions. For any directed study project, there will be a written agreement between the student and Course Director.

FMCH 7600. Family Medicine Four-Week Clerkship. (; 4 cr. ; P-N only; Every Fall, Spring & Summer)
Ambulatory four-week clerkship.

FMCH 7602. Family Medicine Clerkship Part B. (2 cr. ; P-N only; Periodic Fall, Spring & Summer)
Course created specifically to accommodate clinical setting restrictions due to COVID-19 from spring 2020 to spring 2021. Part A of this course covers the virtual coursework while Part B covers the clinical component. Both parts A and B must be completed for the clerkship requirement to be considered fulfilled. Catalog Description: This is a 4 week outpatient clinic-based experience in Family Medicine working with practicing family physicians, colleagues from other disciplines who are working in family medicine clinics and, at some sites, FM residents. The core of the rotation is the 14 days spent in the clinic (except the first Monday, final Friday, and every Wednesday). This is a very hands-on, active patient contact clerkship. Students will spend their four weeks either at a residency clinic or at a community or private practice clinic. We strive to actively involve students in direct patient care with the expectation that a student is directly involved in over 50% of patient encounters in a given day. Students should write up 2-3 notes per half-day. During the 4 weeks, students also attend weekly seminars and didactic skills workshops on Wednesday mornings. In addition there is a comprehensive online curriculum.

FMCH 7700. UCAM Acting Internship Family Medicine. (; 4 cr. ; P-N only; Every Fall, Spring & Summer)
Four-week ambulatory experience in family medicine clinic.

FMCH 7701. RPAP: Family Medicine Clerkship. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
Community-based elective. Extensive primary care experience in rural setting.

FMCH 7702. RPAP: Primary Care Selective. (; 4 cr. ; P-N only; Every Fall, Spring & Summer)
Community-based elective. Extensive primary care experience in rural setting.

FMCH 7910. Family Medicine Med Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Family Medicine medical residency.

FMCH 7930. Family Medicine Med Fellowship. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Family medicine medical fellowship.

Family Policy Minor (FPOL)

FPOL 8000. Family Policy Perspectives. (; 3 cr. ; A-F or Audit; Every Spring)
Policies that effect families, from persepctive of several academic disciplines. Faculty from academic units across the University teach theory/policy analysis skills from their disciplines. How to analyze public/private policies for their impact on families. Advocacy. Current policy making activities at the legislature, county boards, and other public sector policymaking bodies.

Family Social Science (FSOS)

FSOS 5014. Quantitative Family Research Methods I. (; 3 cr. ; Student Option; Every Spring)
Family research methods, issues associated with multiple levels of analysis. Conducting family-focused data analyses using basic/intermediate methods (through ANOVA and multiple regression), including power analysis. Ethical issues involved in family research such as IRB/HIPAA regulations. prereq: Grad student or instr consent

FSOS 5015. Family Research Laboratory. (; 1 cr. ; S-N or Audit; Every Spring)
Application of basic family research methods into experiential learning using statistical software. Analyses that correspond with problem situations in 5014 and that involve secondary data analyses. Using statistical software for basic family research. Preparation to work with quantitative family data sets. prereq: Grad student or instr consent

FSOS 5111. Introduction to Family Therapy. (3 cr. ; A-F only; Periodic Fall & Spring)
This course is designed as an introduction to the field of marriage/couple and family therapy. Students who successfully complete the course should be well versed in the basics of both the foundational and contemporary theories of the discipline. Further, students will be exposed to a number of clinical vignettes and case scenarios that demonstrate the application of the theories in pre-recorded family therapy sessions. Through class assignments and discussions, students will be able to make a more informed decision as to whether or not family therapy is a field that holds potential for them in their own professional pursuits. Other mental health disciplines attend to family variables but having a background in family systems theory and family therapy theories will provide a solid knowledge base for someone embarking on a career in relationship-oriented clinical work. Family systems theory guides the majority of what will be discussed in class.

FSOS 5150. Special Topics in Family Social Science. (; 1-4 cr. [max 12 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Review of research and scholarly thought. Topics specified in Class Schedule. prereq: instr consent

FSOS 5193. Directed Study in Family Social Science. (; 1-6 cr. ; Student Option; Every Fall, Spring & Summer)
tbd prereq: FSoS or grad student in related field

FSOS 5426. Alcohol and Drugs: Families and Culture. (3 cr. ; Student Option; Periodic Fall, Spring & Summer)
Overview of psychology/sociology of drug use/abuse. Life-span, epidemiological, familial, cultural data regarding use. Fundamentals of licit/illicit drug use behavior. Gender, ethnicity, social class, sexuality, sexual orientation, disability.

FSOS 5429. Counseling Skills Practicum I. (3 cr. ; Student Option; Periodic Fall, Spring & Summer)
Basic counseling skills. Counselor needs/motivations, non-verbal communication, basic/advanced empathy, identifying strengths, maintaining focus, challenging discrepancies, use of self. Emphasizes building from client strengths, learning through role-playing.

FSOS 5701. Prevention Science: Principles and Practices. (3 cr. ; A-F or Audit; Spring Even Year)
Theoretical, empirical, and practical foundations for strategic interventions to prevent behavioral problems and promote healthy development. Multidisciplinary roots of prevention science. Trends/directions and best practices.

FSOS 5702. Prevention Science Research Methodology. (3 cr. ; A-F or Audit; Fall Even Year)
This course is intended to provide students with broad exposure to topics in research methodology within the field of prevention science. Prevention science as a discipline focuses on the etiology and prevention of

social, physical, and mental health problems and the translation of that information to promote health and well-being. This course will emphasize research methodology as it pertains to preventive interventions in youth and family contexts. The course is intended to serve as a survey of a wide range of topics within these areas, with research design, measurement issues, and analytic methods representing the major foci. Topics will be covered with attention to the community contexts within which prevention research often occurs as well as the ethical and human subjects issues that may arise. Students who successfully complete the course are expected to be able to interpret and critically evaluate prevention research methodology as well as identify appropriate methodical strategies to address research questions within prevention science.

FSOS 5703. New Topics in Prevention: Implementation and Dissemination. (3 cr. ; A-F or Audit; Spring Odd Year)
This is an interdisciplinary course focused on the new science of implementation and dissemination of evidence-based/empirically-supported family-focused psychosocial prevention programs. Course content will include an overview of conceptual and theoretical foundations of implementation research, key research questions, methods for evaluating implementation and dissemination efforts, and case examples from the empirical literature. The course will take an ecological perspective to the implementation of family-based prevention programs, addressing questions such as how widespread efforts to install programs in communities can ensure that programs create change in children and families.

FSOS 5937. Parent-Child Interaction. (; 3 cr. ; A-F only; Every Fall & Spring)
In Parent-Child Interaction, we will examine the dynamic, reciprocal nature of parent-child interactions across the lifespan through multidisciplinary and diverse research, theories and practices. Emphasis will be given to the bidirectional impact of parent-child interactions on the parent-child relationship and on parents' and children's development within complex family, community, cultural and other socio-ecological contexts. Students will continue to reflect and grow in their understanding of the professional role and competencies of a parent educator and learning activities will focus on practical application to both personal lives and professional work with families.

FSOS 5942. Diverse Family Experiences. (; 3 cr. ; A-F only; Every Fall & Spring)
This course is a research-based in-depth look at family experiences from many diverse points of view. Students will examine diverse experiences of families and their relevance to parent education and to the professional development of parent educators. Research and theoretical knowledge are woven together with observation and personal reflection to create a strength-based approach to both families and professional development.

FSOS 5944. Curricular Design in Parent Education. (; 3 cr. ; A-F only; Every Fall)
Students will develop the skills to adapt and design curricular resources and teaching strategies for effective parent education with diverse families across multiple contexts. Students will develop competence in conducting needs assessment, identifying content, discerning teaching methods, and designing lesson plans. As they develop their own philosophy of practice, students will study the history and evolution of parent education in Minnesota and across the U.S. prereq: FSoS 5937 & FSoS 5942 or instr consent

FSOS 5945. Teaching and Learning in Parent Education. (; 3 cr. ; A-F only; Every Fall)
Students will examine adult, adolescent, and parent learning and development from the perspective of their relevance for parent education. Students will select, use, and reflect on group and individual parent education teaching strategies and facilitation processes designed to meet the needs of diverse populations of adult learners. Critical reflection, ethical practices, and other parent educator competencies related to teaching methods and processes will be addressed. Personal professional development will be facilitated through challenging assumptions and examining the knowledge and competencies required for parent educators. prereq: FSoS 5937 & FSoS 5942 or instr consent

FSOS 5946. Assessment and Evaluation in Parent Education. (; 3 cr. ; A-F only; Every Spring)
Students will be introduced to theory, terminology, issues, and approaches in assessment and evaluation. Students will apply this new material to the tasks of monitoring program performance, assessing program quality, and measuring parent learning and development. prereq: 5944 or instr consent

FSOS 5949. Student Teaching in Parent Education. (; 3 cr. ; A-F only; Every Spring)
Students will participate in mentored and supervised parent education practice designed to meet individual student needs and interests in parent education. The student teaching assignment is supplemented with online discussions and chats intended to provide students an opportunity to engage in discussion, reflection, and cooperative learning with regard to the practice of parent education. prereq: Application for student teaching; FSoS 5937, 5942, 5944 and 5945 or instr consent

FSOS 8001. Conceptual Frameworks in the Family. (3 cr. ; A-F only; Every Fall)
Major theoretical models about families, emphasizing sociohistorical context.

FSOS 8002. Advanced Family Conceptual Frameworks. (3 cr. ; A-F only; Every Spring)
Builds on FSoS 8001 by focusing specifically on family level research questions. Family development/critical theoretical perspectives that can be used to understand/study family processes/contemporary ecological issues. prereq: 8001 or instr consent

FSOS 8003. Current Issues in Family Science. (; 3 cr. ; Student Option; Every Spring)
Content, theories, and methodologies in family science. Emphasizes findings of recent/emerging areas of research. Readings covering a wide range of topics. Critical examination of research studies. Targeted class discussion.

FSOS 8005. Multicultural Issues in Family Social Science. (; 3 cr. ; Student Option; Every Spring)
Impact of culture/ethnicity on family processes. Definitions/measurement of culture as a variable as it relates to family/individual development across life span. How culture/ethnicity influence dynamics, development, constellation, parenting, aging, and socialization. Cultural variations in relationships between families. Prevention/intervention outcomes. Ethnic socialization/identity. Ethnicity as related to family therapy practice/theory.

FSOS 8007. Ethical Issues and Moral Dilemmas in Family Life. (; 3 cr. ; Student Option; Periodic Fall)
Multidisciplinary perspectives of ethics, social norms, family law, family policy, family economics, and family decision-making. Focuses on differing perspectives of individuals representing various ethnicities, socio-economic levels, religions, and sexual orientations.

FSOS 8013. Qualitative Family Research Methods. (3 cr. ; A-F only; Every Fall)
Approaches to qualitative family research evaluation. Phenomenological, feminist, grounded theory, content analytic, ethnomethodological, ethnographic, program evaluation. Theory, research examples, student projects.

FSOS 8014. Quantitative Family Research Methods II. (3 cr. ; A-F only; Every Fall)
Quantitative research process, from developing research question to putting findings to use. Major course project basis for class discussion. Family research. Applying research knowledge to study of families. prereq: [5014 or equiv], [8001 or equiv], [two stat courses or instr consent]

FSOS 8015. Advanced Qualitative Family Research Methods. (3 cr. ; A-F or Audit; Every Spring)
Applying qualitative research methods to understand individual/collective meaning, experience within/across diverse family systems. prereq: 8013 or instr consent

FSOS 8033. Problems in Families. (; 3 cr. ; Student Option; Periodic Spring)
Family therapy assessment/treatment approaches to problems such as depression, alcoholism, and sexual abuse, and to challenges of varying family structures, such as single-parent/remarried families. prereq: [8032 or equiv], instr consent

FSOS 8034. Marriage and Family Therapy Supervision. (3 cr. ; Student Option; Spring Odd Year)
Theories of supervision, structures for supervision, methods of supervision, evaluation process, legal/ethical issues. Therapist-client-supervisor relationships, potential problems,

contextual issues. prereq: FSOS doctoral student enrolled in Couple Family Therapy (CFT) or instr consent

FSOS 8035. Assessment of Couples and Families. (; 3 cr. ; A-F or Audit; Periodic Fall)
Issues in research and clinical assessment. Assumptions and values underlying assessment approaches. Specific assessment techniques discussed, evaluated, and administered. Ethical, legal, and practical issues. prereq: 8014 or equiv or instr consent

FSOS 8036. Couple/Marriage and Family Therapy Research. (3 cr. ; A-F only; Fall Odd Year)
Historic/contemporary approaches to C/MFT research with emphasis on prevention, intervention, dissemination from variety of perspectives. prereq: FSOS doctoral student enrolled in Couple Family Therapy (CFT) or instr consent

FSOS 8037. Ethical, Legal, and Professional Issues in Mental Health Practice: Issues with Couples and Families. (; 2-10 cr. ; A-F or Audit; Periodic Fall & Spring)
Boundaries and triangles, gender inequities, family law, confidentiality and reporting requirements, dual roles, client diversity, and value clashes. prereq: [8032, practicum or internship exper] or [grad student in cooperating mental hlth practice prog who has completed 1 course on therapy with children

FSOS 8039. Clinical Interventions for Couples. (; 3 cr. ; A-F or Audit; Periodic Fall)
Interventions into problems faced by couples at various ages and stages of their relationship. Developing and implementing effective strategies for problem solving, relationship maintenance, and partner growth, including integration of sex therapy into ongoing couple therapy. prereq: 8032 or equiv or instr consent

FSOS 8043. Family Theory Development: A Systemic Perspective. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Concepts and principles of systems and ecosystems and their applications in family science; emphasizes theoretical integration and development of research models with appropriate methodologies. prereq: 8001 or equiv or instr consent, FSoS PhD student beyond 1st yr

FSOS 8047. Integrative Research Seminar. (; 3 cr. ; Student Option; Every Spring)
For advanced doctoral students primarily in family social science who are working on independent research projects. Giving and receiving of constructive criticism and support in integrating theories, methods, and applications in order to create a totality that is logically coherent and conceptually and methodologically sound. prereq: 8001 or equiv, 8013 or equiv, 8014 or equiv

FSOS 8101. Family Stress, Coping, and Adaptation. (; 3 cr. ; Student Option; Every Spring)
Helping families become more resilient to stress by decreasing vulnerability to crises and traumatic stress disorders. Students develop research or intervention proposal on family stress, coping, adaptation, crisis, trauma, or resilience. prereq: 8001 or equiv, research methods course

FSOS 8104. Family Policy Seminar. (; 3 cr. ; Student Option; Periodic Spring)
Distinguishing family policy research from other family research. Conceptual frameworks, methods, and roles family policy research can play in policy-making and knowledge-building processes.

FSOS 8105. Family Gerontology. (; 3 cr. ; Student Option; Periodic Spring)
Integrates gerontology and family studies; new lines of inquiry, qualitative and quantitative, into aging families. Family gerontological research, family relationships, family and long-term care institutions, theoretical frameworks and research methods, and research and interventions. prereq: 4154 or equiv or instr consent

FSOS 8106. Seminar: Families From an Economic Perspective. (; 3 cr. ; Student Option; Periodic Fall)
Conceptual/methodological/economic perspectives of family social science. Family investments in human/social capital. Diversities in families. Interface of public policies and family economic well-being.

FSOS 8107. Family Values Research: Theories and Critical Methods. (; 3 cr. ; Student Option; Periodic Fall)
Interdisciplinary seminar on critical modes of inquiry in the family domain that require designing studies using normative theories, examining values as units of observation, and solving practical problems by collaborative strategies designed to encourage change. prereq: 8013 or equiv, 8014 or equiv or instr consent; WCFE 8920 recommended

FSOS 8150. Topics in Family Social Science. (; 1-6 cr. ; Student Option; Every Fall, Spring & Summer)
Special seminars on timely topics. prereq: FSoS grad student or instr consent

FSOS 8151. Preparation for Independent Teaching in Family Studies. (; 3 cr. [max 9 cr.] ; A-F only; Every Spring)
Practicum. Skills to independently teach family sciences courses to undergrads. prereq: instr consent

FSOS 8160. Topics in Marriage and Family Therapy. (; 1-6 cr. ; Student Option; Periodic Fall)
Special seminars on timely topics. prereq: MFT grad student or instr consent

FSOS 8193. Directed Study in Family Social Science. (1-6 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed study. prereq: Doctoral student in FSoS or related field

FSOS 8196. Couple/Marriage Family Therapy Practicum. (; 1-6 cr. [max 24 cr.] ; S-N only; Every Fall & Spring)
Clinical placement doing marriage/family clinical practice. Supervision of couple/marriage. Family therapy in community setting.

FSOS 8200. Orientation for Family Social Science. (1 cr. ; S-N or Audit; Every Fall)
TBD

FSOS 8201. Teaching Family Courses in Higher Education I. (; 3 cr. ; S-N or Audit; Periodic Fall & Spring)
Students cooperatively plan, administer, and evaluate (with a graduate faculty supervisor) an undergraduate core course. Improvement of teaching and evaluation methods, and conceptualization and presentation of research-based course in family studies. prereq: 12 FSoS grad cr; teaching assistant exper recommended

FSOS 8202. Teaching Family Courses in Higher Education II. (; 3 cr. ; S-N or Audit; Periodic Fall & Spring)
Under faculty supervision, students teach an undergraduate course in family social science for which they have appropriate academic preparation and professional experience. prereq: 8201 or equiv

FSOS 8275. Clinical Consultation with Couples and Families. (; 3 cr. ; S-N or Audit; Periodic Fall & Spring)
Supervised students serve as a consultation group working with community clinicians and their clients, utilizing a one-way window and observation room; opportunities for cotherapy. prereq: instr consent; required for grad FSoS majors in marriage and family therapy prog

FSOS 8296. Couple/ Marriage Family Therapy Internship. (1-12 cr. ; S-N only; Every Fall & Spring)
Supervised clinical/other professional practical experiences in couple/marriage, family therapy. prereq: FSOS doctoral student enrolled in Couple Family Therapy (CFT) or instr consent

FSOS 8333. FTE: Masters. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

FSOS 8396. Supervision of Supervision. (; 1-3 cr. [max 12 cr.] ; S-N or Audit; Every Fall & Spring)
Hands-on practicum to gain AAMFT-approved supervisor status. prereq: MFT student, instr consent

FSOS 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

FSOS 8550. Advanced Topics in Family Social Science. (; 1-6 cr. ; A-F or Audit; Every Fall & Spring)
Special seminars on topics suited to student needs.

FSOS 8560. Advanced Clinical Topics in Marriage and Family Therapy. (; 1-6 cr. [max 36 cr.] ; A-F or Audit; Periodic Spring)
Special advanced topics or seminars.

FSOS 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)

tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

FSOS 8755. Master's Paper: Plan B Project. (; 1-6 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Graduate faculty work with students on research for Plan B paper. prereq: FSoS MA student

FSOS 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

FSOS 8794. Directed Research in Family Social Science. (1-6 cr. [max 18 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed research in family social science.

FSOS 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Finance (FINA)

FINA 5125. Cryptocurrency, Blockchain, and Their Business Applications. (2 cr. ; A-F only; Every Spring)
This course discusses cryptocurrencies (including Bitcoin, Ethereum, and others), blockchain, also referred to as distributed ledger technology (DLT), and their applications in various business sectors. The course first explains the history of cryptocurrency and the fundamentals of blockchain including cryptography and consensus mechanism. Although technical, this part is essential to establish a foundation to understand cryptocurrencies and blockchain. The rest of the course is on the applications of blockchain. We will discuss enterprise blockchain, smart contracts, and token offerings, e.g., initial coin offerings (ICOs) and securities token offering (STOs). We will have industry experts to give guest lectures on the realworld blockchain applications and interact with students. Finally, we will cover the valuation models for cryptoassets, the practical details of how to use cryptocurrency, and various investments related to blockchain. The goal of the course is to provide students with a basic set of skills to understand cryptocurrencies and blockchain and how businesses can use them.

FINA 5422. Financial Econometrics and Computational Methods I. (2 cr. ; A-F only; Every Fall)
This course provides an introduction to the methods used in empirical finance. A review of statistics is followed by intensive instruction on matrix algebra that culminates in a fundamental understanding of linear regression, the basic empirical tool. Asset pricing theories are discussed and developed and then methods are derived to test them. The course will emphasize estimation and inference using computer-based applications.

FINA 5423. Financial Econometrics and Computational Methods II. (2 cr. ; A-F only; Every Fall)
This course builds on Financial Econometrics I and provides instruction on the econometrics used in empirical finance. Topics will include time series analysis, parametric models of volatility, evaluation of asset pricing theories, and models for risk management. The course will emphasize estimation and inference using computer-based applications.

FINA 5529. Derivatives II. (; 2 cr. ; A-F only; Every Spring)
This course begins with a discussion of advanced derivative hedging techniques and proceeds to the economics and mechanics of advanced derivative securities, including interest rate derivatives, swaps, Asian options, and barrier options. The second phase of the course investigates mathematical techniques for stochastic and dynamic modeling of asset prices and derivative security values. Students must use these statistical modeling techniques and advanced programming software (Matlab, Python, R, etc) in a group project to price path dependent securities such as American style options.

FINA 5920. Finance Topic. (; 2-4 cr. [max 8 cr.] ; A-F only; Periodic Fall & Spring)
Discussion and analysis of current topics and developments in Finance.

FINA 6111. Financing over a Firm?s Lifecycle. (1 cr. ; A-F only; Every Fall & Spring)
All companies?from small startups to large public companies?require funding in order to operate. This course provides an overview of the various sources of financing that a company can access throughout the different stages of its life, including debt and equity financing, Venture Capital, Private Equity, Initial Public Offerings, and others. prereq: MBA 6231 (previously MBA 6230)

FINA 6112. Private Equity. (; 1 cr. ; A-F only; Every Spring)
Private equity has emerged as an important force in our financial markets. This course will explore current issues and best practices ranging from early-stage financing with angel investors and Venture Capital to late stage ? take-private? transactions such as leveraged buyouts.

FINA 6113. Public Equity. (; 1 cr. ; A-F only; Every Spring)
Early-stage financing is a critical success factor for growing businesses. This course will explore current issues and best practices for financing with public equity. Topics will include Initial Public Offerings (IPOs), Direct Listings and Special Purpose Acquisition Companies (SPAC), or Blank-check companies.

FINA 6121. Debt Markets, Interest Rates, and Hedging. (; 2 cr. ; A-F only; Every Fall & Spring)
This class introduces the tools and concepts needed to analyze fixed income securities. Topics include the pricing and hedging of fixed-rate Treasuries, floating rate bonds, bonds with embedded options, defaultable bonds, mortgage-backed securities and their derivatives, inflation-indexed bonds, duration analysis, and the Federal Reserve? s impact on interest rates. This course is extremely computationally intensive. Most of the assignments entail statistical modeling via regression analysis on historical data such as the term structure of interest rates, credit spreads, and other fixed income instruments. We also investigate how well future interest rates can be forecasted using forward rates and other observables. Advanced mathematical techniques such as principal component analysis and attribution analysis are investigated. Stochastic modeling of interest rate dynamics via Brownian Motion and Monte Carlo analysis is also introduced. Every class begins by discussing current headline news regarding fixed income markets, and how they relate to the concepts being taught. prereq: MBA student, MBA 6231 (previously MBA 6230)

FINA 6122. Financial Management of Depository Institutions. (; 2 cr. ; A-F only; Every Spring)
Commercial banks, other depository institutions. Asset/liability management, risk management, geographic expansion, investment banking, public policy issues. Lectures, student presentations, project. prereq: MBA 6231 (previously MBA 6230), MBA student

FINA 6123. Financial Services Industry. (; 2 cr. ; A-F only; Every Spring)
This course gives an overview of the U.S. financial services industry, emphasizing the overall environment, key institutional details, and underlying economic functions. After introducing financial markets and institutions and their functions, we look at the biggest sectors of this industry (banking, insurance, securities dealing, money management, etc.) in more depth. We conclude with a discussion of the impact of "fintech" on this sector.

FINA 6125. Cryptocurrency, Blockchain, and Their Business Applications. (; 2 cr. ; A-F only; Every Spring)
This course discusses cryptocurrencies (including Bitcoin, Ethereum, and others), blockchain, also referred to as distributed ledger technology (DLT), and their applications in various business sectors. The course first explains the history of cryptocurrency, and the fundamentals of blockchain including cryptography and consensus mechanism. Although technical, this part is essential to establish a foundation to understand cryptocurrencies and blockchain. The rest of the course is on the applications of blockchain. We will discuss enterprise blockchain, smart contracts, and token offerings, e.g., initial coin offerings (ICOs) and securities token offering (STOs). We will have industry experts to give guest lectures on the real-world blockchain applications and interact with students. Finally,

we will cover the valuation models for crypto assets, the practical details of how to use cryptocurrency, and various investments related to blockchain. The goal of the course is to provide students with a basic set of skills to understand cryptocurrencies and blockchain and how businesses can use them.

FINA 6211. Cash Flows and Project Selection. (; 1 cr. ; A-F only; Every Fall & Spring)
Managers are judged on their ability to select value-added projects; this is also one of the drivers of business value. This course will explore the idea of ranking and selecting the best projects. This will be accomplished through a study of cash flows and ranking metrics, including payback, internal rate of return, and net present value. prereq: MBA 6231 (previously MBA 6230)

FINA 6212. Working Capital Management. (; 1 cr. ; A-F only; Every Fall & Spring)
Cash management is a major factor in the success or failure of a business. Companies often find themselves short on cash even in a time of profitability. Being able to manage a business through the cash cycle is a key factor in business success. This course will explore current issues and best practices for working capital management. Prereq: MBA 6231 (previously MBA 6230)

FINA 6213. Financial Capital Structure. (; 1 cr. ; A-F only; Every Fall & Spring)
This course focuses on one of the most fundamental corporate finance decisions, the determination of a firm?s financial capital structure, and its impact on firm risk, cost of capital, and firm value. The course also studies corporate bankruptcy and reorganization. Fina 6213 and FINA 6214 can have concurrent enrollment. prereq: MBA 6231 (previously MBA 6230)

FINA 6214. Business Valuation. (; 1 cr. ; A-F only; Every Fall & Spring)
Description: Valuation is at the very core of finance. Valuation is about figuring out what we think an asset is worth to us, while pricing determines how much we pay for the asset. The two are not necessarily the same. This course introduces various methods for the valuation of a business or the equity of the business. FINA 6213 and FINA 6214 can have concurrent enrollment. prereq: MBA 6231 (previously MBA 6230) & FINA 6213

FINA 6215. The CFO Mindset: Finance, Strategy and Operations. (1 cr. ; A-F only; Every Spring)
Corporate governance is about the art and sciences of managing the interests of and the relationships among various corporate stakeholders: equity investors, debt investors, top management, and other employees. prereq: MBA 6231 (previously MBA 6230)

FINA 6222. Mergers and Acquisitions. (2 cr. ; A-F only; Every Spring)
How corporate managers achieve growth through mergers/acquisitions. Examine buyer/seller motivations in context of M&A transactions/strategic alliances. Private equity, especially in context of corporate M&A transaction. prereq: MBA or Mgmt Sci MBA Student; MBA 6231 (previously MBA 6230), FINA 6241 OR (FINA 6213 & FINA 6214)

FINA 6241. Corporate Financial Decisions and Analysis. (; 4 cr. ; A-F only; Every Fall & Spring)
Theoretical/applied understanding of corporate financial decisions. Adjusted present value, economic value added options. Impact of financing decisions on real asset valuation, managerial incentives, corporate strategy. prereq: MBA 6230, MBA student

FINA 6242. Advanced Corporate Finance Analysis and Decisions. (; 4 cr. ; A-F only; Every Fall)
Theory/practice of efficiently managing working capital, fixed assets. Emphasizes mergers/ acquisitions, corporate restructuring, real options. Use of derivatives as financing tools, in deal structure. prereq: 6241, MBA student

FINA 6321. Portfolio Analysis and Management. (; 2 cr. ; A-F only; Every Fall)
Introduces analytical concepts used to manage security portfolios from perspective of an institutional investor. Market microstructure. Margin purchasing, short selling. Portfolio risk management, risk/return tradeoffs, strategic/ tactical asset allocation, active versus passive management. Portfolio revision, performance evaluation. prereq: MBA 6121 (previously MBA 6120), MBA 6231 (previously MBA 6230), MBA or Mgmt Sci MBA student

FINA 6322. Financial Modeling. (; 2 cr. ; A-F only; Every Spring & Summer)
Financial modeling tools to access financial data warehouses to build, estimate, maintain, and interpret comprehensive financial models that provide the framework for understanding businesses and their historical performance, plans/strategies, and market values. Financial analytics/modeling skills, including data mining of large standard financial databases (warehouses) (e.g. Capital IQ), and a manageable introduction to Excel VBA programming. prereq: MBA 6231 (previously MBA 6230), MBA or Mgmt Sci MBA student

FINA 6323. Advanced Financial Modeling. (; 2 cr. ; A-F only; Every Fall)
Advanced financial modeling tools to build, estimate, operate, audit, evaluate and understand business performance, and M&A, equity, and credit securities analysis models that have become central to sophisticated financial analysis of all operating businesses, transactions, and securities. How to analyze by way of financial models, screening (data mining) of large financial databases (warehouses). Adding to VBA programming skills required for advanced financial modeling. prereq: FINA 6322, MBA or Mgmt Sci MBA Student

FINA 6324. Securitization Markets. (; 2 cr. ; A-F only; Every Spring)
Splitting risks. Redirecting risks to investors able to analyze and take on those risks. Reasons for development of securitization. Products, their similarities in character. How to build simple models and analyze examples of actual securitized liabilities. prereq: FINA 6121, MBA or Mgmt Sci MBA student

FINA 6325. Behavioral Finance. (; 2 cr. ; A-F only; Every Spring)
Psychology/realistic settings that guide/develop alternative theories of financial market. How behavioral finance complements traditional paradigm on investors' trading patterns, behavior of asset prices, corporate finance, various Wall Street institutions/practices. prereq: MBA or Mgmt Sci MBA student

FINA 6341. World Economy. (; 4 cr. ; A-F only; Every Fall, Spring & Summer)
Tools to predict/understand ramifications of major economic events. Financial crises. Changes in monetary, fiscal, financial policies. Strategies for promoting long-run economic growth. Examples from U.S., Europe, Japan, developing countries. prereq: MBA 6231 (previously MBA 6230), MBA or Mgmt Sci MBA student

FINA 6511. Options for Corporate Finance. (1 cr. ; A-F only; Every Spring)
This course explores financial options from the perspective of a corporation, including what financial options are, how they work, and how they are frequently used to pay employees and managers. Further applications will be explored, including how options can be used as tools to better understand corporate financing and project selection decisions. prereq: MBA 6231 (previously MBA 6230)

FINA 6522. Introduction to Derivatives and Financial Risk Management. (; 2 cr. ; A-F only; Periodic Fall & Spring)
This class provides an introduction to derivatives pricing models and their applications. Building on the insights from the binomial model and the Black-Scholes model, it covers dynamic replication and optimal risk management strategies. It also combines tools from derivatives pricing and the CAPM model to develop investment strategies that achieve the optimal risk and return trade-off. Students are required to use Excel, Matlab or other programming languages to build replicating portfolios and to construct optimal investment and risk management strategies. They are also required to use historical data to evaluate the effectiveness of these investment strategies. prereq: 6121, MBA student

FINA 6529. Advanced Topics in Fixed Income and Derivatives. (2 cr. ; A-F only; Periodic Fall & Spring)
Economics and mechanics of derivatives. First phase focuses on theoretical and institutional foundations for various derivatives instruments and markets. Second phase is practicum in which student groups build working models of derivatives. prereq: (credit will not be granted if already received for 6541)

FINA 6611. Finance for Multinationals. (1 cr. ; A-F only; Every Spring)
Virtually all companies?from small privately held companies to large public companies? are involved in international trade, even if only sourcing raw materials and components internationally. The advent of robust e-commerce websites has further enabled

companies of all sizes to actively participate in international trade. This course explores the nature, purposes, and risks of international trade by multinational companies, and the relevant capital budgeting processes and international financing tools needed to facilitate international trade. Students will gain skills in international investment analysis, capital financing techniques, capital budgeting for international projects, and international trade risk management. Students will examine barriers to international capital flows, and study the financial instruments used to overcome these barriers, focusing on the decisions made by multinational enterprises. Prereq: MBA 6231 (previously MBA 6230)

FINA 6621. International Financial Management. (; 2 cr. ; A-F only; Every Spring)
Applying finance theory to multinational corporations' investment, financing, risk management, decisions. International financial system. Spot, forward, swaps, option markets for foreign exchange. Interest rate arbitrage, parity. Exchange rate risk analysis/forecast. Measuring/managing currency exposure. Long term financing with swaps. Multinational capital budgeting. Cost of capital for international projects. prereq: MBA 6231 (previously MBA 6230), MBA student

FINA 6623. Economic Booms and Busts: Understanding Government Interventions. (; 2 cr. ; A-F only; Every Fall)
The purpose of this course is to provide you with an understanding of the world economy through the impact of government policies in the economy. We focuses on using macro and international economics to analyze the world economy and the implications for business management. The course uses lectures and class discussion to familiarize students with macro and international economic tools with a goal of improving managerial decision-making. We focuses on understanding the role of government monetary policies, fiscal policies, trade policies, and exchange rate policy to impact on economy and study the linkage between economic analysis and strategic business management.

FINA 6801. Finance Independent Study. (; 1-6 cr. [max 12 cr.] ; A-F only; Periodic Fall & Spring)
Independent study. prereq: MBA student, instr consent

FINA 8802. Theory of Capital Markets I: Discrete Time. (; 2 cr. ; Student Option; Every Fall)
Modern asset pricing theory. Static/discrete time frameworks. Fundamental asset pricing equation. Classical finance models: CAPM, consumption-based CAPM, Complete markets, representative agent, Pareto prereq: [Econ 8101, Econ 8102, business admin PhD student] or instr consent

FINA 8803. Theory of Capital Markets II: Continuous Time. (; 2 cr. ; Student Option; Every Spring)
Continuous-time financial economics. Emphasizes mathematical/statistical tools. Ito processes, Girsanov?s theorem, risk-neutral pricing. How to formulate/analyze continuous-time models. prereq: [Econ 8101, Econ 8102, Bbsiness admin PhD student] or instr consent

FINA 8804. Advanced Continuous Time Finance. (; 2 cr. ; Student Option; Every Fall)
Pricing of fixed income securities, optimal capital structure, general equilibrium. Classic/ current papers in continuous-time literature. prereq: 8802, 8803

FINA 8810. Topics in Asset Pricing. (; 2 cr. [max 4 cr.] ; A-F or Audit; Fall Even Year)
Current topics in asset pricing literature. Students read papers on these topics, rederive the main results, identify the main assumptions and thus identify ideas on how to improve upon the current literature. prereq: Business admin PhD student or instr consent

FINA 8812. Corporate Finance I. (; 2 cr. ; Student Option; Every Fall & Spring)
Corporate control, managerial incentives, corporate governance, capital structure. What assets are collected within firm. What determines boundaries of firm. Empirical evidence in support of theoretical models. Modern theories of firm, based on incomplete contracts. How corporate finance decisions expand/limit scope of firm. prereq: [Econ 8103, Econ 8104, business admin PhD student] or instr consent

FINA 8813. Corporate Finance II. (; 2 cr. ; Student Option; Every Fall & Spring)
Theoretical corporate finance. Initial public offering, dividend policy. Financial distress and its resolution. Financial intermediation, applications of auctions in finance. prereq: [8812, business admin PhD student] or instr consent

FINA 8820. Topics in Corporate Finance. (; 2 cr. [max 4 cr.] ; A-F or Audit; Fall Odd Year)
Current topics in corporate finance literature. Students read current papers, rederive the main results, identify the main assumptions and thus identify ideas on how to improve on the current literature. prereq: Business admin PhD student or instr consent

FINA 8822. Empirical Methods in Finance. (; 2 cr. ; Student Option; Every Spring)
Empirical techniques in analysis of financial markets, how they are applied to actual market data. Statistical properties of asset returns, efficient markets hypothesis. Empirical tests of asset pricing models (CAPM, APT, Intertemporal CAPM, Consumption CAPM). Tests of conditional asset pricing models. prereq: 8802, 8803

FINA 8823. Empirical Corporate Finance. (; 2 cr. ; Student Option; Every Spring)
Current empirical research on corporate finance. Mergers/acquisitions, equity offerings, event studies, tests of market efficiency, impact of corporate governance, compensation policies, initial public offerings. prereq: 8802, 8803

FINA 8890. Seminar: Finance Topics. (; 2-4 cr. [max 16 cr.] ; A-F only; Every Fall & Spring)
Current topics/problems of interest considered in depth. Topics vary. prereq: [[8802, 8812, 8822, 8823] or equiv], business admin student] or instr consent. No first year students to enroll.

FINA 8892. Independent Study in Finance. (; 1-8 cr. [max 16 cr.] ; Student Option; Every Fall, Spring & Summer)
Problems or developments of special interest to the student. prereq: Business admin PhD student or instr consent

FINA 8894. Directed Research in Finance. (; 1-8 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
Individualized directed research on a project of interest to the student, approved and advised by faculty. prereq: Business admin PhD student specializing in finance or instr consent

Financial Mathematics (FM)

FM 5001. Preparation for Financial Mathematics I. (; 3 cr. ; Student Option; Every Fall)
Mathematics needed for MFM program. prereq: Grad MFM major or MFM program director approval

FM 5002. Preparation for Financial Mathematics II. (; 3 cr. ; Student Option; Every Spring)
Mathematics needed for MFM program. prereq: 5001, program director approval

FM 5011. Mathematical Background for Finance I. (; 4 cr. ; Student Option; Every Fall)
Mathematics needed for MFM program. Focuses on finance. prereq: [5001, 5002] with grade of at least B or [MFM program director approval, grad MFM major]

FM 5012. Mathematical Background for Finance II. (; 4 cr. ; Student Option; Every Spring)
Mathematics needed for MFM program. Focuses on finance. prereq: 5011, grad MFM major, program director approval

FM 5021. Mathematical Theory Applied to Finance I. (; 4 cr. ; Student Option; Every Fall)
Bridge between theory and application. prereq: [5011 or concurrent registration is required (or allowed) in 5011], grad MFM major, program director approval

FM 5022. Mathematical Theory Applied to Finance II. (; 4 cr. ; Student Option; Every Spring)
Bridge between theory and application. prereq: 5021, [5012 or concurrent registration is required (or allowed) in 5012], grad MFM major, program director approval

FM 5031. A Practitioner's Course in Finance I. (; 4 cr. ; Student Option; Every Fall)
Practical course taught by industry professionals. Focuses on hands-on real-world problem solving. prereq: [5021 or concurrent registration is required (or allowed) in 5021], grad MFM major, program director approval

FM 5032. A Practitioner's Course in Finance II. (; 4 cr. ; Student Option; Every Spring)
Taught by industry professionals. Focuses on hands-on real-world problem solving. prereq: 5031, [5022 or concurrent registration

is required (or allowed) in 5022], grad MFM major, program director approval

FM 5091. Computation, Algorithms, and Coding in Finance I. (4 cr. ; Student Option; Every Fall)
Implements popular finance models and numerical techniques using mainstream computational tools/languages. prereq: Grad MFM major, program director approval

FM 5092. Computation, Algorithms, and Coding in Finance II. (4 cr. ; Student Option; Every Spring)
Implements popular finance models and numerical techniques using mainstream computational tools/languages. prereq: 5091, grad MFM major, program director approval

FM 5101. Current Events in Finance. (1 cr. [max 3 cr.] ; S-N only; Every Fall)
This seminar course focuses on gathering current information and analyzing the effect of local and global happenings on the behavior of the financial markets. Students will use concepts from other courses to interpret weekly market events and present to the class.

FM 5111. Introduction to Financial Markets. (; 3 cr. ; Student Option; Every Fall)
This course is a survey of important elements of financial markets and setting the context to the program. Topics include Complete vs incomplete markets, financial institutions, traded instruments, elements of accounting, arbitrage, Fundamental Theorem of Asset Pricing, Credit, Investment and Risk Management.

FM 5121. Mathematics for Finance. (3 cr. ; Student Option; Every Fall)
This course establishes the mathematical foundation needed for modeling in finance, with focus on probability and statistics, stochastic processes, linear algebra, and more.

FM 5151. Financial Modeling I: Python. (; 3 cr. ; Student Option; Every Fall)
This course establishes the basic principles of Financial Modeling. Topics include different kinds of models (e.g. descriptive vs explanatory, statistical vs structural, etc.), foundational models used in finance (binomial, lognormal, Gaussian, etc.) and their applications (stocks, interest rates, commodities, etc.). Python will be used extensively to illustrate the models, therefore this course also serves as an introduction to the use of Python in finance.

FM 5202. Ethics in Finance. (1 cr. ; S-N only; Every Spring)
This Seminar is formatted as a case study, focusing on financial law, regulation and ethics. Students will analyze various financial decision and discuss cases that exhibit ethical challenges, such as conflict of interests. Discussion will be conducted in small groups and summarized as a presentation to the whole group.

FM 5212. Continuous Time Finance. (3 cr. ; Student Option; Every Spring)
A course on Stochastic Calculus - based modeling in finance, focusing on the Black-Scholes model and its extensions.

FM 5222. Statistical Methods in Finance. (3 cr. ; Student Option; Every Spring)
A course on Statistical methods used in the analysis of financial markets data. It will cover topics such as, Bayesian Statistics, Linear and Non-Linear Regression, Markov Chain Monte Carlo, Copulas and Time-series Analysis, and their applications to financial data.

FM 5252. Financial Modeling II: Numerical Methods and Simulations. (; 3 cr. ; Student Option; Every Spring)
This course focuses on Monte Carlo simulations and elements of scientific computing as tools in modeling. These methods will be used as a key technique to develop and assess models, and considerable time will be spent on the interpretation of model outputs.

FM 5323. Data Science and Machine Learning in Finance. (3 cr. ; Student Option; Every Fall)
This course introduces the basic principles underlying Data Science and Machine Learning, focusing on their applications in finance. Topics include: understanding data, EDA, various types of Machine Learning problems (e.g. classification, regression, recommendation, etc.), various algorithmic approaches (GLMs, Trees, Neural Networks, etc.), model selection, limitations of ML models, and issues in their implementations.

FM 5343. Quantitative Risk Management. (3 cr. ; Student Option; Every Fall)
Topics include: Taxonomies of Risk, Measures of Risk, Risk Modeling and Risk Mitigation strategies. Additionally, the role and purpose of Risk Management will be discussed.

FM 5353. Software Development in Finance. (3 cr. ; Student Option; Every Fall)
This class introduces the toolset of a compiled language and principles of object-oriented programming. Databases are introduced and data models related to finance applications are explored. Projects are sourced from applied finance problems and are implemented with a focus on performance and common practices in professional software development.

FM 5411. Fixed Income Market. (2 cr. ; Student Option; Periodic Fall)
This elective on fixed income markets expands on the basic concepts in the core curriculum and provides students a deeper understanding of this market through a hands-on approach.

FM 5422. Quantitative Hedge Fund Strategies. (2 cr. ; Student Option; Periodic Spring)
A practical course exposing students to a variety of trading strategies used in Hedge Funds.

FM 5443. Credit Risk Models. (2 cr. ; Student Option; Periodic Spring)
This course focuses on basic kinds of credit models (structural, intensity, etc.), and their applications. Both individual credit and portfolio level approaches will be considered.

FM 5462. Market Microstructure. (2 cr. ; Student Option; Periodic Spring)
This course focuses on the stylized facts in market microstructure and its application in algorithmic trading. In order to deal with the vast amount of real time streaming data in algorithmic trading, students will learn how to use KDB+ (a time series database) and its language q (a vectorized functional language).

FM 5990. Topics in Financial Mathematics. (; 1-2 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
The course will focus on a special topic in quantitative finance that supplements the regular curriculum of the Master of Financial Mathematics program. The course features experts, often finance industry practitioners, who share their experience and knowledge. prereq: enrolled in the Master of Financial Mathematics program or instr consent

FM 5993. Directed Study in Financial Mathematics. (1-2 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
A course in which a student is conducting a directed study or a research project under the direction of a faculty member / program instructor. Can be repeated.

FM 5996. Internship. (1 cr. [max 8 cr.] ; S-N only; Every Fall, Spring & Summer)
Financial Mathematics curriculum related Internship. Can be repeated.

Fisheries and Wildlife (FW)

FW 5003. Human Dimensions of Biological Conservation. (; 3 cr. ; Student Option; Every Fall)
Survey of social, psychological, economic, policy aspects of managing/conserving wildlife, fisheries, and related resources. prereq: [Biol 1001 or Biol 1009], Biol 3407

FW 5051. Analysis of Populations. (; 4 cr. ; Student Option; Every Spring)
Regulation, growth, general dynamics of populations. Data needed to describe populations, population growth, population models, regulatory mechanisms. prereq: [4001 or STAT 3011 or ESPM 3012], [EEB 3407 or EEB 3408W or EEB 3807], Senior or grad student

FW 5121. Conservation Planning and Structured Decision-making. (3 cr. ; A-F only; Every Spring)
We are impacting our planet and the species and ecosystems on it at an unprecedented rate. This creates key policy challenges to conserve species, ecosystems, and the benefits they provide to people. But, how do we decide what is the best way to tackle these challenges? How do we do this in a world with limited resources (time, money) for conservation and multiple stakeholders with different objectives? How can we make systematic decisions to get the biggest bang for our conservation buck? To address these questions, this course will cover key topics and concepts in conservation planning and provide exposure and hands-on experience with techniques for conservation plans and decisions. We will cover topics ranging from protected areas, restoration, ecosystem

services, and climate change to structured decision-making, adaptive management, and return on investment. The course has a lecture and in-class computer lab component. This course will present structured approaches to problem-solving and decision-making from a conservation perspective, and students will leave with tools for structuring and solving complex environmental problems. Therefore, this is a foundational course in conservation planning but will also provide students will a tool-box to formulate and solve complex problems in environmental management more broadly and in life. Prerequisites: Senior or graduate standing, or permission of instructor. Recommended: One course in ecology, environmental science or permission of instructor.

FW 5136. Ichthyology. (; 4 cr. ; Student Option; Every Fall)
Fish biology, adaptations to different environments and modes of living, and evolutionary relationships. Laboratory emphasizes anatomy and identification of Minnesota fishes.

FW 5293. Directed Study Fisheries. (1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
A course in which a student designs and carries out a directed study on selected topics or problems under the direction of a faculty member; eg, literature review. Directed study courses may be taken for variable credit and special permission is needed for enrollment. Students enrolling in a directed study will be required to use the University-wide on-line directed study contract process in order to enroll. Prereq: department consent, instructor consent, no more than 6 credits of directed study counts towards CFANS major requirements.

FW 5294. Directed Research Fisheries. (1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
An opportunity in which a student designs and carries out a directed research project under the direction of a faculty member. Directed research may be taken for variable credit and special permission is needed for enrollment. Students enrolling in a directed research course will be required to use the University-wide on-line directed research contract process in order to enroll. Prereq: department consent, instructor consent, no more than 6 credits of directed research counts towards CFANS major requirements.

FW 5392. Special Lectures: Wildlife. (; 1-5 cr. [max 15 cr.] ; Student Option; Every Fall & Spring)
Lectures given by visiting scholar or staff member.

FW 5393. Directed Study Wildlife. (1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
A course in which a student designs and carries out an independent project under the direction of a faculty member. Directed study courses may be taken for variable credit and special permission is needed for enrollment.

FW 5394. Directed Research Wildlife. (1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed Research: An opportunity in which a student designs and carries out a directed research project under the direction of a faculty member. Directed research may be taken for variable credit and special permission is needed for enrollment.Students enrolling in a directed research will be required to use the University-wide on-line directed research contract process in order to enroll. Prereq: department consent, instructor consent, no more than 6 credits of directed research counts towards CFANS major requirements.

FW 5401. Fish Physiology and Behavior. (; 3 cr. ; Student Option; Every Fall)
Fish mechanisms/behavior. Links between fish biology, fisheries ecology, management, aquaculture. Homeostasis, neurobiology, bioenergetics, reproduction, movement.

FW 5459. Stream and River Ecology. (3 cr. ; Student Option; Fall Even Year)
Structure/dynamics of running waters from ecosystem perspective. Historical perspective, basic hydrology/fluvial geomorphology, terrestrial-aquatic interactions, detrital dynamics, metabolism, drift, trophic relations, biotic/abiotic interactions, ecosystem experiments and natural alterations, stability/succession, ecosystem dynamics in a watershed. prereq: Limnology course or instr consent

FW 5493. Directed Study Conservation Biology. (1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
A course in which a student designs and carries out a directed study on selected topics or problems under the direction of a faculty member; eg, literature review. Directed study courses may be taken for variable credit and special permission is needed for enrollment. Students enrolling in a directed study will be required to use the University-wide on-line directed study contract process in order to enroll. Prereq: department consent, instructor consent, no more than 6 credits of directed study counts towards CFANS major requirements.

FW 5494. Directed Research Conservation Biology. (1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
An opportunity in which a student designs and carries out a directed research project under the direction of a faculty member. Directed research may be taken for variable credit and special permission is needed for enrollment. Students enrolling in a directed research course will be required to use the University-wide on-line directed research contract process in order to enroll. Prereq: department consent, instructor consent, no more than 6 credits of directed research counts towards CFANS major requirements.

FW 5603W. Habitats and Regulation of Wildlife. (WI; 3 cr. ; A-F or Audit; Every Fall)
Environmental interactions of wildlife at population/community levels. Environmental threats from human activities. Habitat management practices. Objectives, policies, regulations in population management. prereq: [FW 4102 or FW 4103], [EEB 3407 or EEB 3408 or EEB 3807]

FW 5625. Wildlife Handling and Immobilization for Research and Management. (; 2 cr. ; S-N or Audit; Every Spring)
Practical techniques to maximize human/animal safety and encourage effective operations. Preparation procedures, legal responsibilities, capture drugs/delivery systems, safety measures, ethical issues, basic veterinary procedures for handling wildlife. Field course. Uses live animals. prereq: General biology, [grad student or vet med student or FW sr]

FW 8051. Statistical Modeling of Ecological Data using R and WinBugs/JAGS. (4 cr. ; Student Option; Every Spring)
Regression methods for modeling ecological data. Real world examples from ecology, as well as environmental/natural resource sciences/management. Computer-based solutions using R/Bayesian modeling software. prereq: Graduate-level statistics class, [working knowledge of program R or instr consent]

FW 8200. Seminar. (; 1-4 cr. [max 16 cr.] ; S-N or Audit; Every Fall & Spring)
Oral and written student reports on selected topics from current literature in fisheries biology and management and wildlife. Lectures by and discussions with faculty and visiting specialists.

FW 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

FW 8394. Research in Fisheries. (; 1-4 cr. ; Student Option; Every Fall, Spring & Summer)
Directed research.

FW 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

FW 8452. Conservation Biology. (; 3 cr. ; A-F or Audit; Every Fall)
Seminar examining population- to system-level biological issues (genetics; demographic processes; community, ecosystem, and landscape scale interaction; restoration ecology; ex situ strategies for restoration and recovery) and societal issues (social, economic, cultural perspectives; sustainable development strategies; roles of institutions; international and U.S. policies).

FW 8459. Stream and River Ecology. (; 3 cr. ; Student Option; Fall Even Year)
Structure/dynamics of running waters from ecosystem perspective. Historical perspective, basic hydrology/fluvial geomorphology, terrestrial-aquatic interactions, detrital dynamics, metabolism, drift, trophic relations, biotic/abiotic interactions, ecosystem experiments and natural alterations, stability/succession, ecosystem dynamics in a watershed. prereq: Limnology course or instr consent

FW 8461. Advanced Topics in Fish Physiology. (; 1 cr. ; Student Option; Periodic Fall)
Lectures, discussion, current literature. Complements 5459. prereq: Vertebrate physiology course or instr consent

FW 8462. Advanced Topics in Fish Behavior. (; 1 cr. ; Student Option; Periodic Fall & Spring)
Current literature. Complements 5459. prereq: 5459 or behavior course or instr consent

FW 8465. Fish Habitats and Restoration. (; 3 cr. ; Student Option; Fall Odd Year)
Mechanisms underlying physiology/behavior that shape fish community structure in specific north temperate habitats. Techniques and planning procedures for restoring lakes/ streams. prereq: Intro ecology course or instr consent

FW 8494. Research in Wildlife. (; 1-4 cr. ; Student Option; Every Fall)
Directed research. prereq: instr consent

FW 8576. Biology and Management of Large Mammals. (; 2 cr. ; A-F or Audit; Every Fall)
Ungulates. Ecology, population dynamics, energy, nutrition, predation, disease/parasites, social behavior. Research approaches, management implications/practices. Key information on North American species. prereq: [Ecology course, [wildlife, forestry, and ecology grad student]] or instr consent

Food Science and Nutrition (FSCN)

FSCN 5122. Food Fermentations and Biotechnology. (2 cr. ; Student Option; Every Fall)
Major food fermentations important for today's food industry, with particular focus on microbiological components. Fermentations cover all major commodity food groups of dairy, cereal, meat, vegetables, fruits. prereq: MICB 3301, BIOL 4003

FSCN 5123. Molecular Biology for Applied Scientists. (1 cr. ; A-F only; Every Fall)
Half semester course. Two hours per week for 8 weeks. Basics of molecular biology/ how it has been used for biotechnological applications. Origins of molecular biology from discovery of DNA as inheritance material within cells to advent of gene cloning/sequencing technologies. prereq: MicB 3301 or FScN 2021 or instr consent

FSCN 5131. Food Quality for Graduate Credit. (3 cr. ; Student Option; Every Fall)
Management systems, statistical procedures, regulatory requirements involved with producing quality food/ingredients. Risk assessment/management, good manufacturing practices, hazard analysis critical control point (HACCP), statistical methods for process control, total quality management, food/drug laws. Prereq: Food Science Grad Student Student may select grading basis if instructor approves. A-F registration is required for class to count toward degree.

FSCN 5312. Food Analysis. (4 cr. ; A-F or Audit; Every Fall)
Analytical tools needed for investigation in Food Science/Technology, whether by food industry, governmental agencies, or universities. Application of quantitative/ qualitative physical, chemical/instrumental methods used for analysis/examination of food constituents. Sensory evaluation techniques, evaluation of methods/interpretation of results. prereq: 4112, STAT 3011

FSCN 5334. Food Processing Fundamentals I. (3 cr. ; Student Option; Every Fall)
Food processing fundamentals (add heat, remove heat, remove water, add barriers and add preservatives) Overview of mass and energy balances for food process design, fundamentals of fluid flow, heat transfer as applied to food process unit operations such as pumping, heat exchangers, thermal processing, dehydration, refrigeration, freezing and extrusion. Two lecture periods (50 min each) and one laboratory (105 min each) period each week.

FSCN 5441. Introduction to New Product Development. (; 2 cr. ; Student Option; Fall Even, Spring Odd Year)
This course is designed to give students an overview of the product development process including management systems, team dynamics, technical problem solving, idea generation, and differences between different categories of food R&D. Prerequisites: FSCN 4112

FSCN 5461. Food Packaging. (2 cr. ; Student Option; Fall Odd Year)
Materials, principles, and procedures of packaging as they apply to food products. Emphasis is on consumer products, but the principles also apply to bulk and institutional foods and ingredients. prereq: 1102, 3102, Phys 1102 or Phys 1302

FSCN 5481. Sensory Evaluation of Food Quality. (; 2 cr. ; Student Option; Periodic Spring)
Fundamentals of sensory perception. Test designs and methods in studying sensory qualities of foods. Issues in sensory evaluation. Group research project. prereq: 3102, STAT 3011

FSCN 5521. Flavor Technology. (; 2 cr. ; Student Option; Spring Even Year)
Overview of flavor chemistry/related technology. Analytical techniques, mechanisms of flavor development (chemical/ biogenesis), off-flavors, industrial production/application of food flavorings. prereq: 4112

FSCN 5531. Grains: Introduction to Cereal Chemistry and Technology. (; 2 cr. ; Student Option; Periodic Fall & Spring)
Origins, structure, biochemistry, and cellular properties of major cereal grains as they relate to primary processing (milling) and secondary processing (production of cereal products). prereq: Biol 1009, Chem 1022

FSCN 5541. Dairy Product Chemistry and Technology. (2 cr. ; Student Option; Fall Odd Year)
Designed for upper division Food Science undergraduate/graduate students. Physiology of milk production in ruminants. Resulting composition. Chemical, physical, microbiological properties of milk components. How milk products are manufactured. prereq: 3102, 4112, Food Science major, upper division undergraduate or graduate student

FSCN 5601. Management of Eating Disorders. (3 cr. ; Student Option; Every Fall & Spring)
Etiology, occurrence, course, treatment, prevention of eating disorders from multidisciplinary perspective. Roles and responsibilities of eating disorder treatment team members of varying types across various treatment milieus. Prereq: Junior, senior or graduate student in nutrition or health related program or instructor consent.

FSCN 5993. Directed Study. (1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
A course in which a student designs and carries out a directed study on selected topics or problems under the direction of a faculty member; eg, literature review. Directed study courses may be taken for variable credit and special permission is needed for enrollment. Students enrolling in a directed study will be required to use the University-wide on-line directed study contract process in order to enroll. Prereq: department consent, instructor consent, no more than 6 credits of directed study counts towards CFANS major requirements.

FSCN 5994. Directed Research. (1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
An opportunity in which a student designs and carries out a directed research project under the direction of a faculty member. Directed research may be taken for variable credit and special permission is needed for enrollment.Students enrolling in a directed research will be required to use the University-wide on-line directed research contract process in order to enroll. Prereq: department consent, instructor consent, no more than 6 credits of directed research counts towards CFANS major requirements.

FSCN 8001. Orientation to the Food Science Graduate Program. (2 cr. ; S-N only; Every Fall)
This course will serve as an orientation to the Food Science Graduate Program. Topics will include planning your degree completion; using library resources to conduct and write a literature review; understanding research ethics; critically reviewing literature; improving soft skills, being aware of extracurricular activities, internships, and career options for graduate students; and a presentation of your research topic.

FSCN 8224. Advanced Food Processing. (3 cr. ; Student Option; Every Fall)
Research advances in food process design and development in conventional food process operations, such as thermal processing, refrigeration, and freezing, and also in novel food process operations, such as high pressure processing, pulsed electric field processing,

ultrasound assisted processing, etc. ? Process simulation for food processing system optimizations and procedures for optimizing formulations. Two lecture periods (75 min each) each week.

FSCN 8310. General Seminar. (; 1 cr. [max 2 cr.] ; S-N or Audit; Every Fall & Spring)
Presentations by faculty, graduate students, and outside speakers. prereq: instr consent

FSCN 8314. Food Materials Science. (2 cr. ; Student Option; Periodic Spring)
Principles of materials science as applied to food processing and product development. Overview of phase transitions, phase and state diagrams of food materials. Discussion of the glassy state in foods, the role of water as plasticizer, and the implications for shelf life and texture. Crystallization in foods. Introduction to molecular dynamics and transport phenomena. Mechanical properties and rheology of concentrated food systems. Application to processes such as freezing, drying, extrusion, spray drying, freeze drying, agglomeration, baking. Use in product development: ice cream and other frozen foods; extruded cereal and protein-based foods; food powders for application in dairy, culinary, instant beverages, nutritional products; cereal bars; baked goods, pasta, etc. Integration and extension of foundational concepts in selected topics, such as in encapsulation and controlled release of bioactives in food, food powders, films and coatings.

FSCN 8318. Current Issues in Food Science. (; 2 cr. [max 4 cr.] ; A-F or Audit; Every Spring)
Current issues in Food Science and how they impact the food industry.

FSCN 8320. Advanced Topics in Food Science. (; 1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Recent research or special topics.

FSCN 8330. Research Topics. (; 1 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
Seminar in which faculty member or group of faculty/graduate students discuss research progress or review/discuss current research literature.

FSCN 8331. Food Proteins. (; 2 cr. ; Student Option; Spring Even Year)
Protein biochemistry as applied to food systems/processing. Forces that determine protein structure. Isolation/characterization of food proteins. Structure/function relationships in handling/processing food protein systems. prereq: 4112, 4312

FSCN 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

FSCN 8335. Carbohydrate Chemistry in Food and Nutrition. (; 2 cr. ; Student Option; Every Spring)
Carbohydrates as food components, their use as food ingredients. Reactions of mono/di/polysaccharides during food processing. Biosynthesis of carbohydrates, their metabolism. Methods in carbohydrate analysis. prereq: 4112

FSCN 8336. Lipid Chemistry and Rancidity of Foods. (; 2 cr. ; Student Option; Periodic Fall)
Chemistry of food lipid oxidation/rancidification. Protective functions of antioxidants. prereq: 4112

FSCN 8337. Flavor Chemistry. (; 2 cr. ; Student Option; Periodic Fall)
Chemistry involved in formation, analysis, and release of flavoring materials in foods. prereq: 4111

FSCN 8338. Antioxidants in Food: Practical Applications. (; 2 cr. ; Student Option; Every Spring)
Mechanisms of antioxidant activities in food systems. Free radical scavengers, hydroperoxide stabilizers, synergists, metal chelators, singlet oxygen quenchers, substance reducing hydroperoxides. Practical applications of antioxidants in various food systems, effect of antioxidants on health/diseases. prereq: 4111, Bioc 3021, food chemistry, organic chemistry, biochemistry

FSCN 8391. Independent Study: Food Science. (; 1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
Includes written reports. prereq: instr consent

FSCN 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

FSCN 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

FSCN 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

FSCN 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Foreign Study (FOST)

FOST 5000. Study Abroad. (0-18 cr. [max 40 cr.] ; Student Option; Every Fall, Spring & Summer)
Study abroad registration. prereq: dept consent

FOST 5010. Study Abroad Directed Study placeholder course. (; 0-10 cr. [max 20 cr.] ; Student Option; Every Fall, Spring & Summer)
Study abroad course.

FOST 5020. Global Experience Program. (; 0-6 cr. [max 18 cr.] ; Student Option; Every Fall & Summer)
The course is used to award credit for work successfully completed on the Global Experience Program study abroad internship program. Evaluation standards and work load are determined by the graduate faculty member who signs the Global Experience Program learning contract required of each participant. Number of contact hours varies from location to location. prereq: Must have graduate student status

Forest and Natural Res. Mgmt. (FNRM)

FNRM 5101. Park and Protected Area Tourism. (; 3 cr. ; A-F or Audit; Fall Odd Year)
Tourism is a significant industry locally, nationally, and internationally. Park and protected area attractions are among the most visited but also the most vulnerable attractions. This course is designed to familiarize you with the basic concept of park and protected area tourism, including cultural and ecotourism, and then develop your expertise to plan and evaluate sustainable tourism development and operations. Accordingly, you will complete assignments that apply the knowledge gained to planning and evaluation activities. This course is offered partially online. COURSE OBJECTIVES By the end of the class you will be able to: 1. Differentiate and appreciate the complexities involved with defining and developing nature, eco, heritage, geo-, park and protected, cultural & "sustainable tourism." 2. Identify specific social, economic, and environmental impacts associated with park and protected area tourism, how to measure them, and methods to minimize the negative and maximize the positive impacts. 3. Analyze domestic and international case studies of park and protected area tourism. 4. Critically evaluate park and protected area tourism services and effective management and planning. 5. Create elements of a business plan for park and protected area tourism operations that emphasize sustainability.

FNRM 5104. Forest Ecology. (; 4 cr. ; A-F or Audit; Every Fall)
Form and function of forests as ecological systems. Characteristics and dynamics of species, populations, communities, landscapes, and ecosystem processes. Examples applying ecology to forest management. Weekly discussions on research topics, exercises, and current issues in forest resource management. Required weekend field trip. Introductory biology course recommended.

FNRM 5114. Hydrology and Watershed Management. (; 3 cr. ; Student Option; Every Fall)
Hydrologic cycle and water processes in upland/riparian systems. Applications of hydrological concepts to evaluate impacts of forest and land management activities on water yield, streamflow, groundwater erosion, sedimentation, and water quality. Concepts, principles, and applications of

riparian/watershed management. Regional/ national/global examples. Forest ecosystems.

FNRM 5131. Geographical Information Systems (GIS) for Natural Resources. (4 cr. ; A-F or Audit; Every Fall)
Geographic information systems (GIS), focusing on spatial data development and analysis in the science and management of natural resources. Basic data structures, sources, collection, and quality; geodesy and map projections; spatial and tabular data analyses; digital elevation data and terrain analyses; cartographic modeling and layout. Lab exercises provide practical experiences complementing theory covered in lecture. prereq: Grad student or instr consent

FNRM 5140. Traditional Ecological Knowledge and Western Natural Resource Management. (3 cr. ; Student Option; Every Fall)
This course is designed to refine your understanding of traditional ecological knowledge, Indigenous knowledge, and the relationship to western natural resource sciences and ecology. Students read and discuss foundational and current literature (typically one book per week) on the topic. The course focuses on Indigenous authors and scholarship. This is a graduate seminar where students will lead class discussions and prepare an individual research project (typically a research paper) related to the class topic and/or their thesis. Students will also discuss and practice how to be good relatives.

FNRM 5153. Forest Hydrology & Watershed Biogeochemistry. (3 cr. ; Student Option; Spring Odd Year)
This rigorous course examines hydrology and biogeochemical cycling in forested watersheds. Topics include role of forests in hydrologic processes (precipitation, runoff generation, and streamflow) and exports (sediment, carbon, and nitrogen). Readings from primary literature, active discussion participation, research/review paper. prereq: [Basic hydrology course, one course in ecology, and one course in chemistry [upper div or grad student]] or instr consent

FNRM 5161. Northern Forest Field Course. (; 2 cr. ; A-F or Audit; Every Summer)
Field identification of common trees, shrubs, and nonwoody vascular plants. Plant communities, soil site relationships, wildlife values. Natural history of northern/ boreal forests in terms of soils, ecological characteristics of trees, community-environment relationships, stand development, succession, and regeneration ecology. Land survey, tree/forest stand measurement, forest sampling techniques. Taught at the Cloquet Forestry Center.

FNRM 5203. Forest Fire and Disturbance Ecology. (3 cr. ; A-F or Audit; Every Spring)
Ecology, history, management, control of fire, wind, insect infestation, deer browsing, other disturbances in forests, including disturbance regimes of boreal, northern hardwood, savannas of North America. Influence of disturbance on wildlife habitat, urban/wildland interfaces, forest management, stand/landscape dynamics. Tree mortality in fires, successional patterns created by fires, interactions of life history traits of plants with disturbances. prereq: Grad student or instr consent

FNRM 5204. Landscape Ecology and Management. (; 3 cr. ; A-F or Audit; Every Fall)
Introduction to landscape ecology at different scales in time/space. Development/implications of broad-scale patterns of ecological phenomena, role of disturbance in ecosystems. Characteristic spatial/temporal scales of ecological events. Principles of landscape ecology as framework for landscape research, analysis, conservation, and management. prereq: Grad student or instr consent

FNRM 5206. Park and Protected Area Management Field Studies. (2 cr. [max 3 cr.] ; A-F only; Every Fall)
This course is designed to be a directed field study of park and protected area management including observation of and training in (1) recreation planning and visitor management, (2) cultural resource management, (3) natural resource management, (4) nature-based tourism management, and (5) resource interpretation and communication across local, state, federal and tribal park and protected areas in northern Minnesota. prereq: grad student

FNRM 5216. Geodesy, Coordinate, and Surveying Calculations for GIS Professionals. (1 cr. ; Student Option; Every Fall)
Where exactly are we? How do we define and refine geographic locations on a lumpy, spinning, unstable planet? On course completion students will understand concepts and practices that are at the very foundation of GIS: geodesy and geographic projections. They will have a working knowledge of geodetic datums and datum evolution, be able to make common geodetic and coordinate geometry calculations, and solve common problems that arise during datum and coordinate system conversions while engaged in the practice of GIS.

FNRM 5218. Measuring and Modeling Forests. (; 3 cr. ; A-F or Audit; Every Spring)
General sampling design and survey techniques to assess current resource conditions. Application of metrics/sampling methods to forest vegetation. Calculation of tree/stand volume, selection of modeling approaches. Case studies of modeling to project future growth. Landscape processes, characterization, and modeling.

FNRM 5228. Advanced Topics in Assessment and Modeling of Forests. (; 3 cr. ; A-F or Audit; Fall Even Year)
Application of recently developed mathematics, computer science, and statistics methodologies to natural resource functioning, management, and use problems. Specific topics, software, and methodologies vary. prereq: 3218, Math 1272, Stat 5021

FNRM 5232. Managing Recreational Lands. (; 4 cr. ; A-F or Audit; Every Spring)
Most of us participate in some form of outdoor recreation: hiking, hunting, riding all-terrain vehicles, or simply enjoying nature. Managing for outdoor recreation on public lands is mandated by federal law and an integral part of natural resource management. In this class, we?ll learn why and how agencies manage recreation at the federal level, the management frameworks that guide this work, and apply management principles to an actual federal property in Minnesota. This course is designed to provide students with an understanding of the principles and practices of outdoor recreation management. Specific objectives are to: 1) Compare and contrast federal recreation land management policies and organizations, 2) Develop and demonstrate an understanding of conceptual frameworks for recreation resource and visitor use management, 3) Evaluate visitor caused impacts to resources and to visitor experiences, 4) Understand and apply management tools designed to reduce recreation- related impacts and conflicts, and 5) Demonstrate an understanding of course material through exams and applied assignments. prereq: Grad student or instr consent

FNRM 5259. Visitor Behavior Analysis. (; 3 cr. ; Student Option; Every Fall)
Recreation, leisure, and tourism are significant parts of the world, national, and state economies. Understanding visitor behavior is important and has significant implications for organizations, agencies, and businesses related to parks, tourism destinations, and museums. In this class, you will learn to apply both social science theory and methods to understand consumers, with an emphasis on visitors to parks and protected areas. You will immediately apply your learning of survey development, interviewing, observation and content analysis to real-word situations in class projects. This is an online course.

FNRM 5262. Remote Sensing and Geospatial Analysis of Natural Resources and Environment. (3 cr. ; Student Option; Every Fall & Spring)
Introductory principles and techniques of remote sensing and geospatial analysis applied to mapping and monitoring land and water resources from local to global scales. Examples of applications include: Land cover mapping and change detection, forest and natural resource inventory, water quality monitoring, and global change analysis. The lab provides hands-on experience working with satellite, aircraft, and drone imagery, and image processing methods and software. Prior coursework in Geographic Information Systems and introductory Statistics is recommended. prereq: Grad student or instr consent

FNRM 5264. Advanced Forest Management Planning. (; 3 cr. ; Student Option; Every Fall)
Modeling tools for forest planning to better integrate forest resource conditions/uses and better understand trade-offs and potential management strategies. Analyzing facets of forest management that add complexity including multi-market interactions, temporal detail, spatial objectives, planning under

uncertainty, and recourse strategies. Optimization models, decomposition and heuristic techniques designed to capitalize on characteristics of forestry problems. Case studies involving recent or ongoing large-scale applications. Student projects with opportunity to tailor to student interests or expertise.

FNRM 5362. Drones: Data, Analysis, and Operations. (3 cr. [max 6 cr.] ; Student Option; Every Spring)
This course explores principles and techniques of Unmanned Aircraft Systems (UAS, also "drones"), applied to natural resource and environmental issues. The course provides hands-on experience with UAS vehicles, sensors, imagery, and software. Course topics include: UAS flight characteristics, regulations/safety, mission planning, flight operations, data collection, image analysis, and applications. Examples of UAS applications to be explored include: forest and natural resource inventory, wetland monitoring, and land cover mapping. Prior coursework in Geographic Information Systems is recommended. Prereq: grad student or instr consent

FNRM 5411. Managing Forest Ecosystems: Silviculture. (3 cr. ; A-F only; Every Fall)
Management of forest ecosystems for sustaining ecological integrity, soil productivity, water quality, wildlife habitat, biological diversity, commodity production in landscape context. Silvics, forest dynamics, disturbances, regeneration, restoration, silvicultural systems. Ramifications of management choices. Weekend field trip. FEMC track students should take FNRM 5413 concurrently. prereq: grad student

FNRM 5413. Managing Forest Ecosystems: Silviculture Lab. (1 cr. ; A-F only; Every Fall)
Development of silvicultural prescriptions to achieve various landowner objectives. Timber cruise, growth/yield simulations, stand density management diagrams, thinning schedules, use of forest vegetation simulator. Field trips, computer labs, lectures. prereq: FNRM major or minor or grad student; FNRM-FEMC track students should take FNRM 3411/5411 concurrently or instructor consent

FNRM 5431. Timber Harvesting and Road Planning. (; 2 cr. ; Student Option; Every Spring)
Introduction to forest operations. Terminology, basic engineering, equipment and harvesting system options, productivity/costs. Relationship to forest management and silviculture. Road planning, forest management guidelines, approaches for mitigating potential impacts to forest resources. Environmental implications of method/equipment choices. Selling timber. Sale design, layout, and administration. One all-day field trip. prereq: grad student

FNRM 5462. Advanced Remote Sensing and Geospatial Analysis. (3 cr. ; Student Option; Every Spring)
This course builds on the introductory remote sensing class, FNRM 3262/5262. It provides a detailed treatment of advanced remote sensing and geospatial theory and methods including Object-Based Image Analysis (OBIA), lidar processing and derivatives, advanced classification algorithms (including Random Forest, Neural Networks, Support Vector Machines), biophysics of remote sensing, measurements and sensors, data transforms, data fusion, multi-temporal analysis, and empirical modeling. In-class and independent lab activities will be used to apply the course topics to real-world problems. Prior coursework in Geographic Information Systems, remote sensing, and statistics is necessary. Prereq: grad student or instr consent

FNRM 5471. Forest Management Planning. (; 3 cr. ; A-F or Audit; Every Fall)
Management science as applied to forest decision-making to help develop better forest management plans. Helps students develop a basic understanding of common analytical tools from operations research and how they are applied to forestry problems to help explore many potential solutions. Also reviews traditional approaches based on simulation. Emphasizes trade-off information, interpretation of model results, and linkages between stand-level economic analysis and forest-wide planning. Reviews recent modeling efforts in Minnesota. Includes synthesis of information from multiple natural resource disciplines. Guest speakers demonstrate value of analyses in planning. Emphasizes homework assignments with some group work. An individual project requires an informal class presentation. prereq: Grad student

FNRM 5480. Topics in Natural Resources. (; 1-3 cr. ; Student Option; Every Spring)
Lectures in special fields of natural resources given by visiting scholar or faculty member. Topics specified in Class Schedule.

FNRM 5501. Urban Forest Management: Managing Greenspaces for People. (; 3 cr. ; Student Option; Every Spring)
Management concepts for green infrastructure of cities, towns, and communities. Urban forest as social/biological resource. Emphasizes management of urban forest ecosystem to maximize benefits. Tree selection, risk assessment, cost-benefit analysis, landscape planning, values, perceptions. How urban forestry can be a tool to improve community infrastructure.

FNRM 5562. Field Remote Sensing. (; 1 cr. ; Student Option; Every Fall)
This course is intended to be taken with, or after, the introductory remote sensing class, FNRM 3262/5262. It builds on the introductory course by providing a field context to the remote sensing discipline. We will focus on field methods and associated analyses that are typical in using and applying imagery and other spatial data. We will use a variety of remote sensing imagery, maps, field data collection tools, and software. Students will learn in an active, hands-on, way through multiple small-group field exercises. This course includes two eight-hour weekend field sessions. Prerequisite: grad student

FNRM 8101. Research Problems: Physiological Ecology. (; 1-5 cr. [max 10 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent research under faculty guidance.

FNRM 8102. Research Problems: Forest-Tree Genetics. (; 1-5 cr. ; Student Option; Every Fall, Spring & Summer)
Independent research under faculty guidance.

FNRM 8103. Research Problems: Forest Hydrology. (; 1-5 cr. ; Student Option; Every Fall, Spring & Summer)
Independent research under faculty guidance.

FNRM 8104. Research Problems: Forest Ecology. (; 1-5 cr. ; Student Option; Every Fall, Spring & Summer)
Independent research under faculty guidance.

FNRM 8105. Research Problems: Silviculture. (; 1-5 cr. ; Student Option; Every Fall, Spring & Summer)
Independent research under faculty guidance.

FNRM 8106. Research Problems: Urban Forestry--Biology and Management. (; 1-5 cr. ; Student Option; Every Fall, Spring & Summer)
Independent research under faculty guidance.

FNRM 8108. Research Problems: Forest Ecosystem Health. (1-5 cr. ; Student Option No Audit; Every Fall, Spring & Summer)
Independent research under faculty guidance.

FNRM 8109. Research Problems: Indigenous Natural Resource Management. (1-5 cr. ; Student Option No Audit; Every Fall, Spring & Summer)
Independent research under faculty guidance.

FNRM 8201. Research Problems: Forest Economics. (; 1-5 cr. ; Student Option; Every Fall, Spring & Summer)
Independent research under faculty guidance.

FNRM 8202. Research Problems: Forest Biometry and Measurements. (; 1-5 cr. ; Student Option; Every Fall, Spring & Summer)
Independent research under faculty guidance.

FNRM 8203. Research Problems: Forest Recreation. (; 1-5 cr. ; Student Option; Every Fall, Spring & Summer)
Independent research under faculty guidance.

FNRM 8204. Research Problems: Forest Policy. (; 1-5 cr. [max 10 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent research under faculty guidance.

FNRM 8205. Research Problems: Spatial Data Analysis. (; 1-5 cr. [max 10 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent research under faculty guidance. prereq: instr consent

FNRM 8206. Research Problems: Forest Management. (; 1-5 cr. ; Student Option; Every Fall, Spring & Summer)
Independent research under faculty guidance.

FNRM 8207. Economic Analysis of Natural Resource Projects. (; 1-5 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Independent research under faculty guidance. prereq: instr consent

FNRM 8208. Research Problems: Environmental Learning and Leadership. (; 1-5 cr. ; Student Option; Every Fall, Spring & Summer)

Independent research under faculty guidance. prereq: instr consent

French (FREN)

FREN 5265. Graduate Proseminar in French Studies. (2 cr. ; Student Option; Every Spring)
This course introduces new graduate students to the goals, skills, practices, standards and other components of academic careers in the fields of French and Francophone studies, mostly in the US context. It is an introduction to all major aspects of our profession. The seminar combines readings, lectures and presentations by the instructor and guest lecturers, collective discussions, individual and group research, and writing assignments. The final product of the seminar is a talk ready to be delivered at a graduate or national conference, or a book review or short article ready to be submitted for publication.

FREN 5350. Topics in Literature and Culture. (; 3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Problem, period, author, or topic of interest. See Class Schedule. prereq: 3101 or equiv

FREN 5410. Topics in Quebecois Literature. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Study writing produced in Quebec as a literature of its own, not simply as a part of Canadian literature. Literature will be studied in relation to other North American literatures and to Francophone literature produced elsewhere in the world.

FREN 5431. Gender and Sexuality in Francophone Literature and Cinema. (3 cr. ; A-F only; Periodic Fall & Spring)
This course will introduce students to colonial and postcolonial representations of gender and sexuality in Francophone contexts. Through literary and cinematic works from the Caribbean, Maghreb, West Africa, and Quebec, we will examine constructions and deconstructions of gender roles and sexual norms in relation to other identity categories such as race, class, nation and religion. We will consider topics such as exotic portrayals of the other, repressive and rebellious eroticism, and ambivalent or unruly affirmations of identity. Taught in French.

FREN 5531. Sociolinguistics of French. (; 3 cr. ; Student Option; Periodic Fall)
Explores variation in the use of French associated with factors such as medium (oral/written), style (formal/informal), region, social and economic groups. prereq: Graduate student status and advanced proficiency in French

FREN 5614. Disabled Bodies, Minds and Selves in French Literature, Culture and Art. (3 cr. ; Student Option; Periodic Fall & Spring)
At any given moment in history, what are the socio-cultural forces that give rise to an understanding of physical difference? What forces enable self-expression, self-determination, and liberation from this understanding? This course explores the history of disability and the representations of disability in literature, art, and culture. We will investigate theory and praxis of disability studies in France. Spanning the Renaissance to the present day, this course seeks to understand the experiences of disabled people and their communities in different periods, through a variety of genres and media, exploring medical histories, representation (for a public presumed to be able-bodied), memoir, activism, and art and literature by disabled people.

FREN 5852. Memory in French and Francophone Cinema. (; 3 cr. ; Student Option; Periodic Fall & Spring)
This course will examine cinema's privileged relationship with memory. Our itinerary will take us through key French and Francophone films, asking how these works record, construct and deconstruct individual and collective memories. Topics will include bearing witness to the traumas of war, genocide and colonization; commemorating resistance and fostering emancipation; interventions in identity politics; (re)partitions of rural and urban spaces; and the elusive divide between fiction, documentary and memoir. Students will be expected to master a vocabulary for the formal analysis of film. prereq: Students should have completed FREN 3016 with a minimum grade of B.

FREN 5995. Directed Teaching. (; 1 cr. ; S-N or Audit; Every Fall)
Directed teaching.

FREN 8110. Topics in Early Medieval French Literature. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Spring)
Introduction to epic, romance, allegory, and theater in Old French readings (12th-13th centuries). Specific topics/texts studied vary. Taught in French.

FREN 8111. Introduction to Old French. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Studies in medieval French: instruction in reading Old French, sources of bibliography, and topics in medieval studies (language and literature). Taught in French.

FREN 8114. Troubadour Lyric and Old Occitan Language. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Language and literature of Old Occitan (Old Proven[c]al), chiefly troubadours' songs. Some language instruction, reading of lyrics, consideration of social context, introduction to scholarly tradition. Knowledge of French, Spanish, Italian, or Latin desirable. Taught in English.

FREN 8120. Topics in Later Medieval French Literature. (; 3 cr. [max 9 cr.] ; Student Option; Fall Odd Year)
Problems presented by texts written in France ca. 1300-1500. Evolution of Middle French language. Specific topics/texts vary. Taught in French. prereq: 8110 or instr consent

FREN 8125. Short Narrative in the Middle Ages. (3 cr. ; A-F only; Fall Odd Year)
Short forms of medieval narrative. Examples from French literary production within context of socioeconomic history from ca. 1100 to ca. 1550. prereq: grad student

FREN 8190. Old French Workshop. (; 1 cr. [max 3 cr.] ; A-F only; Periodic Fall)
Workshop runs concurrently with seminars on Old French literature. Advanced practicum in reading Old French, with discussions of the particularities of seminar texts and formal, aesthetic, and hermeneutic issues directly related to the original language. Students read portions of texts in Old French and prepare an original translation. The workshop is not an introduction to Old French Students planning to make medieval French literature their research field should register for the workshop each time it is offered. prereq: French 5571 or other prior course on Old French language, concurrent registration in the related Ph.D. seminar.

FREN 8200. Topics in Early Modern French & Francophone Literatures and Cultures. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Critical issues relating to the early modern period in French and Francophone literatures and cultures. Content varies by instructor.

FREN 8210. Narrative, History, and Memory: Topics. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall)
Significance of narrative paradigm in literature, history, and cultural memory. Specific topics/texts treated vary. Taught in French.

FREN 8220. Staging the Common. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Developments in 20th-century drama/performance in relation to French theatrical tradition. Post-1945 avant-garde innovation, interculturalism in contemporary theater. Specific topics/texts vary. Taught in French.

FREN 8230. Critical Issues: Criticism and Thought. (; 3 cr. [max 9 cr.] ; Student Option; Fall Odd Year)
Critical issues relating to works in criticism/thought related to French/Francophone literature, philosophy or culture.

FREN 8240. Critical Issues: French and Francophone Cinema. (; 3 cr. [max 9 cr.] ; A-F only; Fall Odd Year)
Critical issues relating to French/Francophone cinema.

FREN 8250. Critical Issues: Poetry. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Significant critical issues relating to poetic writing of selected authors or periods.

FREN 8260. Critical Issues: Theatre. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Spring)
Significant critical issues relating to dramatic writing of selected authors or periods.

FREN 8270. Critical Issues: Prose. (; 3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Significant critical issues relating to prose writing of selected authors or periods.

FREN 8271. The Novel of the Ancien Regime. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Considers major novels of the 17th and 18th centuries in connection with developments

in such areas as esthetic theory, intellectual currents, social transformations, and reading practices.

FREN 8280. Ethics and Aesthetics in French and Francophone Writing. (; 3 cr. ; A-F only; Periodic Spring)
Issues related to the articulation of ethics, politics, and aesthetics in French/Francophone literature and culture.

FREN 8290. Critical Issues: Perspectives on an Author. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
In-depth study of major author's writing, critical tradition this writing has occasioned, and theoretical issues upon which this writing may be brought to bear.

FREN 8291. Jean Genet's Writings and French Institutions. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Jean Genet's writings at the crossroads of several disciplines (politics, psychoanalysis, religion, and law). Genet's novels, dramas, and political essays explore the power of institutional settings and strategies imagined by individuals to short-circuit their impact.

FREN 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

FREN 8371. The Rule of Reason, The Reign of Madness: Readings in Early Modern France. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Relationship between construction of reason and madness in philosophy, legitimation of political rule, and the institution of literature in early modern France.

FREN 8410. Topics in Quebecois Literature. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Spring)
Quebecois in relation to other North American literatures and to Francophone literature produced elsewhere in the world. Specific topics/texts vary. Taught in French.

FREN 8420. Critical Issues: Francophone Literature. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall)
Critical issues relating to literature of Francophone world. Specific topics/texts vary. Taught in French.

FREN 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

FREN 8521. History of the French Language. (; 3 cr. ; Student Option; Periodic Fall & Spring)
History of French from its origins in Latin to the present day. Aspects of diachronic phonology (sound change), morphology, syntax. Taught in French.

FREN 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

FREN 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

FREN 8812. Seminar: Dissertation Preparation and Writing. (; 3 cr. ; Student Option; Every Fall & Spring)
Initiates dissertation writing process after preliminary exams. Students work with faculty mentors, peer writing groups to develop productive writing/revising strategies. Issues related to professional research/writing. Conceptualizing the dissertation. Developing chapter outlines. Using feedback. Producing a chapter draft. prereq: Completion of doctoral prelims

FREN 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: max 18 cr per semester or summer, 24 cr required

FREN 8888W. Thesis Credit Dissertation Seminar. (; 1-3 cr. [max 24 cr.] ; No Grade Associated; Every Fall & Spring)
A means for students to make progress on the dissertation in a structured setting. Brings together students writing on related topics. Credits are applied to doctoral thesis credits. Contact instructor for description. prereq: Doctoral student who has passed oral prelims

FREN 8980. Directed Teaching. (; 1-5 cr. [max 25 cr.] ; Student Option; Every Fall & Spring)
tbd

FREN 8992. Directed Readings for Graduate Students. (; 1-5 cr. [max 25 cr.] ; Student Option; Every Fall & Spring)
tbd prereq: instr consent

FREN 8994. Directed Research. (; 1-5 cr. [max 25 cr.] ; Student Option; Every Fall & Spring)
tbd prereq: instr consent; may be taken as tutorial with instr consent

French and Italian (FRIT)

FRIT 5240. Topics in French & Italian Literatures & Cultures. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Topics dealing with intersections of French & Italian literatures & cultures. Taught in English.

FRIT 5999. Teaching of French and Italian: Theory and Practice. (; 3 cr. ; Student Option; Every Fall)
Theoretical and practical aspects of language learning and teaching applied to French and Italian. Includes history of foreign language teaching in 20th-century United States. Taught in English.

FRIT 8999. Advanced Teaching Methods: Integrating Language and Disciplinary Content. (3 cr. ; Student Option; Periodic Fall)
This course explores theoretical and practical approaches to cultivating students' advanced literacies in a second language through the integration of language proficiency development and the study of disciplinary content in upper-level literature, linguistics, and culture courses. Students must have passed FRIT 5999 or GSD 5103 or SPPT 5999 or have permission from the instructor in order to take this course.

Gay, Lesbian, Bisexual, Transg (GLBT)

GLBT 5993. Directed Study. (; 1-12 cr. ; Student Option; Every Fall & Spring)
Directed Study

Gender, Women, & Sexuality Std (GWSS)

GWSS 5104. Transnational Feminist Theory. (; 3 cr. ; Student Option; Fall Odd Year)
Third World and transnational feminisms. Interrogating the categories of "women," "feminism," and "Third World." Varieties of power/oppression that women have endured/ resisted, including colonization, nationalism, globalization, and capitalism. Concentrates on postcolonial context.

GWSS 5122. Philosophy and Feminist Theory. (; 3 cr. ; Student Option; Periodic Fall)
Encounters between philosophy/feminism. Gender's influence in traditional philosophical problems/methods. Social role of theorist/ theorizing as they relate to politics of feminism. This course surveys central debates in feminist philosophy, with a focus on the methods and virtues of resistance. Along the way, we will consider the question of how we should live in an oppressive society. Topics may include intimidation, gaslighting, silencing, epistemic injustice, emotional labor, intersectionality, resistance, anger, and violence. prereq: 8 crs in [philosophy or women's studies] or instr consent

GWSS 5190. Topics: Theory, Knowledge, and Power. (; 3 cr. ; Student Option; Fall Odd, Spring Even Year)
Topics specified in Class Schedule.

GWSS 5290. Topics: Biology, Health, and Environmental Studies. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Topics specified in class schedule.

GWSS 5390. Topics: Visual, Cultural, and Literary Studies. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Topics specified in Class Schedule.

GWSS 5406. Black Feminist Thought in the American and African Diasporas. (; 3 cr. ; Student Option; Periodic Spring)

Critically examines spatiality of African descendant women in Americas/larger black diaspora. Writings from black feminist/queer geographies, history, contemporary cultural criticism. Recent black feminist theorizing.

GWSS 5490. Topics: Political Economy and Global Studies. (; 3 cr. [max 12 cr.] ; Student Option; Every Spring)
Topics specified in Class Schedule.

GWSS 5502. Gender and Public Policy. (3 cr. ; Student Option; Periodic Fall & Spring)
Public policy issues, processes, and histories as these affect women-, children-, and gender-related issues.

GWSS 5503. Queering Theory. (3 cr. ; Student Option; Periodic Fall & Spring)
This course will give you a solid theoretical foundation in the field of queer studies in addition to explaining its relation to other scholarly traditions, including (but not limited to) feminist theory, GLBT studies, literary studies, psychoanalysis, and postmodernism. Over the course of the semester you will examine the historical forces that birthed queer politics and theory, become conversant in its conceptual basis, interrogate and analyze its various uses and applications, and finally apply it in your own arguments. prereq: Any GWSS or GLBT course

GWSS 5993. Directed Study. (; 1-12 cr. ; Student Option; Every Fall, Spring & Summer)
TBD

GWSS 5994. Directed Instruction. (; 1-12 cr. [max 36 cr.] ; Student Option; Every Fall, Spring & Summer)
TBD

GWSS 5995. Directed Research. (; 1-8 cr. [max 36 cr.] ; Student Option; Every Fall & Spring)
TBD

GWSS 8101. Intellectual History of Feminism. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Major trends in feminist intellectual history from 14th century to the present, especially in the United States and Europe.

GWSS 8102. Advanced Studies in Sexuality. (; 3 cr. ; Student Option; Fall Odd Year)
Contemporary theoretical scholarship/research on selected issues related to sexuality, gender, and the body. prereq: Priority given to feminist studies grad students

GWSS 8103. Feminist Theories of Knowledge. (; 3 cr. ; Student Option; Periodic Fall)
Interdisciplinary seminar. Feminist approaches to knowledge and to criticism of paradigms of knowledge operative in the disciplines. Feminist use of concepts of subjectivity, objectivity, and intersubjectivity. Feminist empiricism, standpoint theory, and contextualism. Postmodern and postcolonial theorizing.

GWSS 8107. Feminist Pedagogies. (; 3 cr. ; Student Option; Spring Odd Year)
Explore feminist theories/critical approaches to pedagogy. Develop teaching philosophy statement, design syllabus, practice teach/learn problem-solving strategies for classroom. prereq: Feminist Studies grad student [Maj or Minor] or instr consent

GWSS 8108. Genealogies of Feminist Theory. (3 cr. ; Student Option; Every Fall)
Two-semester seminar. First term: debates in gender theory; intersections of gender theory with critical race theory, post-colonial theory, sexuality theory, social class analysis. Second term: inter-/multi-disciplinary feminist research methodologies from humanities/social sciences. prereq: Feminist studies PhD or grad minor student or instr consent

GWSS 8109. Feminist Knowledge Production. (3 cr. ; Student Option; Every Spring)
Two-semester interdisciplinary seminar. First term: debates in gender theory; gender theory, critical race theory, post-colonial theory, sexuality theory, social class analysis. Second term: inter-/multi-disciplinary feminist research methods from humanities/social sciences. prereq: Feminist studies PhD or grad minor student or instr consent

GWSS 8111. Transnational Feminist Theories. (3 cr. ; A-F only; Fall Odd Year)
This course takes a transnational feminist approach to studies of gender, sexuality, and feminist theories, methods, & praxis in order to highlight linkages and relations of power between sociocultural, political, economic, and affective structures that construct gender and sexuality in different locations acorss geopolitical contexts. By interrogating naturalized categories such as ?women,? ?feminism,? and ?queer,? students learn to think beyond the binaries of ?Third world/ First world,? ?West/East,? ?native/diasporic,? ?citizen/non-citizen,? ?U.S./transnational,? and ?North/South.? The course gives the students the necessary background in transnational feminist theories and methods and helps them develop relational and decolonial approaches that highlight temporal and spatial connectivities between past and present discourses and practices of settler colonialism, slavery, colonialism, nationalism, racism, imperialism, global capitalism, and neoliberalism.

GWSS 8201. Feminist Theory and Methods in the Social Sciences. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Seminar on recent theories, including feminist versions of positivist, interpretivist, critical theoretical, and postmodernist models of social science knowledge. Methodologies congenial to feminist practices of inquiry, including use of narrative in theory, feminist ethnography, discourse analysis, and comparative methods in history.

GWSS 8210. Seminar: Feminist Theory & Praxis. (; 3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Topics in feminist theory.

GWSS 8220. Seminar: Science, Technology & Environmental Justice. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Spring)
Topics related to science, technology, environmental justice.

GWSS 8230. Seminar: Cultural Criticism and Media Studies. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Spring)
Topics in literature, film, art.

GWSS 8250. Seminar: Nation, State, and Citizenship. (; 1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Topics related to nation, state, citizenship.

GWSS 8260. Seminar: Race, Representation and Resistance. (; 3 cr. [max 6 cr.] ; Student Option; Every Spring)
Race, racialization, racial justice as related to representation/struggles for social/economic justice. Intersectional analysis of power, politics, ideology/identity. Queer of color critique, women of color feminisms, critical sex/body positive approaches. prereq: Grad student

GWSS 8270. Seminar: Theories of Body. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
How body is configured in many social arenas. Legal decisions, public policy, medical research, cultural customs. Examine how attitudes toward male/female bodies influence social myths/discourses about social policy/change.

GWSS 8301. Feminist Literary Criticism. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Recent developments and major issues in feminist studies of literature. Introduction to array of scholars and scholarship in field of feminist literary theory and criticism, emphasizing broad range of feminist textual analysis taking place in various University departments.

GWSS 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

GWSS 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

GWSS 8490. Seminar: Transnational, Postcolonial, Diaspora. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Graduate topics in comparative/global studies.

GWSS 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

GWSS 8888. Thesis Credit: Doctoral. (; 1-24 cr. ; No Grade Associated; Every Fall, Spring & Summer)

(No description) prereq: Max 18 cr per semester or summer; 24 cr required

GWSS 8993. Directed Study. (; 1-6 cr. [max 9 cr.] ; Student Option; Every Fall, Spring & Summer)
TBD

GWSS 8994. Directed Instruction. (; 1-8 cr. [max 36 cr.] ; Student Option; Every Fall, Spring & Summer)
TBD

GWSS 8995. Directed Research. (; 1-8 cr. [max 36 cr.] ; Student Option; Every Fall & Spring)
TBD

GWSS 8996. Feminist Studies Colloquium. (; 1 cr. [max 4 cr.] ; S-N or Audit; Every Fall & Spring)
TBD prereq: Grad major or minor in feminist studies

GWSS 8997. Dissertation Seminar. (; 3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Conceptualizing the research problem for the dissertation and structuring the process of writing a chapter of it. prereq: GWSS or AMST doctoral student beginning dissertation work

GWSS 8998. Professional Development. (1-3 cr. [max 6 cr.] ; S-N only; Every Spring)
Workshop addressing one of a variety of professional development issues including, but not limited to, grant writing, book reviewing, revising term papers for publication, course development, writing and presenting conference papers, preparing to enter the job market (writing a c.v./application letter, preparing for interviews, job talk). Prereq Grad student.

General Dentistry (GEND)

GEND 5151. Advanced General Dentistry Seminar I. (; 5-10 cr. ; S-N or Audit; Every Fall & Summer)
Clinical seminars with emphasis on treatment planning, case presentation, techniques and materials, comprehensive oral healthcare and maintenance, and issues in practice management. Correlated with concurrent clinical experiences.

GEND 5152. Advanced General Dentistry Seminar II. (; 5-10 cr. ; S-N or Audit; Every Fall)
Clinical seminars with emphasis on treatment planning, case presentation, techniques and materials, comprehensive oral healthcare and maintenance, and issues in practice management. Correlated with concurrent clinical experiences.

GEND 5153. Advanced General Dentistry Seminar III. (; 2-10 cr. ; S-N or Audit; Every Fall & Spring)
Clinical seminars with emphasis on treatment planning, case presentation, techniques and materials, comprehensive oral healthcare and maintenance, and issues in practice management. Correlated with concurrent clinical experiences.

GEND 5254. Advanced General Dentistry Clinic I. (; 5-15 cr. ; S-N or Audit; Every Fall & Summer)
Comprehensive oral health care delivered in a variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

GEND 5255. Advanced General Dentistry Clinic II. (; 5-15 cr. ; S-N or Audit; Every Fall)
Comprehensive oral health care delivered in a variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

GEND 5256. Advanced General Dentistry Clinic III. (; 5-15 cr. ; S-N or Audit; Every Fall & Spring)
Comprehensive oral health care delivered in a variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

GEND 5261. Advanced General Dentistry Clinical Administration I. (; 5-10 cr. ; S-N or Audit; Periodic Fall & Spring)
Field experience in community dental clinic practice and administration.

GEND 5262. Advanced General Dentistry Clinical Administration II. (; 5-10 cr. ; S-N or Audit; Every Fall)
Field experience in community dental clinic practice and administration.

GEND 5263. Advanced General Dentistry Clinical Administration III. (; 1-10 cr. ; S-N or Audit; Every Fall & Spring)
Field experience in community dental clinic practice and administration.

GEND 5264. Advanced General Dentistry Clinic IV. (; 1-15 cr. ; S-N or Audit; Every Summer)
Comprehensive oral health care delivered in a variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

GEND 5265. Advanced General Dentistry Clinic V. (; 1-15 cr. ; S-N or Audit; Every Fall)
Comprehensive oral health care delivered in a variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

GEND 5266. Advanced General Dentistry Clinic VI. (; 1-15 cr. ; S-N or Audit; Every Fall & Spring)
Comprehensive oral health care delivered in a variety of settings, emphasizing complex restorative care, coordinating care with dental and medical specialists, special needs patients, and advanced techniques.

GEND 6151. General Practice Seminar I. (; 5-10 cr. ; S-N or Audit; Every Fall & Summer)
A sequence of lectures, discussions, and seminars on topics related to current dental practice. Correlated with clinical experiences.

GEND 6152. General Practice Seminar II. (; 5-10 cr. ; S-N or Audit; Every Fall & Summer)
A sequence of lectures, discussions, and seminars on topics related to current dental practice. Correlated with clinical experiences.

GEND 6153. General Practice Seminar III. (; 2-10 cr. ; S-N or Audit; Every Fall & Spring)
A sequence of lectures, discussions, and seminars on topics related to current dental practice. Correlated with clinical experiences.

GEND 6254. General Practice Clinic I. (; 10-15 cr. ; S-N or Audit; Every Fall & Summer)
A series of planned experiences in the clinical disciplines of dentistry, with emphasis on patient care.

GEND 6255. General Practice Clinic II. (; 10-15 cr. ; S-N or Audit; Every Fall & Summer)
A series of planned experiences in the clinical disciplines of dentistry, with emphasis on patient care.

GEND 6256. General Practice Clinic III. (; 10-15 cr. ; S-N or Audit; Every Fall & Spring)
A series of planned experiences in the clinical disciplines of dentistry, with emphasis on patient care.

GEND 6261. General Practice Clinical Administration I. (; 5-10 cr. ; S-N or Audit; Periodic Fall & Spring)
Field experience in hospital dental clinic administration for residents.

GEND 6262. General Practice Clinical Administration II. (; 5-10 cr. ; S-N or Audit; Every Fall)
Field experience in hospital dental clinic administration for residents.

GEND 6263. General Practice Clinical Administration III. (; 5-10 cr. ; S-N or Audit; Every Fall & Spring)
Field experience in hospital dental clinic administration for residents.

GEND 6264. General Practice Clinic IV. (; 10-15 cr. ; S-N or Audit; Periodic Fall & Spring)
A series of planned experiences in the clinical disciplines of dentistry, with emphasis on patient care.

GEND 6265. General Practice Clinic V. (; 10-15 cr. ; S-N or Audit; Every Fall)
A series of planned experiences in the clinical disciplines of dentistry, with emphasis on patient care.

GEND 6266. General Practice Clinic VI. (; 10-15 cr. ; S-N or Audit; Every Fall & Spring)
A series of planned experiences in the clinical disciplines of dentistry, with emphasis on patient care.

Genetics, Cell Biol/Developmnt (GCD)

GCD 5005. Computer Programming for Biology. (3 cr. ; Student Option; Every Fall)
Computer programming skills with applications in biology. Design/build new computer programs for applications in cell/developmental

biology, including modeling of biological processes, advanced data analysis, automated image analysis. prereq: BIOL 4003 or BIOL 4004 or GCD 3033 or CBS grad or BMBB or MCDB&G grad student, general statistics course

GCD 5036. Molecular Cell Biology. (; 3 cr. ; Student Option; Every Fall)
Analysis of dynamic cellular activities at the molecular level in cell biological fields that are experiencing new research advances not yet reflected in textbooks. Significant emphasis is placed on understanding the experimental basis of our current knowledge of cellular processes through analysis of scientific papers. Project and presentation-based assessments of learning outcomes. prereq: Biol 4004 or GCD 4005W or grad

GCD 5101. Critical and Translational Reasoning in Visual Science. (3 cr. ; A-F only; Every Spring)
This course is appropriate for graduate and senior undergraduate students in several areas of biology, including GCD, NSC, IBP, and BMBB programs. Students will be introduced to the function of the visual system, including the retina and brain, and learn to understand the visual system on a cellular level. Main goals of the course include to practice scientific and translational reasoning and scientific communication. This will be facilitated through a combination of lectures and group discussions of scientific papers, as well as writing of a term paper. In most weeks one lecture and one group discussion will be held. Scientific and translational reasoning and scientific communication are core competencies for life scientists. Scientific reasoning includes the ability to recognize why a scientific question is significant (or not), experimental design and rigor, interpretation of data, and identifying caveats to conclusions. Models of biological processes will be discussed and appropriate predictions will be identified in order to test those models. Translational reasoning is needed to move basic scientific discoveries into practice. To practice translational reasoning, we will investigate how diseases manifest on the cellular level, examine the use of disease models (cell based or animal models) and their limitations, how investigational therapeutic drugs are tested, how their effects on disease are scored, and how clinical trials are used to test the safety and efficacy of new therapeutic drug candidates. Students will interact with MD and PhD faculty and learn about their respective priorities. This course should be informative for students who are interested in the life sciences, and may help to discover personal interests and preferred career paths. The course will be taught by a team of instructors who share an interest in vision science. prereq: Senior major in GCD, Neuroscience, IBP, or BMBB or grad, open to advanced juniors with instructor permission

GCD 5111. Quantitative Fluorescence Microscopy. (3 cr. ; A-F only; Every Summer)
Fluorescence microscopy is an essential technique to probe the inner workings of cells and tissues. You will learn hands on the inner workings of fluorescent microscopes, how to set up and acquire fluorescent images using microscopes, and how to quantitatively analyze image data using FIJI (ImageJ) software. prereq: Undergraduate students require instructor permission for enrollment. Graduate students are allowed to register for 5111 without instructor permission. Recommended prerequisite: GCD 3033 or BIOL 4004

GCD 5914. Ethical and Legal Issues in Genetic Counseling. (2 cr. ; A-F only; Every Fall)
This course will provide a foundational knowledge of the ethical and legal considerations that are relevant to individuals working at the intersection of genetics and medical science. This will involve pre-class reading and research assignments in addition to relevant videos, podcasts, blog readings, and documentaries on this topic. Students will learn to frame ethical questions using appropriate frameworks, consult research, develop strategies for reaching resolutions, and communicate their process and outcomes. Students will work individually as well as collectively through case discussions in small groups and large group settings. Class time will be split between lecture, discussion, and in-class activities.

GCD 6103. Human Histology. (; 3-8 cr. ; P-N or Audit; Every Fall)
Human histology is a lecture and laboratory class covering light and electron microscopic anatomy of tissues and their organization into human organs. The emphasis is on integrating structure and its relationship to function at levels from molecules to organs. prereq: Enrolled as medical or dental student or instr consent

GCD 6110. Science of Medical Practice. (3-6 cr. ; A-F or Audit; Every Fall)
Combines Biochemistry/Medical Genetics aimed toward Medical/Genetic Counseling students. Biochemistry content covers genome organization, transcription, metabolism, nutrition, stem cell biology, cell signaling, cancer. Genetics content covers inheritance, genetic/genomic conditions, inborn errors of metabolism, cancer genetics, complex inheritance/genetic susceptibility to disease, birth defects. Meets with INMD 6802. prereq: Medical student or MCDG MS student with genetic counseling specialization or instr consent

GCD 8001. Genetic Counseling Clinical Internship I. (3 cr. [max 6 cr.] ; A-F only; Every Summer)
This is a 10-week clinical internship in genetic counseling practice. Students in this course will be assigned to an appropriate clinic affiliated with the graduate program of study in genetic counseling. Students must be enrolled in the program in order to take this course. Students will be expected to attend clinic and under the supervision of a board certified genetic counselor or medical geneticist, students are expected to log a minimum case load as defined by the Accreditation Council for Genetic Counseling (ACGC), the American Board of Genetic Counseling and the graduate program in genetic counseling at the University of Minnesota. The actual days and hours of the assigned clinic will be set by the clinical supervisor on site.

GCD 8002. Genetic Counseling Clinical Internship II. (5 cr. [max 10 cr.] ; A-F only; Every Fall)
This is a 15-week clinical internship course in genetic counseling practice. Students in this course will be assigned two appropriate clinics affiliated with the graduate program of study in genetic counseling. Students must be enrolled in the program in order to take this course. Students will be expected to attend clinic and will provide genetic counseling services under the supervision of a board certified genetic counselor or medical geneticist. Students are expected to log a minimum caseload that meets the criteria for clinical training by the Accreditation Council for Genetic Counseling (ACGC), the American Board of Genetic Counseling and the graduate program in genetic counseling at the University of Minnesota. The actual days and hours of the assigned clinics will be set by the clinical supervisor on site.

GCD 8003. Genetic Counseling Clinical Internship III. (5 cr. [max 10 cr.] ; A-F only; Every Spring)
This is a 15-week clinical internship course in genetic counseling practice. Students in this course will be assigned two appropriate clinics affiliated with the graduate program of study in genetic counseling. Students must be enrolled in the program in order to take this course. Students will be expected to attend clinic and will provide genetic counseling services under the supervision of a board certified genetic counselor or medical geneticist. Students are expected to log a minimum caseload that meets the criteria for clinical training by the Accreditation Council for Genetic Counseling (ACGC), the American Board of Genetic Counseling and the graduate program in genetic counseling at the University of Minnesota. The actual days and hours of the assigned clinics will be set by the clinical supervisor on site.

GCD 8008. Mammalian Gene Transfer and Genome Engineering. (; 2 cr. ; A-F or Audit; Every Spring)
Current gene transfer and genome engineering technology. Applications of genetic modifications in animals, particularly transgenic animals and human gene therapy. prereq: instr consent

GCD 8014. Small RNA Biology. (; 2 cr. ; A-F or Audit; Every Spring)
Small RNAs as major regulators of gene and protein expression. MicroRNAs and their potential use in diagnosis and prognosis of various disease conditions including cancers. Biology of small RNAs and their role in health and disease. prereq: MICA 8004 or BIOC 8002 or equiv or instr consent

GCD 8073. Genetics & Genomics in Human Health. (2 cr. [max 3 cr.] ; Student Option; Every Spring)

Application of molecular, biochemical, chromosomal, and population genetics to human variation and disease. Abnormal chromosome number and structure; abnormal enzyme, structural protein, receptor, and transport; analysis of inheritance patterns; behavioral genetics; genetic basis of common disease. Current research articles in human genetics. prereq: 8131 or BIOL 4003 or instr consent

GCD 8103. Human Histology. (; 5 cr. ; Student Option; Every Fall)
Light/electron microscopic anatomy of tissues and their organization into human organs. Emphasizes integrating structure, its relationship to function at levels from molecules to organs. Lecture, lab. prereq: Undergraduate biology, chemistry, math, and physics course; instr consent

GCD 8111. Quantitative Fluorescence Microscopy. (3 cr. ; A-F only; Every Summer)
Fluorescence microscopy is an essential technique to probe the inner workings of cells and tissues. You will learn ?hands on? the inner workings of fluorescent microscopes, how to set up and acquire fluorescent images using microscopes, and how to quantitatively analyze image data using FIJI (ImageJ) software.

GCD 8131. Advanced Molecular Genetics and Genomics. (3 cr. ; Student Option; Every Fall & Spring)
Literature-based course in modern molecular genetic and genomic analysis. Students will gain a deep understanding of the fundamental molecular mechanisms controlling inheritance in biological systems. Students will gain a facility in thinking critically and creatively about how genes work at cellular, organismal, and transgenerational levels. Course instruction emphasizes active-learning approaches, student presentations, and group projects. prereq: [3022 or BIOL 4003], [BIOC 3021 or BIOC 4331] or instr consent

GCD 8141. Computational Genomics. (3 cr. ; Student Option; Every Spring)
Genomic data is increasingly prevalent in biology today, and the ability to analyze and interpret genomic data is an important skill for a career in biology. This class will provide you with an overview of the emerging genomics field by review and discussion of seminal papers, combined with hands-on analysis of genomics data. At the end of this course, you will gain a broad view of cutting edge research in the field of genomics, gain experience in analysis and interpretation of genomic data, and learn basic computer programming, data visualization, and bioinformatics skills using R and UNIX.

GCD 8151. Cellular Biochemistry and Cell Biology. (; 2-4 cr. ; A-F only; Every Fall)
This course introduces graduate students to fundamental concepts of Biochemical Unity (Part 1) and Cell Theory (Part 2). For Part 1, we will discuss matter of life, equilibrium, entropy & law of mass action, two state systems, random walks & diffusion, rate equations of chemical reactions, and explore how they relate to regulation of biological networks (gene regulation and signal transduction). For Part 2 we will focus on properties of biological membranes, membrane trafficking, protein import & degradation, nuclear structures and their function, as well as molecular motors, cytoskeletal dynamics, and mitosis. The course assumes students have had previous undergraduate courses in cell biology, biochemistry and genetics. prereq: [[[4034 or 8121 or BioC 8002], Biol 4004] or BMBB or MCDBG grad student] or instr consent

GCD 8161. Advanced Cell Biology and Development. (; 2 cr. [max 3 cr.] ; A-F only; Every Spring)
The advanced cell and developmental biology of embryos, taught through in-depth, comparative analysis of historical and current primary research articles that illustrate developmental mechanisms and experimental approaches in key invertebrate and vertebrate model organisms. prereq:[BMBB or MCDBG grad student] or [GCD 4161, [GCD 8131 or Biol 4003], Biol 4004, and GCD 4034] or instr consent

GCD 8171. Literature Analysis. (; 1-2 cr. ; A-F only; Every Fall)
Critical reading and evaluation of current literature. May include evaluation of both excellent and flawed papers. Intensive and in-depth discussions of selected papers in molecular biology, genetics, cell biology, and developmental biology. prereq: Grad MCDB&G or BMBB major

GCD 8401. Ethics, Public Policy & Careers in Molecular Cell Biology. (1 cr. ; S-N or Audit; Every Spring)
Ethics of scientific investigation from viewpoint of western scientific enterprise. Relationship between science, culture, and public policies. Careers in molecular/cellular biology. Nontraditional career tracks. Invited speakers, case studies, small-group discussions, lectures.

GCD 8900. Seminar. (; 1-2 cr. [max 8 cr.] ; S-N or Audit; Every Fall & Spring)
Current scientific research. prereq: Grad MCDG major or instr consent

GCD 8911. Introduction to Genetic Counseling Skills and Practice. (4 cr. ; A-F only; Every Fall)
Course focuses on basic concepts used in clinical genetic counseling practice. Students learn the necessary skills to prepare for and implement a genetic counseling session. The class will cover a variety of areas in the genetic counseling sub-specialty of perinatal genetics as well as newborn screening. Students will practice communicating genetics and medical information in a patient-friendly manner. At the end of the semester, students will be equipped with tools to assess medical and family histories, present genetic cases, and role play genetic counseling sessions. prereq: This class is intended for Molecular, Cellular, Biology and Genetics M.S. students with genetic counseling specialization.

GCD 8912. Genetic Counseling in Practice. (; 4 cr. ; A-F or Audit; Every Spring)
Practical genetic counseling, communicating genetics and medical information to the family, helping families with decision making. prereq: MCDG MS student with genetic counseling specialization or instr consent

GCD 8913. Psychosocial Issues in Genetic Counseling I. (; 3 cr. ; A-F only; Every Fall)
This course is designed to introduce students to the psychosocial issues that commonly arise in genetic counseling, as well as develop their individual counseling skills to assist them in effectively counseling patients. prereq: MCDG MS student with genetic counseling specialization or instr consent

GCD 8914. Ethical and Legal Issues in Genetic Counseling. (; 2 cr. [max 3 cr.] ; A-F or Audit; Every Spring)
Professional ethics; ethical and legal concerns with new genetic technologies. prereq: MCDG MS student with genetic counseling specialization or instr consent

GCD 8915. Psychosocial Issues in Genetic Counseling II. (3 cr. [max 5 cr.] ; A-F only; Every Spring)
This course is designed to introduce Genetic Counseling Masters students to the psychosocial issues that commonly arise in genetic counseling, as well as develop their individual counseling skills to assist them in effectively counseling patients. prereq: MCDG MS student with genetic counseling specialization

GCD 8916. Genetic Counseling Research Seminar. (2 cr. [max 3 cr.] ; A-F only; Every Spring)
This course is designed to develop student knowledge and skills needed for addressing researchable questions encountered in genetic counseling. Must be a Genetic Counseling master's student.

GCD 8917. Medical Genetics I. (3 cr. ; A-F only; Every Fall)
This course integrates basic biochemical, molecular, and genetic principles with human development and disease. This course will provide a scientific foundation for clinical medicine genetics. Topics covered include chromosomal abnormalities, protein structural and folding abnormalities (e.g. hemoglobinapathies, connective tissue disorders, familial hypercholesterolemia), metabolic pathways and disorders. prereq: MCDG MS student with genetic counseling specialization

GCD 8918. Medical Genetics II. (3 cr. ; A-F only; Every Fall)
This course integrates basic biochemical, molecular, and genetic principles with human development and disease. This course will provide a scientific foundation for clinical medicine genetics. Topics covered include newborn screening, neurological and neuromuscular conditions, hearing and vision loss, cardiology, psychiatric conditions, and genetic therapies. prereq: MCDG MS student with genetic counseling specialization

GCD 8920. Special Topics. (; 1-4 cr. ; Student Option; Every Fall & Spring)
Special topic shell

GCD 8921. Professional Development Seminar I. (1 cr. ; S-N only; Every Fall & Spring)
This course will focus on developing awareness, attitudes, and skills to promote readiness for clinical placements. Course content will focus on the impact of identity on the professional life of genetic counselors. After introducing the importance of metacognition and self-care to success in graduate school and the profession, the major topics of the course will be exploration of personal intersectional identity, understanding the lenses by which we view the world, tools for navigating cultural differences, and assessing systemic barriers to inclusion in healthcare. Major topics will include interprofessional collaboration, variations to traditional operating procedures, utilizing clinical supervision, and cultivation of reflective practice.

GCD 8922. Professional Development Seminar II. (1 cr. [max 2 cr.] ; S-N only; Every Fall & Spring)
We will focus on preparing students for the transition to independent practitioners and leaders in the field. The primary emphasis of the course content in the fall semester will be development of skills and materials to help secure initial job placement, including professional networking, job search strategies, preparing application materials, interviewing, and financial planning. We will also explore individual leadership styles, professional leadership roles, innovation-thinking, and revisit self-care to incorporate the pressures of clinical practice and initial career decisions. Professional longevity content will explore sources of burnout and career satisfaction, ways to diversify job responsibilities, and work-life balance.

GCD 8993. Directed Studies. (; 1-5 cr. [max 15 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
tbd prereq: MCDG MS student with genetic counseling specialization or instr consent

GCD 8994. Research. (; 1-5 cr. [max 20 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Independent research determined by student's interests, in consultation with faculty mentor. prereq: MCDG MS student with genetic counseling specialization or instr consent

Geographic Information Science (GIS)

GIS 5530. GIS Internship. (; 1-3 cr. [max 6 cr.] ; S-N only; Every Fall & Spring)
Practical hands-on experience using GIS to solve problems in a real-world work environment. prereq: instr consent, strong GIS/mapping skills

GIS 5555. Basic Spatial Analysis. (; 3 cr. ; Student Option; Every Fall)
How to use spatial data to answer questions on a wide array of social, natural, and information science issues. Exploratory data analysis/visualization. Spatial autocorrelation analysis/regression. prereq: [STAT 3001 or equiv, MGIS student] or instr consent

GIS 5571. ArcGIS I. (; 3 cr. ; Student Option; Every Fall)
First of a two-course series focusing on ArcGIS Desktop. Overview of ArcGIS system and its use for spatial data processing. Data capture, editing, geometric transformations, map projections, topology, Python scripting, and map production. prereq: [GEOG 5561 or equiv, status in MGIS program, familiarity with computer operating systems] or instr consent

GIS 5572. ArcGIS II. (; 3 cr. ; Student Option; Every Spring)
Continues GIS 5571. Raster analysis, dynamic segmentation, geometric networks, geocoding, Python scripting, and data interoperability. Substantial projects include map and poster design and production. prereq: [5571, [GEOG 5561 or equiv], in MGIS program] or instr consent

GIS 5573. Introduction to Digital Mapping: ArcGIS Basics. (2 cr. ; A-F only; Every Fall)
Desktop mapping functions using ArcGIS software. Application of systems to display/analysis of geographical data. prereq: [GEOG 5561 or equiv, in MGIS program] or instr consent

GIS 5574. Web GIS and Services. (3 cr. ; Student Option; Every Fall)
Plan, design, develop, publish web-based GIS solution. Build websites, prepare data for web. Commercial software, Open Source software, volunteer geographic information, open GIS standards/developing web GIS application. Hands-on experience with variety of web GIS technologies/software. prereq: [GEOG 5561 or equiv, in MGIS program] or instr consent

GIS 5576. Spatial Digital Humanities. (3 cr. ; Student Option; Every Spring)
Introduction to Spatial Digital Humanities GIS 5576 is a basic overview of desktop GIS (both Esri and open source), as well as an introduction to a number of other mapping techniques (such as Esri Maps for Office, ArcGIS Online, web mapping basics, georeferencing historical maps, etc) in addition to digital scholarship techniques. Course objectives include: understanding the basics of mapping and geospatial information using GIS; documenting and managing spatial data using coherent/standardized methods; understanding several spatial analysis methods that are relevant to student research area; and applying spatial research methods into student research.

GIS 5577. Spatial Database Design and Administration. (3 cr. ; Student Option; Every Spring)
Spatial database design, development planning/management, maintenance, security, access/distribution, and documentation. prereq: instr consent

GIS 5578. GIS Programming. (3 cr. ; Student Option; Every Spring)
Programming techniques using Python and other languages specifically relating to GIS technologies. prereq: instr consent

GIS 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Master's student, adviser and DGS consent

GIS 8501. GIS Project Management and Professional Development. (3 cr. ; A-F only; Every Fall)
Project management/professional development. Portfolio creation, career exploration, degree program planning. GIS project management through lectures, class exercises, guest speakers. prereq: MGIS student or instr consent

GIS 8990. Research Problems in GIS. (; 1-6 cr. ; A-F only; Every Fall, Spring & Summer)
Project of sufficient scope/complexity to document student's ability to apply spatial analysis and visualization techniques to real-world problems. Supervised by faculty member. prereq: MGIS student, instr consent

Geography (GEOG)

GEOG 5385. Globalization and Development: Political Economy. (; 4 cr. ; Student Option; Periodic Fall & Spring)
Nature/scope of modern world system (capitalism), its impact on regional development processes. Roles of state and of international financial institutions. prereq: Sr or grad or instr consent

GEOG 5401W. Geography of Environmental Systems and Global Change. (ENV,WI; 3 cr. [max 4 cr.] ; Student Option; Periodic Fall)
Geographic patterns, dynamics, and interactions of atmospheric, hydrospheric, geomorphic, pedologic, and biologic systems as context for human population, development, and resource use patterns. prereq: grad student or instr consent

GEOG 5426. Climatic Variations. (; 3 cr. ; Student Option; Periodic Fall)
Theories of climatic fluctuations and change at decadal to centuries time scales; analysis of temporal and spatial fluctuations especially during the period of instrumental record. prereq: 1425 or 3401 or instr consent

GEOG 5511. Principles of Cartography. (; 4 cr. ; Student Option; Every Spring)
Topics on data sources for mapping. History of thematic cartography (focused on 19th-century European activity). Multivariate classification/symbolization. Models for cartographic generalization, spatial interpolation, and surface representation. Animated/multimedia cartography.

GEOG 5531. Numerical Spatial Analysis. (; 4 cr. ; Student Option; Every Fall)
Applied/theoretical aspects of geographical quantitative methods for spatial analysis. Emphasizes analysis of geographical data for spatial problem solving in human/physical areas.

GEOG 5541. Principles of Geocomputing. (; 3 cr. ; A-F or Audit; Every Spring)
The availability of computing infrastructures such as high-performance and cloud computing, high-speed networks, and rich data has led to a new scientific paradigm using computational science. Geocomputation is the "application of a computational science paradigm to study a wide range of problems in geographical and earth systems (the geo)

contexts" (Openshaw, 2014). This course will introduce students to geocomputation as well as related areas including big spatial data, and cyberinfrastructure. Students will engage in hands-on-exercises learning principles and best-practices in geocomputing. The ability to program is an essential skill for GIScientists. Learning to program takes time and a lost of practice, and in this course students will learn how to develop programs in the Python programming language to solve geospatial problems.

GEOG 5543. Advanced Geocomputing. (3 cr. ; Student Option; Every Fall)
The availability of computing infrastructures such as high-performance and cloud computing, highspeed networks, and rich data has led to a new scientific paradigm using computational approaches, termed computational science. Geocomputation is the "application of a computational science paradigm to study a wide range of problems in geographical and earth systems (the geo) contexts" (Openshaw, 2014). This course will delve into advanced topics in geocomputation as well as related areas ranging from geographic information and spatial big data to cyberinfrastructure and parallel computation. Students will engage in hands-on exercises learning principles and best practices in geocomputing while using cutting-edge computational infrastructures.

GEOG 5561. Principles of Geographic Information Science. (; 4 cr. ; Student Option; Every Fall & Spring)
Introduction to the study of geographic information systems (GIS) for geography and non-geography students. Topics include GIS application domains, data models and sources, analysis methods and output techniques. Lectures, reading, and hands-on experience with GIS software. prereq: grad

GEOG 5562. GIS Development Practicum. (3 cr. ; Student Option; Periodic Fall)
Algorithms/data structures for digital cartographic data, topological relationships, surface modeling, and interpolation. Map projections, geometric transformations, numerical generalization, raster/vector processing. Hands-on experience with software packages. prereq: GIS 5571 or instr consent

GEOG 5563. Advanced Geographic Information Science. (; 3 cr. ; Student Option; Every Fall & Spring)
Advanced study of geographic information systems (GIS). Topics include spatial data models, topology, data encoding, data quality, database management, spatial analysis tools and visualization techniques. Hands-on experience using an advanced vector GIS package. prereq: B or better in 3561 or 5561 or instr consent

GEOG 5564. Urban Geographic Information Science and Analysis. (; 3 cr. ; Student Option; Periodic Fall)
Core concepts in urban geographic information science including sources for urban geographical and attribute data (including census data), urban data structures (focusing on the TIGER data structure), urban spatial analyses (including location-allocation models), geodemographic analysis, network analysis, and the display of urban data. prereq: 3561 or 5561

GEOG 5588. Advanced Geovisualization. (; 3 cr. ; Student Option; Every Fall)
The generation and use of geographic information has become an integral part of our daily life, science, and technology. This has led to increasing interest in the design and development of interactive maps and dynamic geographic visualizations in 2D, 3D, and Web environments. The Advanced Geovisualization course intends to equip students with the knowledge and advanced technical skills needed to design and implement effective maps and create dynamic and interactive visualizations using geospatial data sets.

GEOG 5900. Topics in Geography. (; 3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Special topics and regions. Course offered by visiting professors in their research fields.

GEOG 8001. Problems in Geographic Thought. (; 3 cr. ; A-F or Audit; Periodic Fall)
Currents of geographic thought in biophysical, GIS, human, cultural, and human-environment subfields. Focuses on concepts/paradigms through which geographers have attempted to unify/codify the discipline, around which debate has flourished, and about which interdisciplinary histories can be traced.

GEOG 8002. Research Methods in Geography. (; 3 cr. ; Student Option; Every Spring)
Seminar. Overview of research designs/methods in geography. Relationships between different research paradigms (modes of inquiry), research designs, and methods. Critical readings. Analyses of research projects.

GEOG 8005. Proseminar: Population Geography. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Conceptual literature and empirical studies on fertility, mortality, and migrations in different parts of the world. prereq: instr consent

GEOG 8006. Proseminar: Research Methods in Geography. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Introduction to research design, strategies, methods of data collection, analysis, interpretation, and representation in contemporary geographic research. prereq: instr consent

GEOG 8007. Proseminar: Theories of Development and Change. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Recent research themes and questions in geography and related social sciences on Third World development; development theories, conceptually grounded case studies, and grassroots-based research. prereq: instr consent

GEOG 8020. Research Seminar: Economic Geography. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Contemporary research. Advanced topics, which vary with interests of faculty offering course. prereq: instr consent

GEOG 8101. Proseminar: Nature and Society. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Interconnectedness of environment and people, nature and society. Conceptual literature and empirical studies in human/cultural/political ecology. prereq: instr consent

GEOG 8102. Proseminar: The State, the Economy, and Spatial Development. (; 3 cr. ; Student Option; Periodic Fall)
Introduction to research in economic, political, and urban geography: conceptual research addressing interrelationship between political and economic processes and spatial dynamics of urban and regional development; empirical research documenting nature and extent of this interrelationship at different spatial scales. prereq: instr consent

GEOG 8103. Proseminar: Physical Geography. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Historical development of research in physical geography, current research trends, and transfer of current research to undergraduate education. prereq: instr consent

GEOG 8105. Proseminar: Historical Geography. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Introduction to conceptual research and empirical studies. prereq: instr consent

GEOG 8106. Seminar: Social and Cultural Geography. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Role of space and place in constitution of social and cultural life, social relations, and social identities; class, space, and place; geography of race and racism; environmental racism; geography of gender and sexuality; nationalism, national identity, and territory. prereq: instr consent

GEOG 8107. Geographic Writing. (; 3 cr. ; S-N or Audit; Every Fall)
Analysis of organization and presentation of geographic research. Critiques of selected examples of geographic writing. prereq: instr consent

GEOG 8200. Seminar: Urban Geography. (; 2-3 cr. ; A-F or Audit; Periodic Spring)
Contemporary research. Topics vary with the interests of faculty.

GEOG 8201. Explorations in the Geography of Minnesota. (; 3 cr. ; S-N or Audit; Periodic Fall & Spring)
Physical environment, agriculture, forestry, mining, land survey, population, recreation, cities/towns, transportation. Sources of information about the state. Students make short oral/written reports. Might provide springboard for a Plan B paper, thesis, or dissertation. Two or three Saturday field trips. prereq: instr consent

GEOG 8211. Federal Policy Research. (; 3 cr. ; Student Option; Every Fall)
U.S. environmental policies at federal/state level. Policy formulation, implementation, and

evaluation. This seminar provides students with the necessary information to carry out independent research into public policy and will add unfamiliar sources to their research bibliographies. Descriptive and analytical rather than theoretical, and illustrative rather than comprehensive, it gives both social scientists and biophysical scientists additional perspective to their personal research and adds an important dimension to their analysis. It will allow them to find, describe, critically review, and communicate those aspects of federal policy of concern. Students are encouraged to choose areas of policy coinciding with their areas of research. prereq: instr consent

GEOG 8212. Africa. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Advanced topics. Topics vary with interests of faculty offering course. prereq: instr consent

GEOG 8213. East Asia and China. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Contemporary research, advanced topics. Topics vary with interests of faculty offering course. prereq: instr consent

GEOG 8214. South Asia. (; 3 cr. ; Student Option;)
Advanced topics. Topics vary with interests of faculty offering course.

GEOG 8220. Agrarian Change and Rural Development. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Contours of agricultural/rural development in Third World. Theories of agrarian transformation and of rural development. Role of agriculture in economic development. Peasant economy. Nature/role of state intervention in rural sector.

GEOG 8230. Theoretical Geography. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Advanced topics. Topics vary with interests of faculty offering course. Contemporary theoretical/philosophical themes transcending subdisciplines of human/physical geography. prereq: instr consent

GEOG 8240. Medical Geography. (; 3 cr. ; Student Option; Periodic Spring)
Geographic inquiry concerning selected problems of health and health care. prereq: instr consent

GEOG 8260. Seminar: Physical Geography. (2 cr. [max 3 cr.] ; Student Option; Every Spring)
Topics of contemporary research. Topics vary with interests of faculty offering course.

GEOG 8270. Seminar: Climatology. (; 3 cr. ; Student Option No Audit; Fall Odd Year)
Sample topics: climate modeling; climatic variability; climate change and predictability; severe local storms; drought; energy balance; urban climate; statistical climatology. prereq: instr consent

GEOG 8280. Biogeography. (; 3 cr. [max 9 cr.] ; Student Option; Every Fall)
Forest dynamics, dendrochronology, tree rings and climate, environmental disturbance, paleobiogeography, field/lab methods in biogeography. prereq: instr consent

GEOG 8290. Seminar in GIS and Cartography. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Selected concepts/methods. Topics, which vary yearly, include spatial analysis methods in GIS; advanced visualization methods; data quality and error propagation in GIS; generalization methods in GIS and cartography; role of time in GIS; interactive/animated cartography; incorporation of uncertainty. prereq: instr consent

GEOG 8291. Seminar in GIS, Technology, and Society. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Relationships between practice of GIS and political, economic, legal, institutional structures of society. Effects of GIS on society. Nontraditional spaces in GIS. GIS and local decision making. Privacy issues. prereq: instr consent

GEOG 8292. Seminar in GIS: Spatial Analysis and Modeling. (; 3 cr. ; Student Option; Spring Even Year)
Overview of Geographic Information Systems (GIS) and spatial analysis/modeling of human/environmental systems. Spatial statistics, modeling spatiotemporal processes, simulation techniques, visualization, complex systems/complexity. Guidance in thesis/dissertation research. prereq: 3511 [or equiv statistics course], [3561 or 5561 or equiv intro GIS course] or instr consent

GEOG 8293. CyberGIS. (3 cr. ; Student Option; Every Spring)
Just as physical infrastructure provides services such as electricity, plumbing, and road networks to communities across the world, cyberinfrastructure has emerged to provide computational services and capabilities to scientific communities. Cyberinfrastructure integrates high-performance computing, digital sensors, virtual organizations, and software tools and services to facilitate computationally-intensive and collaborative scientific research. CyberGIS, broadly defined as cyberinfrastructure-based geographic information systems, integrates cyberinfrastructure, geographic information systems (GIS), and spatial analysis to enable collaborative geographic problem solving. This course will delve into advanced topics within the context of cyberGIS and related technologies. Particular emphasis will be placed on raster data processing including a broad introduction to raster data, cartographic modeling, and raster data manipulation. We will situate raster data processing in the broader context of geographic information science and cyberGIS focusing on the how synthesizing computational thinking and spatial thinking influence methodological approaches. Students will be expected to draw on their own experiences and backgrounds to enhance discussions, labs, and research projects. Students will gain hands-on experience developing methods to analyze and manipulate raster data.

GEOG 8294. Spatiotemporal Modeling and Simulation. (3 cr. ; Student Option; Periodic Spring)
Many geographic, societal, and environmental phenomena as well as biological and ecological systems involve dynamic processes that are changing in space and time. Examples include hurricanes, animal migrations, spread of diseases, human mobility and population dynamics. Movement is a key to understanding the underlying mechanisms of these dynamic processes. Today, the availability of an unprecedented amount of movement observations at ne spatial and temporal granularities has resulted in substantial advances in GISciences approaches for the analysis, modeling, and simulation of movement and its patterns. Spatiotemporal models and simulation techniques are often used to analyze and better understand the patterns of spatiotemporal processes, and to assess their behavioral responses in varying environmental conditions. This seminar introduces students to the concepts of spatiotemporal processes and patterns. We review existing methods for modeling and simulation of spatiotemporal phenomena, especially movement. Students will develop computational skills to model a phenomena of their choice and create simulations.

GEOG 8301. Advanced Qualitative Methods. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Techniques available to scholars who use qualitative methods. Participant observation. Formal/informal interviews: life/oral histories, focus interviews. Documentary and material culture analysis. Practical experience, theoretical/ethical questions.

GEOG 8302. Research Development. (; 3 cr. ; S-N or Audit; Periodic Fall)
Students in geography and related social sciences are guided in key steps to effective research proposal writing. prereq: instr consent

GEOG 8333. FTE: Masters. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

GEOG 8336. Development Theory and the State. (; 3 cr. ; A-F or Audit; Every Spring)
Why certain interventionist states in third world countries have been able to guide their economies to overcome legacy of underdevelopment while most have failed to induce development. Internal/external conditions that facilitated such departure from underdevelopment. Comparative national/provincial case studies: Taiwan, South Korea, Botswana, Brazil, India. Applying theoretical approaches to policy issues.

GEOG 8350. Seminar: World Population. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Contemporary research in world population development and problems. Topics vary with interests of faculty offering course. prereq: instr consent

GEOG 8405. Seminar: Graduate Student Professional Development. (; 1 cr. [max 2 cr.] ; S-N or Audit; Periodic Fall & Spring)
Strategies for success in graduate program. Preparation for a career as a geographer. Completing/defending the dissertation.

Publishing, job search, tenure process, oral presentations, non-academic career paths. prereq: Geography grad student

GEOG 8420. Teaching Practicum. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Fall & Spring)
Teaching methodologies, learning objectives, course content, classroom techniques, student/course evaluation. Specific application to instruction in Geography. prereq: [Geog or MGIS] grad student or instr consent

GEOG 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

GEOG 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

GEOG 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

GEOG 8800. Seminar: Development of Geographic Thought. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Topics vary with interests of faculty offering course. prereq: instr consent

GEOG 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

GEOG 8970. Directed Readings. (; 1-5 cr. [max 10 cr.] ; Student Option; Every Fall, Spring & Summer)
tbd prereq: dept consent

GEOG 8980. Topics: Geography. (; 1-3 cr. [max 30 cr.] ; Student Option; Every Fall & Spring)
Seminar offered by visiting or regular faculty. Topics vary with interests of faculty. prereq: instr consent

GEOG 8990. Research Problems in Geography. (; 1-5 cr. [max 10 cr.] ; Student Option; Every Fall, Spring & Summer)
Individual research projects. prereq: dept consent

Geriatrics (GERI)

GERI 7100. Oral Health Services for Older Adults Seminar. (; 2 cr. ; Student Option; Every Fall & Spring)
A seminar for graduate students on a broad variety of topics related to aging, oral health of older adults, and delivery of oral health services to older adults. Students present articles, complex clinical cases, and ongoing research projects for group discussion.

GERI 7200. Advanced Clinical Geriatric Dentistry. (; 1-10 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Practical clinical experience in examination, diagnosis, treatment planning, and treatment of older adult patients in the dental clinic at the Amherst H. Wilder Senior Health Center.

GERI 7210. Geriatric Hospital Dentistry. (; 1-6 cr. ; Student Option; Every Fall, Spring & Summer)
Rotations at University of Minnesota Hospital Dental Clinic and/or Minneapolis V.A. Medical Center Dental Clinic. Management of elderly patients in acute care settings. Dental management of patients compromised by medical therapies such as radiation treatment or chemotherapy, as well as those with acute illnesses.

German (GER)

GER 5011. Advanced Conversation and Composition. (; 3 cr. ; Student Option; Fall Odd Year)
Achieving high proficiency in writing/speaking professional/academic German. prereq: 3012, [grad student or adv undergrad]

GER 5410. Topics in German Literature. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Topic may focus on a specific author, group of authors, genre, period, or subject matter. Topics specified in Class Schedule.

GER 5510. Topics in Contemporary German Culture. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
A topic of contemporary German culture explored in depth. prereq: 3011

GER 5610. German Literature in Translation. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Study in depth of authors or topics from various periods in German literature. Requires no knowledge of German. prereq: No knowledge of German required; cr toward major or minor requires reading in German

GER 5630. Topics in German Cinema. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Spring)
Topics chosen may focus on specific directors, genres, film production or reception, and/or other formal, theoretical, historical, or political issues. prereq: 3xxx film course or instr consent

GER 5651. Thinking Environment: Green Culture, German Literature and Global Debates. (ENV,LITR; 3 cr. ; Student Option; Fall Odd, Spring Even Year)
How environmental thinking became social-political force through German literature/culture, with comparisons to global or U.S. developments. Authors include Goethe, Christa Wolf, Enzensberger.

GER 5711. History of the German Language I. (; 3 cr. ; Student Option; Fall Even Year)
Historical development of German, from beginnings to 1450. prereq: 3011

GER 5721. Introduction to Middle High German. (; 3 cr. ; Student Option; Fall Odd Year)
Introduction to Middle High German language and literature. Study of grammar through formal description of Middle High German phonology, morphology, and syntax. Normalized MHG texts read.

GER 5734. Old Saxon. (; 3 cr. ; Student Option; Periodic Fall)
Study of the poetry of Old Saxon. Detailed investigation of Old Saxon in comparison with the other Old Germanic languages.

GER 5993. Directed Studies. (1-4 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. Prereq instr consent, dept consent, college consent.

GER 8010. Current Debates in Literary and Cultural Theory. (; 3 cr. [max 12 cr.] ; Student Option; Every Spring)
Seminar. Close readings of theoretical constellations in texts. Topic such as text/image, history/memory/time, oral culture/literacy, public/private, authority/crisis. Draws on literary, philosopical, and theoretical work.

GER 8020. Problems in Literary and Cultural History. (; 3 cr. [max 12 cr.] ; Student Option; Every Spring)
Historiographic texts as literature and literary or filmic texts as historical documents. Homogenizing/constructive elements in historiography. Strategies of writing historical syntheses.

GER 8200. Seminar in Medieval German Literature and Culture. (; 3 cr. [max 9 cr.] ; Student Option; Spring Even Year)
Topics on specific author, group of authors, genre, or subject matter in German literature, ca. 800-1450. prereq: 5721

GER 8210. Seminar in Early Modern German Literature and Culture. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Topics on specific author, group of authors, genre, or subject matter in German literature, 1450-1750.

GER 8220. Seminar in 18th-Century German Literature and Culture. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Literary, philosophical, and aesthetic texts emerging from major 18th-century literary trends, 1720-1810. Cultural and historical contexts of Enlightenment and Weimar Classicism.

GER 8230. Seminar in 19th-Century German Literature and Culture. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Examination of an author, issue, or movement, using a variety of critical approaches.

GER 8240. Seminar in 20th-/21st-Century German Literature and Culture. (; 3 cr. [max 9 cr.] ; A-F or Audit; Periodic Fall & Spring)
Topics on literature, film, or other forms of "high" and popular culture.

GER 8300. Topics in Literature and Cultural Theory. (; 3 cr. [max 18 cr.] ; Student Option; Periodic Fall & Spring)

Authors, themes, movements, and social issues from 1700 to present. Focus varies each semester.

GER 8741. Gothic and Methods of Comparative Reconstruction I. (; 3 cr. ; Student Option;)
The oldest extant Germanic language and the prehistory of Germanic group of languages.

GER 8742. Gothic and Methods of Comparative Reconstruction II. (; 3 cr. ; Student Option; Periodic Fall)
Continuation of study of the oldest extant Germanic language and the prehistory of Germanic group of languages. prereq: 8741

GER 8751. Paleography: Medieval Manuscript Readings. (; 3 cr. ; A-F or Audit; Periodic Spring)
Introduction to techniques of reading and transcribing medieval German and Latin manuscripts.

GER 8752. Medieval Text Editing. (; 3 cr. ; Student Option; Periodic Spring)
Introduction to techniques of historical text-critical editing of medieval Germanic and Latin manuscripts.

GER 8820. Seminar: Advanced Theory. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Topic in critical thought, e.g., the Frankfurt School, hermeneutics, reception theory.

GER 8994. Directed Research. (; 1-3 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
tbd prereq: instr consent, dept consent; may be taken as tutorial with instr consent

German,Scandinavian, and Dutch (GSD)

GSD 5103. Teaching of Germanic Languages. (; 3 cr. ; Student Option; Every Fall)
Second language acquisition theory, methods, testing, and technology applicable to teaching of modern Germanic languages.

GSD 8001. Approaches to Textual Analysis. (; 3 cr. ; Student Option; Every Fall)
Theoretical approaches to textual analysis that shape disciplinary discussions in Germanic studies.

GSD 8002. Interdisciplinary Approaches to Textual Analysis. (; 3 cr. ; Student Option; Spring Odd Year)
Theoretical approaches in textual studies that challenge conventional notions of boundaries between disciplines and between national literatures/cultures.

GSD 8103. Advanced Teaching Methods: Integrating Language and Disciplinary Content. (3 cr. ; Student Option; Periodic Fall)
This course explores theoretical and practical approaches to cultivating students? advanced literacies in a second language through the integration of language proficiency development and the study of disciplinary content in upper-level literature, linguistics, and culture courses. Students must have passed FRIT 5999 or GSD 5103 or SPPT 5999 or have permission from the instructor in order to take this course.

GSD 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall & Spring)
TBD prereq: Master's student, adviser and DGS consent

GSD 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student, adviser and DGS consent

GSD 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

GSD 8801. Dissertation Seminar. (; 3 cr. ; S-N or Audit; Periodic Fall & Spring)
For doctoral students in German and Scandinavian studies who are beginning to establish topics and do research for their dissertations. Discussion of a variety of topics related to this process as well as presentation of some written work.

GSD 8802. Dissertation Writing Seminar. (; 3 cr. ; S-N or Audit; Periodic Fall & Spring)
Critical, supportive forum for discussion of problems/issues related to dissertation research/writing. Shaping/controlling one's topic. Developing chapter outlines. Questions of audience. Careful uses of language. Turning a dissertation into a book. prereq: 8801, completion of doctoral preliminary examinations

GSD 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(no description) prereq: Max 18 cr per semester or summer; 24 cr required

Gerontology (GERO)

GERO 5100. Topics in Gerontology. (; 0.5-4 cr. [max 10 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Timely topics related to the biology, sociology, and psychology of aging and applied aging services.

GERO 5102. Hot Topics in the Biology of Aging. (1 cr. ; S-N only; Fall Even Year)
The goals of the course include providing the students with an essential understanding of the contemporary issues in biogerontology, including analysis of ethics issues in the field. This course is open to graduate students and post-doctoral fellows involved in the NIA training grant Functional Proteomics of Aging. others may enroll with instr permission.

GERO 5103. Aging and Society. (2 cr. ; Student Option; Every Fall)
Examines the broad range of topics and issues related to aging, and how the process of aging is shaped by social context and relationships in connection with individual factors, including family, the economy, health care, and the political system. Students in Master's or doctoral programs most likely to benefit. Students new to the field of aging studies are recommended to begin with GERO 5105/PubH 6883: Multidisciplinary Perspectives in Aging.

GERO 5105. Multidisciplinary Perspectives on Aging. (; 2 cr. [max 3 cr.] ; Student Option; Every Fall)
Obtain a broad understanding of the multidisciplinary perspectives, theoretical underpinnings, and advancements in the study of aging ("gerontology"), in the inter-related domains of clinical geriatrics, psychology, sociology, and policy as related to aging.

GERO 5111. Studying Aging and Chronic Illness. (; 2 cr. ; Student Option; Every Fall)
Methodological issues unique to studies of older populations. Focuses on measurement of epidemiological characteristics. Health conditions/disorders of older Americans. prereq: Introductory course in epidemiology or instr consent

GERO 5117. Adult Development and Aging. (2 cr. ; Student Option; Every Spring)
This course examines the dynamic interaction of individual development and aging. Students will review the principal theories applied to understand individual development and aging, and explore methodological issues in adult development and aging; cognitive aging; social and health factors that influence developmental trajectories in aging and vice versa; and psychopathological issues in aging. It is recommended that those new to the field of aging students take PubH 6883/GERO 5105: Multidisciplinary Perspectives in Aging prior to taking this course. This course fulfills the Behavioral and Social Sciences concentration area requirement of the Gerontology Minor.

GERO 5125. Gerontology Service Learning. (; 1-3 cr. ; Student Option; Every Fall, Spring & Summer)
At least 100 hours of service to seniors or organizations serving seniors required. Longitudinal one-on-one relationship with at least two seniors. Service activities may include: friendly visiting, escorting seniors to medical appointments, chore services, teaching health education to groups of seniors and staff, participating in social or recreational activities with seniors, assisting with immunization and screening programs, assisting seniors with selection of health plans, or providing volunteer home health aide or nursing assistant services or emergency non-medical response under the supervision of a nurse. Students may use up to 25 percent of their service time for project that benefits the campus as a whole. Reading, monthly class discussions, a term paper and weekly self-reflection

GERO 5191. Independent Study: Gerontology. (1-4 cr. [max 16 cr.] ; Student Option No Audit; Periodic Fall, Spring & Summer)
Independent study: gerontology. prereq: Approval of [adviser, DGS] for gerontology minor

GERO 5518. Equity and Long-Term Care Quality. (2 cr. ; A-F only; Periodic Spring)
The objective of this course is to help students gain a deeper understanding of long-term care quality with a focus on equity. We will pay particular attention to post-acute care settings, care integration across settings, the role of the workforce, and equity considerations across all these topics. Post-acute care settings reviewed will include home care, assisted living, alternative care arrangements, nursing homes, and hospice. There are no required prerequisites but students are encouraged to take a course on U.S. health care (e.g., PubH 6556, Health and Health Systems) prior to taking the course. Cross-listed with: PubH 6518

GERO 8021. Application of Proteomics to Aging. (1 cr. ; Student Option; Fall Odd Year)
Proteomic technology in aging research. Faculty/student led discussions on topics relevant proteomic research. Overview of special techniques/analytical approaches complementary to proteomics, hands-on experience with data analysis, discussion of literature. prereq: [Grad students, post-doctoral fellows involved in National Institutes on Aging training grant Functional Proteomics of Aging] or grad students or post-doctoral fellows with instr consent

GERO 8022. Fostering a Career in Aging Research. (1 cr. ; Student Option; Spring Odd Year)
Prepare pre-doctoral students/post-doctoral fellows for next step in academic career. Student/faculty led discussions on preparing for job interviews, including composing CV/cover letter, preparing grant applications/manuscripts, developing course syllabus based on biology of aging. prereq: Grad students/post-doctoral fellows involved in National Institutes on Aging training grant Functional Proteomics of Aging or grad students or post-doctoral fellows with instr consent

GERO 8023. Aging Policy Seminar. (2 cr. ; S-N only; Every Fall)
Topics chosen to match student interest. Potential issues include Medicare, Medicaid, Social Security, policies about long-term care, preventive care for older people, employment discrimination, ethical topics. Run seminar on topic of choice, write follow-up paper. prereq: Grad student or instr consent [recommended to have taken GERO 5105]

Global Doctorate of Business (GDBA)

GDBA 7000. DBA Program Fee. (0 cr. ; No Grade Associated; Every Fall & Spring)
Course created for purpose of charging program fee to various DBA cohorts. Total cost of program charged upfront and nonrefundable.

GDBA 7101. Critical Thinking and Leadership. (2 cr. ; A-F only; Every Fall, Spring & Summer)
This course integrates approaches to leadership and ethics in related courses delivered at top business schools, placing them in the distinct context of these times. The course is devoted to providing a relatively complete view for executives of enterprises, who want to take control of their organizations, realize strategies and accomplish missions, to help them rethink, review and improve their leadership of self and of their organizations. The course will be delivered through a combination of theoretical analyses, cases study and review of practice, through which students will be better able to understand multiple dimensions of human nature; they will also practice and strengthen critical thinking (to get at the truth), creative thinking (for divergence), situational thinking (for effectiveness), and ethical thinking (for fairness). All of these are necessary for leaders? daily decision-making, and help leaders realize their full potential to lead their organizations by overcoming internal and external challenges in the face of uncertainty, and help them cultivate outstanding leaders and create great companies.

GDBA 7102. Exploration of Tsinghua University. (2 cr. ; A-F only; Every Fall, Spring & Summer)
The course stems from the research, thinking and epiphany of administrators of the college, to expose students to cutting edge academic research and scholarship at Tsinghua University and elsewhere. It draws on current, contextual work from recognized "national excellent courses" such as "Scientific Research in Laboratory," and includes research results, teachers' reflections on and comprehension of the full range of advances in liberal arts, science and economic management, and in industry-university-research integration. Staying at the forefront, this course rediscovers higher-level scientific research resources and the cultural resources of Tsinghua University, relying on its status as a comprehensive, research-based, and open university. Based on China's national context and the need to improve the local education system in economics and management, it focuses on the frontiers of engineering, the characteristics of science and industry in the information society, and the consequent changes to the rules of economy and management. It can inspire students to think differently and learn how to make full use of the resources at Tsinghua University to create and assist the competitive enterprises of the future.

GDBA 7103. Financial Market and Investment Decision Making. (2 cr. ; A-F only; Every Fall, Spring & Summer)
The course starts with the basic theory of financial markets to examine the analytical framework of China's financial market theory, in light of the financial market system and interest rate policies of the United States and Europe. The course focuses on introducing the evolution of China's credit market, bond market, stock market, derivatives market, and securities investment funds market, through analysis of cases. It also emphasizes hot issues in the capital market, such as interest rate liberalization, multi-level capital market construction and structured finance. The course also introduces the financial derivatives market and its application to corporate risk management. Discussions in the class will include cases on Chinese and foreign financial markets, and the latest research results of the academic community. Students will become familiar with the mechanism of China's financial market, and thoroughly understand the operation of capital markets through this course.

GDBA 7104. International Environment and National Strategy. (2 cr. ; A-F only; Every Fall, Spring & Summer)
The course focuses on and explores the roots of global economic and political situations. International development trends, China's overall diplomacy, domestic and international views and disputes will be addressed. The course will mainly elaborate on the relationship between China and other major powers in the world such as the United States, Russia, and Japan, and the impact of the development of these relationships on economic behaviors and interactions between these markets.

GDBA 7105. Management Psychology. (2 cr. ; A-F only; Every Fall, Spring & Summer)
This course lays stress on analyzing factors that have influence on the organization's performance from three levels of the individual psychology, group psychology and organizational leadership psychology. It reveals the essence of human psychology and behaviors to improve all executives? ability to predict, coordinate and control people?s behaviors, so as to stimulate people's enthusiasm in work and realize their potential to full extent for the purpose of achieving the organizational goals. The course will reach its goal of teaching through the analysis of real cases to lead students into the field of psychology and inform them of the psychological problems in practice of management: how to perform leadership in various types of organizations; how to stimulate and integrate views of all parties, strengthen the enterprise?s structure and develop the self-management organization; how to improve communication skills and manage and transform the conflicts into a boost for performance.

GDBA 7106. Management Wisdom Learned from History. (2 cr. ; A-F only; Every Fall, Spring & Summer)
This course centers on discussions of the comprehensive and dynamic relationship between politics and economic development in Chinese and World history. Instruction will focus on the implications of historical events and received wisdom on modern management, and the evaluation skills needed to manage complex organizations. The course combines both Western thought and Chinese traditional philosophy to help students develop a deeper understanding of history and its implications for modern business administration.

GDBA 7107. Sinology Wisdom and Management Innovation. (2 cr. ; A-F only; Every Fall, Spring & Summer)
This course provides an introduction to the research and theory of management, leadership, logical thinking, and governance within organizations based on the wisdom and knowledge learned from classic historical

events and modern management cases in China. The course will improve students? abilities in theoretical thinking and historical and cultural knowledge accumulation.
The course is intended to sharpen their strategic vision, decision-making methods and leadership, based on a comprehensive understanding of Chinese and global historical management wisdom.

GDBA 7108. The Macroeconomic Situation and Policy. (2 cr. ; A-F only; Every Fall, Spring & Summer)
This course uses the perspectives and methods of modern economics to analyze problems and systematically investigate the process of China?s economic reform, opening-up, and development since 1979.
It draws lessons from other countries and regions through comparison, so as to obtain an overall understanding of China's economic achievements in the past, its current problems, and its challenges for the future.

GDBA 7201. Global Strategic Alliances. (2 cr. ; A-F only; Every Fall, Spring & Summer)
This course helps the students understand the strategic rationale for strategic alliances, how to choose the right alliance partner, structure and negotiate alliances, how alliances can be best managed, and learn alliance termination and restructuring, and understand alliances in the Chinese context.

GDBA 7202. Innovation through Emerging Technologies. (2 cr. ; A-F only; Every Fall, Spring & Summer)
This course helps top executives and leaders become tech savvy and prepare their organizations for the rapidly changing technological and social environments. The course covers current IT trends such as social media, business analytics, sharing economy, mobile, and platform economy. It also covers next generation technologies that will define and shape our future such as Internet of things, 3D printing, artificial intelligence, and augmented reality. Students will learn about the technicality, key concepts, principles, and tools of each technology, collectively envision the implications of these technologies for business operations and innovations.

GDBA 7203. Marketing Strategies for Firms in the Era of Globalization. (1 cr. ; A-F only; Every Fall, Spring & Summer)
The course focuses on and explores the marketing strategies for firms in the new era of globalization. During the past decades, firms of western countries have been very successful in expanding their business in the global market, including in the emerging markets such as Brazil, Russia, India, China, and South Africa (BRICS) that hold great potentials. For instance, China?s economy has been growing rapidly to become the world?s second largest economy by nominal GDP, and many western firms have successfully gained a foothold in it. One key factor that helps the western firms to be successful in the global market is the long-term accumulated wisdom of business administration, both academically and practically. Examples include Coca-Cola and Apple that have been using brilliant branding management and other marketing tactics to help boom their business across continents.

GDBA 7204. Qualitative Research Methods. (1 cr. ; A-F only; Every Fall, Spring & Summer)
The course focuses on important methodologies that are helpful for students to do qualitative research in business administration. The course will focus on problem formulation and building theories for your study, designing appropriate case studies, collecting and analyzing primary data, and obtaining managerial insights to help improve your business decisions. In addition, the course will expose students to a new and useful research method---field experiments for studying business decision making in the field.

GDBA 7205. Global Accounting. (1 cr. ; A-F only; Every Fall, Spring & Summer)
This course aims to enhance students? understanding of contemporary issues in accounting and corporate disclosures, with particular emphasis on issues arising in the process of globalization. Building on discussions of practical reporting issues, this course also exposes students to scholarly accounting research in the context of agency and contracting theory that has practical implications. Topics addressed include the role of accounting in capital markets and contracting, real effects of accounting, recent development in accounting in the global market place, cross-country comparisons of regulatory frameworks, corporate governance and accounting, and transfer pricing in multinational corporations.

GDBA 7206. Mergers and Acquisitions. (1 cr. ; A-F only; Every Fall, Spring & Summer)
Mergers and acquisitions (M&A) is an important way to achieve corporate growth. In this course, we will explore various means for corporate managers to achieve growth through M&A. The objective of the course is to help students develop a good understanding of the four principal areas related to M&A transactions (our four ?learning pillars?): fit and strategy, M&A process, valuation, and post-merger integration. For each ?learning pillar?, we not only discuss the general principles and practices, but also emphasize the advantages and challenges of acquiring a business in a foreign country. This course uses a balanced mix of lectures and case studies to deliver key insights from theories and real-world practices.

GDBA 7207. Family Wealth Management. (1 cr. ; A-F only; Every Fall, Spring & Summer)
This course offers an integrated and strategic approach to family wealth management. Wealthy individuals or families wish to protect and grow the wealth, enjoy financial security, and build a lasting legacy. Effective wealth management is critical to achieve these goals. A successful wealth management is an integrated and strategic discipline that includes investment strategy, risk management, taxes, financial planning, philanthropy, governance, and family culture. This course will help wealthy families to understand fundamentals of family wealth management, importance of diversification and risk management in family wealth, strategies that can help to achieve tax-efficient and cost-effective diversification, comprehensive family financial planning, and effective oversight of the wealth management process.

GDBA 7208. Management of Headquarters. (1 cr. ; A-F only; Every Fall)
This course is experiential in that it provides an opportunity for the students to visit multinational companies whose headquarters are based in the Twin Cities. During the visits the students will learn about the processes and structures in place, which enable global outreach. They will also observe a variety of managerial practices that facilitate these companies? success on the world stage.
Each visit will be followed by a content-driven reflection session during which the students will process their observations within established frameworks from the International business literature.

GDBA 7209. Service Operations Management. (1 cr. ; A-F only; Every Fall, Spring & Summer)
Services represent the largest segment of most industrial economies and an important growing segment of most global regions. China is experiencing tremendous growth in its service economy, with a near doubling in its service economy during the past two decades. The focus of executive attention is strongly shifting toward services, with increasing importance of service industries such as travel, finance, health care, media, and publishing. Despite its importance in the economy, service sector productivity growth generally lags that of manufacturing. A stronger focus on managing service operations is necessary to maintain local and globally competitive businesses.
In addition, the effects of increasingly sophisticated consumers, deregulation, technology changes, and expanding global services combine to create new challenges. To succeed, business executives must have the skills to lead their service managers to allocate resources, design effective processes, analyze and improve operating practices, and apply new technologies. This course examines these opportunities.

GDBA 7210. Fundamental Data Analysis. (1 cr. ; A-F only; Every Fall, Spring & Summer)
The course begins with an overview of descriptive statistics, which includes both graphical and numerical methods for summarizing data. Then we provide a review of essential steps of inferential statistics, which include random variables, estimation, and hypothesis testing. The second half of the course is devoted to predictive analytics, including simple linear regression, multiple linear regression, and a brief introduction of experimental design. Throughout, we focus on basic concepts and the practical use of these methods in management environments. This course provides the background in statistical methods that is required for conducting research in a doctoral program in business.

GDBA 7211. Global Branding. (2 cr. ; A-F only; Every Fall, Spring & Summer)
This course will combine critical current perspectives from information economics,

psychology, sociology, behavioral decision theory and neuro-science to inform students about how brand information is acquired, processed and employed in decision-making, across segments and cultures. Students are expected to be familiar with basic marketing concepts to allow for a discussion of strategic issues related to global branding. The course will involve multiple pedagogies including lecture, case discussion and class exercises.

GDBA 7212. Global Talent Management. (2 cr. ; A-F only; Every Fall, Spring & Summer)
Global talent challenges are increasingly prevalent as organizations increasingly compete on a worldwide stage. Global talent management reflects an individual?s and/or organizations capacity to influence others and work with people from other countries and manage international operations and to the use of human resource practices designed to ensure needed access to talent for multinational enterprises competing in a global environment. In this course, we will put particular attention on the development of global competencies and a ?global mindset? in individuals and organizations. We will also explore how to effectively manage talent in the context of increasing globalization. In the course, we will focus upon identifying best practices for recruiting, developing and retaining global talent and managing high performance global work systems. More specifically, we will consider how one should organize the processes and systems of hiring, rewarding, evaluating, developing, and motivating talent in today?s global context.

GDBA 7213. Business Ethics. (1 cr. ; A-F only; Every Fall, Spring & Summer)
This course will help equip students to analyze and resolve ethical challenges that arise in business. Students will have the opportunity to reflect on the place of business in society and how to manage the tensions between their dual roles as business leaders and citizens. A special focus will be on the corporation and to whom or what it is responsible.

GDBA 7888. Thesis. (12 cr. [max 24 cr.] ; S-N only; Every Fall, Spring & Summer)
Students have to complete and defend a thesis in order to be granted with the DBA degree.

Global Health & Soc Respnsb (GHSR)

GHSR 6713. Global Health In Local Contexts. (3 cr. ; Student Option; Every Fall)
Global Health in Local Contexts: A Transnational Experiential Course on the Social Determinants, Health Equity, and Leading Change will immerse students in the study of health equity, the social and structural determination of health, the principles and practice of global health in local settings, and leading change. The discipline of social medicine provides a theoretical and practical framework to explore these topics. Social medicine is an approach to health that recognizes the centrality of the social and structural determination of health, integrates social theory to understand social forces that marginalize and harm communities, and builds collective power to challenge oppression and support the struggle for social justice. The course uses an experiential and inter-professional model; global, collaborative participation will promote understanding of the ways in which globally-connected social forces impact experience in local settings in similar and different ways.

Global Studies (GLOS)

GLOS 5315. Never Again! Memory & Politics after Genocide. (GP; 3 cr. ; A-F or Audit; Spring Odd Year)
Course focuses on the social repercussions and political consequences of large-scale political violence, such as genocide, war crimes and crimes against humanity. Students learn how communities and states balance the demands for justice and memory with the need for peace and reconciliation and addresses cases from around the globe and different historical settings. prereq: SOC 1001 or 1011V recommended, A-F required for Majors/Minors.

GLOS 5403. Human Rights Advocacy. (; 3 cr. ; Student Option; Every Fall)
Theoretical basis of human rights movement. Organizations, strategies, tactics, programs. Advocacy: fact-finding, documentation, campaigns, trial observations. Forensic science. Human rights education, medical/psychological treatment. Research project or background for case study. prereq: Grad student

GLOS 5611. Stories, Bodies, Movements. (6 cr. ; A-F only; Periodic Fall & Spring)
For most of us, stories seem to simply 'happen.' We listen to stories, we tell stories, we are moved by stories, and we retell stories. However, every act of telling stories involves making decisions or moves, and each re-telling of a familiar story may either give birth to new meanings, nuances, and affects, or, it may erase their possibility. Thus, each storyteller can be seen as a translator of stories with a responsibility to retell stories ethically. It is precisely through these translational acts that all politics become politics of storytelling. In this course, we will consider the ways in which the politics of the global and the intimate derive their meanings, effects, and affects from the circulation, transaction, and re-tellings of stories within and across borders. We will ask how a praxis of ethical engagement with politics can be imagined as a praxis of receiving and retelling stories. By immersing ourselves in the process of remembering, telling, listening, trimming, interweaving, distilling, and performing stories, we will consider how ethical receiving and retelling of stories involves continuous revising, repositioning, and re-theorizing of such vexed and entangled terrains and terminologies as identity, community, rights, and justice, as well as the contingent meanings of knowledge, truth, and ethics. This course engages this terrain through a mode of active learning in which all the participants will read and reflect, listen and discuss, tell and retell, watch and play, move and perform collectively. By becoming aware of the ways in which our minds-bodies-souls are inserted in the receiving and translation of stories, we will grapple together with the ways in which our bodies--as our embodiments--help to relationally shape not only our own performances but also our responses to the performances of other living and moving bodies around us. We will learn from writings, film, songs, and plays by writers, artists, activists, and thinkers from a range of historical and contemporary locations and struggles. These include: Marie Lily Cerat, W. E. B. Du Bois, Suheir Hammad, Sterlin Harjo, Naeem Inayatullah, June Jordan, AnaLouise Keating, Kauanui, J. Kehaulani, Audre Lorde, Viet Thanh Nguyen, Middle East Research and Information Project, Munshi Premchand, Alok Rai, Nina Simone, Leanne Betasamosake Simpson, Sangtin Writers, Standing Rock Collective, Eve Tuck, PatriGLOSck Wolfe, and K. Wayne Yang. Many of the 'Acts' in this course will be co-facilitated with local or international artists and writers. Grading Basis: A/F. The course requires all the participants to do sustained work and deep reflections, enjoy the process of imagining and creating with peers in a non-competitive environment. Prereq: For graduate students only, or with instructor consent. People from all kinds of locations and journeys are invited to join us in this collective exploration. For further information, email: nagar@umn.edu.

GLOS 5900. Topics in Global Studies. (; 1-4 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Proseminar. Selected issues in global studies. Topics specified in Class Schedule.

GLOS 5993. Directed Studies. (; 1-4 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Guided individual reading or study. Open to qualified students for one or more semesters.

GLOS 5994. Directed Research. (1-4 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Qualified students work on a tutorial basis. Prereq instr consent, dept consent, college consent.

Graduate Medical Education (GME)

GME 7910. GME Residency. (6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
This course is for GME Residents only.

GME 7930. GME Fellowship. (6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
This course is for GME Fellows only.

Graduate School (GRAD)

GRAD 5102. Preparation for University Teaching for Nonnative English Speakers. (; 2 cr. ; S-N or Audit; Every Fall & Spring)
Theory/practice of teaching in higher education in the United States. Emphasizes clear oral

classroom communication and development of presentation skills. Students practice in a simulated instructional setting. prereq: English Language Proficiency Rating of 4; Contact cei@umn.edu for permission number.

GRAD 5105. Practicum in University Teaching for Nonnative English Speakers. (; 1-2 cr. ; S-N or Audit; Every Fall & Spring)
Theory, advanced practice in teaching in higher education for nonnative speakers of English. Emphasizes interactive teaching strategies, awareness of cross-cultural classroom issues,oral classroom presentation skills, and legal/policy issues. prereq: 5102 or English Language Proficiency Rating of 2; Contact cei@umn.edu for permission number.

GRAD 8101. Teaching in Higher Education. (; 3 cr. ; Student Option No Audit; Every Fall, Spring & Summer)
Teaching methods/techniques. Active learning, critical thinking, practice teaching, and preparing a portfolio to document/reflect upon teaching. Readings, discussion, peer teaching, e-mail dialog, reflective writing, co-facilitation of course. prereq: Non-Degree Students: contact pffcollege consentumn.edu with questions about registration. If adding a section after first class meeting, contact your instructor as soon as you enroll.

GRAD 8102. Practicum for Future Faculty. (; 3 cr. ; Student Option No Audit; Every Fall & Spring)
Collegial support for teaching, faculty mentorship at regional college or university. Faculty role at various institutions. Classroom observation/feedback, preparation for academic job search. prereq: [8101 or equiv], [native English speaker or [ibTOEFL score of 27-30] or [ELP score of 1 from CTL]]

GRAD 8200. Teaching and Learning Topics in Higher Education. (; 1 cr. [max 4 cr.] ; A-F only; Every Fall & Spring)
Create course materials for context/discipline. Assess student learning. Write action plan. Topics may include active learning in sciences, teaching with technology, multicultural education, teaching in clinical settings, learning-community course design.

GRAD 8400. Interdisciplinary Dissertation Writing Seminar. (; 1-3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Led by graduate faculty. For course description, see sponsoring program(s). prereq: PhD student, instr consent

GRAD 8401. Dissertation Proposal Development Seminar. (3 cr. ; S-N only; Every Fall)
This seminar is the culminating component of intensive work on dissertation proposal development. The program involves a five-day spring workshop, independent summer research, a five-day fall workshop, and opportunities for on-going interactions with the cohort and with faculty instructors. The work is designed to help participants develop cogent and fundable dissertation research proposals. The main goal of the spring workshop is to help clarify students research questions and scope as well as to better prepare them for a productive predissertation summer research experience. The fall workshop is intended to help students build on their spring workshop efforts and summer research experiences to prepare full dissertation research proposals. These proposals are intended to serve as the foundation for department prospectus requirements and for internal and external dissertation research and completion grants. All components of the program are required though registration is only for the fall seminar. Admission will be based on application in the prior year and requires a commitment to participate in all components of the program. A grade of Satisfactory will be based on attendance at and satisfactory performance in all of the spring and fall workshops, demonstrated completion of independent research over the summer, and the submission of a dissertation research proposal as part of the fall workshop. Students must be enrolled in a doctoral degree program, must be pre-ABD (may not have passed the prelim oral exam), and have advisor approval. prereq: PhD student who has not passed prelim oral exams

Grand Challenge Curriculum (GCC)

GCC 5003. Seeking Solutions to Global Health Issues. (GP; 3 cr. ; A-F only; Periodic Fall)
Often, the most progress on challenging issues such as health and equity is made when you apply an interdisciplinary perspective. The same is true for global health issues. Whether responding to emerging pandemics, food insecurity, maternal mortality, or civil society collapse during conflict, solutions often lie at the intersection of animal, environmental, and human health. In this course, students will work in teams to examine the fundamental challenges to addressing complex global health problems in East Africa and East African refugee communities here in the Twin Cities. Together we will seek practical solutions that take culture, equity, and sustainability into account. In-field professionals and experts will be available to mentor each team, including professionals based in Uganda and Somalia. This exploration will help students propose realistic actions that could be taken to resolve these issues. This course will help students gain the understanding and skills necessary for beginning to develop solutions to global health issues. This is a Grand Challenge Curriculum course. GCC courses are open to all students and fulfill an honors experience for University Honors Program students.

GCC 5005. Innovation for Changemakers: Design for a Disrupted World. (GP; 3 cr. ; A-F only; Periodic Fall & Summer)
Do you want to make a difference? We live in a world full of complex challenges, such as COVID-19, racism, economic recession, and environmental collapse, to name a few. Now is the time to use your own skills and passion to make a positive impact in the world. In this project-based course, you will learn how to develop effective and sustainable responses to current social and environmental problems. You'll study a variety of tools, mindsets, and skills that will help you to address any complex grand challenge, as well as engage with case studies of successful grand challenge projects in the past. Your project may address food insecurity, unemployment, housing, environmental impacts, equity, or other issues. Proposed designs for how you might have an impact may take many forms (student group, program intervention with an existing organization, public policy strategy, or for-profit or non-profit venture) but this class will focus on how to make ideas financially sustainable. The primary focus of this (GCC 5005) course is how to develop a pilot project plan that addresses a grand challenge. You will learn business modeling, financial projections, and pitching to potential investors and funders. You will build a model for your idea around input from primary and secondary research, as well as the affected community?s culture, needs, and wants. Community members, locally and globally, may serve as mentors and research consultants to teams. External speakers will be brought in to share their stories of how to build and scale innovative efforts to serve the common good. Students enrolled will work either independently, or in small teams, on a project of their own choosing. Ideally, students will apply to take this class with a project in mind. By the end of the class, students will have a well-designed plan to turn their project into an actionable solution if that is of interest. This is a Grand Challenge Curriculum course. GCC courses are open to all students and fulfill an honors experience for University Honors Program students.

GCC 5007. Toward Conquest of Disease. (ENV; 3 cr. ; A-F only; Every Spring)
Since the rise of civilization, the large predators of humans have been subdued and the most dangerous predators remaining are those unseen--vastly smaller than our bodies. They are the microbial predators that cause disease. Infectious disease has devastated human populations and even caused global population declines. Subduing and managing disease is one of the grand challenges of our time. Through an enormous global effort, we have driven smallpox in humans and Rinderpest in livestock extinct from the natural world, and guinea worm is expected to follow. Other infectious diseases are in continual decline. In this course we will combine ecological thought and ecological models with historical and future perspectives to understand the fundamental dynamics of our miniscule predators, and relate this to similar miniscule predators of wild and domestic animals, to crops, and to other plants. This is a Grand Challenge Curriculum course. prereq: sophomore, junior, senior, graduate student

GCC 5008. Policy and Science of Global Environmental Change. (ENV; 3 cr. ; A-F only; Periodic Spring)
Through readings, lectures, discussions, written assignments, and presentations this course introduces the critical issues underpinning global change and its environmental and social implications. The course examines current literature in exploring evidence for human-induced global change

and its potential effects on a wide range of biological processes and examines the social and economic drivers, social and economic consequences, and political processes at local, national, and international scales related to global change. This is a Grand Challenge Curriculum course.

GCC 5011. Pathways to Renewable Energy. (TS; 3 cr. ; A-F only; Periodic Spring)
This interdisciplinary course will examine obstacles to energy transitions at different scales. It will explore the role of energy in society, the physics of energy, how energy systems were created and how they function, and how the markets, policies, and regulatory frameworks for energy systems in the US developed. The course will closely examine the Realpolitik of energy and the technical, legal, regulatory, and policy underpinnings of renewable energy in the US and Minnesota. Students will learn the drivers that can lead global systems to change despite powerful constraints and how local and institutional action enables broader reform. Students will put their learning into action by developing a proposal and then working on a project to accelerate the energy transition and to ensure that the energy transition benefits people in a just and equitable way. This is a Grand Challenge Curriculum course.

GCC 5013. Making Sense of Climate Change - Science, Art, and Agency. (CIV; 3 cr. ; A-F only; Periodic Fall & Spring)
The overarching theme of the course is the role of artistic/humanistic ways of knowing as tools for making sense and meaning in the face of "grand challenges." Our culture tends to privilege science, and to isolate it from the "purposive" disciplines--arts and humanities--that help humanity ask and answer difficult questions about what should be done about our grand challenges. In this course, we will examine climate change science, with a particular focus on how climate change is expected to affect key ecological systems such as forests and farms and resources for vital biodiversity such as pollinators. We will study the work of artists who have responded to climate change science through their artistic practice to make sense and meaning of climate change. Finally, students create collaborative public art projects that will become part of local community festivals/events late in the semester. This is a Grand Challenge Curriculum course.

GCC 5014. The Future of Work and Life in the 21st Century. (TS; 3 cr. ; A-F only; Periodic Fall)
This course seeks solutions to the technological, demographic, and economic forces that challenge taken-for-granted mindsets and existing policies around work, careers, and life. Students will consider positive and negative impacts of the forces that render the conventional education/work/retirement lockstep obsolete. What do these changes mean for men and women of different ages and backgrounds? What are alternative, sustainable ways of working and living in the 21st century? These questions reflect global challenges that touch the lives of people everywhere. Students will work in teams to begin to address these realities and formulate innovative solutions to better transform learning, working, caring, and community-building in the 21st century. This is a Grand Challenge Curriculum course.

GCC 5016. Science and Society: Working Together to Avoid the Antibiotic Resistance Apocalypse. (TS; 3 cr. ; A-F only; Periodic Spring)
Before the discovery of antibiotics, even a simple thorn prick could lead to life threatening infection. Antibiotics are truly miracle drugs, making most bacterial infections relatively easy to cure. However, this landscape is rapidly changing with the advent of microbes that are resistant to antibiotics. This course will provide an overview of how antibiotic use invoked antibiotic resistance, including in depth discussions of antibiotic resistant microorganisms and the impact of globalization on this exploding problem. Societal and ethical implications associated with antibiotic use and restriction in humans and animals will be discussed, along with global issues of antibiotic regulation and population surveillance.
The class will conclude with discussions of alternative therapeutic approaches that are essential to avoid "antibiotic apocalypse."
The course will include lectures by world-renowned experts in various topics, and students will leverage this knowledge with their own presentations on important topics related to issues of personal freedom versus societal needs. This is a Grand Challenge Curriculum course.

GCC 5017. World Food Problems: Agronomics, Economics and Hunger. (GP; 3 cr. ; A-F only; Periodic Fall)
This course provides a multi-disciplinary look at problems (and some of the possible solutions) affecting food production, distribution, and requirements for the seven plus billion inhabitants of this planet. It is co-taught by a plant geneticist (Morrell) and an economist (Runge) who together have worked on international food production and policy issues for the past 40 years. Historical context, the present situation and future scenarios related to the human population and food production are examined. Presentations and discussions cover sometimes conflicting views from multiple perspectives on population growth, use of technology, as well as the ethical and cultural values of people in various parts of the world. The global challenge perspective is reflected in attention to issues of poverty, inequality, gender, the legacy of colonialism, and racial and ethnic prejudice. Emphasis is placed on the need for governments, international assistance agencies, international research and extension centers, as well as the private sector to assist in solving the complex problems associated with malnutrition, undernutrition, obesity, and sustainable food production. Through a better understanding of world food problems, this course enables students to reflect on the shared sense of responsibility by nations, the international community and ourselves to build and maintain a stronger sense of our roles as historical agents. Throughout the semester students are exposed to issues related to world food problems through the lenses of two instructors from different disciplinary backgrounds.
The core issues of malnutrition and food production are approached simultaneously from a production perspective as well as an economic and policy perspective throughout the semester. This is a Grand Challenge Curriculum course. GCC courses are open to all students and fulfill an honors experience for University Honors Program students.

GCC 5022. The Human Experience of Sensory Loss: Seeking Equitable and Effective Solutions. (TS; 3 cr. ; A-F only; Periodic Fall & Spring)
This course focuses on the visual, auditory, and other sensory pathways that convey information about the world to mind and brain. Millions of people worldwide experience deficits in sensory function that affect their quality of life. We will focus on the characteristics of healthy sensory functioning as well as how sensory disorders can affect personal identity, impede information processing, and alter brain structure and function. The course will address the demographics and risk factors for sensory disabilities, the implications of these disabilities for activities of daily living, the history of society's response to sensory disability, as well as societal, ethical, and personal attitudes toward sensory disabilities. The course will also explore translational and applied approaches for addressing sensory disabilities. Each class session will be co-taught by a pair of instructors, representing multiple scientific and social perspectives. A major goal of the course is to view sensory function and impairment from multiple perspectives cognitive science, neuroscience, medicine, engineering, society, consumers, ethics and social justice. The course will combine lectures, discussions, and student-led presentations of research papers. The course will include hands-on demonstrations of assistive technology and panel discussions with people with visual and hearing disabilities. During the semester, each student (or pairs of students) will develop a mini research proposal to address a real-world issue related to sensory impairment. The proposal must be translational in nature, and must include consultation with consumers of the proposed project. The final class session will be devoted to poster presentations of the mini proposals. The proposal report must include consideration of potentially opposing viewpoints about the proposed research.
This course addresses two of our University's grand challenges: Advancing Health Through Tailored Solutions, and Just and Equitable Communities. This is a Grand Challenge Curriculum course.

GCC 5027. Power Systems Journey: Making the Invisible Visible and Actionable. (TS; 3 cr. ; A-F only; Periodic Fall)
An energy revolution is underway, and needs to accelerate to support climate and economic goals. But the general citizenry does not understand our current energy systems, particularly the seemingly invisible

phenomena of electricity, and its generation, distribution, and use. Technical knowledge is only half the solution, however. It is through human decisions and behaviors that technical solutions get applied and adopted, and the importance of communication and storytelling is being recognized for its relevance to making change. How can science literacy and behavior-motivating engagement and storytelling be combined to help make systemic change? This course explores the integration of science-based environmental education, with art-led, place-based exploration of landscapes and creative map-making to address this challenge. How do we make electricity visible, understandable, and interesting--so we can engage citizens in energy conservation with basic literacy about the electric power system so that they can be informed voters, policy advocates, and consumers. In this class, you will take on this challenge, first learning about the electric power systems you use, their cultural and technical history, systems thinking, design thinking, and prior examples of communication and education efforts. With this foundation, you will then apply your learning to create a public education project delivered via online GIS Story maps that use a combination of data, art, and story to help others understand, and act on the power journey we are all on. All will share the common exploration of power systems through field trips, and contribute to a multi-faceted story of power, presented in a group map and individual GIS Story maps. No prior knowledge of GIS story maps or electricity issues is needed. The study of power systems can be a model for learning and communicating about other topics that explore the interaction of technology and society toward sustainability. This is a Grand Challenge Curriculum course. GCC courses are open to all students and fulfill an honors experience for University Honors Program students.

GCC 5028. Harnessing the Power of Research, Community, Clinic and Policy to Build a Culture of Health. (DSJ; 3 cr. ; A-F only; Periodic Fall)
Imagine a world where factors such as race, ethnicity, and socioeconomic status had no bearing on a person's health status, quality of life, or longevity--a world where everyone had an equal opportunity to live a long and healthy life. Unfortunately, this is not the case. Despite decades of focused public health efforts, health inequities remain; individuals from low income and diverse racial/ethnic backgrounds are far more likely to, (1) struggle with chronic health conditions, (2) report lower quality of life, and (3) have a lower life expectancy, than others. Bold and innovative solutions are needed to address this grand challenge. Integration is one such method that can potentially increase the success and sustainability of approaches to reduce health disparities and create a culture of health for all. Integration is an approach to solving complex public health problems that merges academic research, clinical practice, policy and community resources in new ways. This interactive course will challenge students to identify root causes of health, including access to food, housing, transportation and education. Students will also focus on health disparities and barriers to eliminating these existing, disparate, negative outcomes. Students will be introduced to the concept of integration science and practice; will learn about the importance of integration across research, practice, community, and policy domains to address health disparities; and will cultivate the communication skills needed to intentionally and successfully facilitate integration practice. Course instructors with unique vantage points as concerned scientists, health practitioners, and policy wonks will engage students in class discussions and activities, individual writing assignments and small-group work aimed at unveiling the reasons health disparities persist globally--challenging them to consider opportunities for integration to alleviate existing disparities. The semester will culminate in students working in groups to create their own integrated projects aimed at addressing a health disparity.

GCC 5029. Agents of Change: scientific and philosophical perspectives. (CIV; 3 cr. ; A-F only; Every Fall)
Grand challenges like structural racism, climate change, gender oppression, and global poverty have to be solved by individual people, acting together, often through institutions. This means that we need good agents of change to address the challenges we face. What does it mean to be a ?good agent?? What are the best ways to think about this kind of agency? And how can we foster more of it in ourselves, our friends, our children, and our fellow citizens? This course is taught by a philosopher and a psychologist, and we approach questions like these from both perspectives. Traditionally, many philosophers have thought that we need to cultivate virtues such as compassion and open-mindedness in order to be good people. Some recent psychological work casts doubt on this picture: the social and environmental forces that influence our behavior cannot be overcome with virtuous character! On the other hand, psychological research also shows that some of the good traits we have are ones that develop reliably, from early childhood. Which perspective offers more opportunities for progress? Should we foster good agency by working on individual character or by changing social circumstances? Or, if both are important, what would a combined approach look like? The ultimate goal of the course is to encourage students to apply the theoretical and scientific ideas about improving agency to specific grand challenges. How do philosophy and psychology help us to define and resolve the challenges that confront people who want to make a difference? To provide a model for this kind of research, we focus on structural racism and white supremacy to expose the ways in which individual and structural forces can impede epistemic and moral agency. Course requirements include active class participation, group projects, and writing assignments designed to foster creative engagement across different fields.

GCC 5031. The Global Climate Challenge: Creating an Empowered Movement for Change. (CIV; 3 cr. ; A-F only; Periodic Spring)
Students will explore ecological and human health consequences of climate change, the psychology of climate inaction, and will be invited to join us in the radical work of discovering not only their own leadership potential but that of others. We will unpack the old story of domination and hierarchy and invite the class to become part of a vibrant new story of human partnership that will not only help humanity deal with the physical threat of climate change but will help us create a world where we have the necessary skills and attitudes to engage the many other grand challenges facing us. Using a strategy of grassroots empowerment, the course will be organized to help us connect to the heart of what we really value; to understand the threat of climate change; to examine how we feel in the light of that threat; and to take powerful action together. Students will work in groups throughout the course to assess the global ecological threat posed by climate change, and they will be part of designing and executing an activity where they empower a community to take action. This is a Grand Challenge Curriculum course. For: so, jr, sr, grad

GCC 5032. Ecosystem Health: Leadership at the intersection of humans, animals and the environment. (ENV; 3 cr. ; A-F only; Periodic Spring)
What are the effects of climate change, disease emergence, food and water security, gender, conflict and poverty, and sustainability of ecosystem services on health? Unfortunately, these large-scale problems often become overwhelming, making single solution-based progress seem daunting and difficult to implement in policy. Fortunately, the emerging discipline of ecosystem health provides an approach to these problems grounded in trans-disciplinary science. Ecosystem health recognizes the interdependence of human, animal and environmental health, and merges theories and methods of ecological, health and political sciences. It poses that health threats can be prevented, monitored and controlled via a variety of approaches and technologies that guide management action as well as policy. Thus, balancing human and animal health with management of our ecosystems. In this class, we will focus on the emerging discipline of ecosystem health, and how these theories, methods and computational technologies set the stage for solutions to grand challenges of health at the interface of humans, animals and the environment. We will focus not only on the creation and evaluation of solutions, but on their feasibility and implementation in the real world through policy and real time decision making. This will be taught in the active learning style classroom, requiring pre class readings to support didactic theory and case-based learning in class. Participation and both individual and group projects (written and oral presentation) will comprise most of the student evaluation. These projects may reflect innovative solutions, discoveries about unknowns, or development of methods useful for ecosystem health challenges. We envision that some of them will lead to peer-review

publications, technical reports or other forms of publication. This is a Grand Challenge Curriculum course.

GCC 5035. Child Labor: Work, Education, and Human Rights in Global Historical Perspective. (GP; 3 cr. ; A-F only; Periodic Spring)
It seems obvious that we should oppose child labor. Or should we? This course challenges students to think critically about the many angles that need to be considered in deciding whether any particular type of children's work should be opposed or permitted. Drawing on contemporary and historical scholarship in the interdisciplinary arena of childhood and youth studies, this course takes on ethical as well as economic analyses; it reflects upon child development and legal perspectives; it examines cases ranging across the globe and across recent centuries. It may very well change the way you think about kids, forever. Historians find evidence of many different kinds of "childhoods," as well as changing notions of what work is appropriate for children. Coming from social-scientific and policy studies approaches, analysts and critics of contemporary global policies affecting child labor argue that the presumed superiority of "modern Western childhood" needs rethinking. This course will also look at tensions between the presumption that schooling should be the only or primary occupation of childhood years and competing ideas child labor can be valuable and justifiable in many settings including, for example, American farm families. Looking at child labor from comparative global and historical perspectives will encourage and enable students to address some important questions: What types of ?work? have children done in various modern historical and contemporary settings? When and how is work arguably bad, or good, for children and their families? Under what conditions is schooling better than work, or vice-versa? Who gets to decide what's best for children? How should governments intervene, and how does intervention differ when children work for their family as opposed to other employers? What forms of regulatory measures or political activism have changed policies and practices regarding child labor in the past and present? This is a Grand Challenge Curriculum course.

GCC 5036. Seeking Connection through Decolonization: The Power of Indigenous Lands and Languages. (DSJ; 3 cr. ; A-F only; Periodic Fall & Spring)
Seeking Connection through Decolonization: The Power of Indigenous Languages and Place-Based Knowledge in the Face of Racism How has unequal distribution of power resulted in the decline in Indigenous language and the loss of societal connections to the land? How might we all, from different positionalities, revitalize our relationships to indigenous land and languages, in the face of racism and attempts to perpetuate colonization? In this course students will grapple with ideological roots of the ongoing decline in Indigenous language and place-based knowledge and how their decline has implications for all peoples. To understand the connections, students will participate in Indigenous language learning (Dakota and Ojibwe) as acts of cultural production. Discussion and reading will be supplemented with visits to local sites, for example, Medicine Gardens, Bell Museum, Gibbs Farm, and Bdote to directly interact with the land as pedagogy. Through the course themes, students will experience the interconnectedness of place-based knowledge, language, and human identity, while also seeing the importance of understanding the lands on which one resides and the power of indigenous languages in re-imagining those relationships. This is a Grand Challenge Curriculum (GCC) course. GCC courses are open to all students and fulfill an honors experience for University Honors Program students.

GCC 5041. Transition to a Sustainable World: Can Psychology Help Facilitate Global Sustainability?. (ENV; 3 cr. ; A-F only; Periodic Fall)
Despite understanding the consequences of not acting to curb unsustainability, why do people fail to act? Human?s behavioral apathy toward sustainability may be due to an inaccurate characterization of sustainability and/or a lack of understanding of cultural diversity and behavior. Therefore, an understanding of the human behavior will contribute greatly to (i) decipher human actions that negatively impact global ecosystems, (ii) slowdown or stop human ecologically destructive trajectory, and (iii) promote sustainable alternatives. The problem is that environmental issues are not generally included in psychology programs, and psychology is not often represented in environmental programs. In the United Nation?s (UN) Sustainable Development goals 2030 (UN SDG 2030), psychological indices have been conspicuously absent (except for mental health in general terms) even though environmental degradation, social or economic inequity, all are implicated by human behavior. The UN SDG 2030 is based on the unproven concept that sustainability is an intersection of social, economic and environmental factors, the key pillars of sustainability. Since economic activity and society are subsets of human behavior, psychology should be considered central to unsustainability and/or sustainability. Therefore, we hypothesize that behavioral psychology has a critical role to play in creating a sustainable society. The aim of the proposed GCC is to discuss (un)sustainability using this new paradigm that will allow new approaches to achieve transition from unsustainability to sustainability worldwide. The specific aims of the proposed GCC are following: (i) Describe interaction between sustainability and behavioral psychology as the 4th pillar of sustainability. (ii) Explain the behavioral correlates of cultural differences in terms of transition to sustainability. (iii) Explain the consumption (related to unsustainability) and conservation (related to sustainability) behavior. (iv) Determine the place of Psychology in the UN?s Sustainable Development Goals (SDGs) that are mostly based on Sociology, Economy and Environment. (v) Describe humanity?s transition from unsustainable to sustainable development. This is a Grand Challenge Curriculum Course. GCC courses are open to all students and fulfill an honors experience for University Honors Program students.

GCC 5042. Just Education: The Role of Higher Education in Disrupting Mass Incarceration. (DSJ; 3 cr. ; A-F only; Periodic Spring)
The United States has the highest incarceration rate in the world. We have just 5% of the world?s population, but 25% of its prisoners. Since 1970, the number of incarcerated persons in this country has increased by 700%. Of the 2.3 million people currently in prison or jail, however, just 6 percent have access to higher education. Indeed, contemporary higher education policy and infrastructure disregards incarcerated individuals as potential postsecondary students. Even as colleges and universities across the country champion diversity-driven and inclusivity-oriented mission statements, and look to create viable postsecondary pathways for systemically underserved students, only a handful include incarcerated and justice-impacted individuals in these efforts. The University of Minnesota is not currently among them. This course will explore the intersection of higher education and mass incarceration in the United States with a focus on the role of higher education in disrupting the collateral consequences of incarceration and justice involvement. In particular, we will examine the potential for the University of Minnesota to play a pivotal role in disrupting what we call the ?ripple effect? of incarceration and justice involvement on individuals and communities in Minnesota. Students will have an opportunity to tour local correctional facilities and both hear from and present to experts in the field, including formerly incarcerated people. In addition, students? ideas will directly inform a ?college in prisons? program that is being developed by Professors Moriearty and Shlafer, in collaboration with other University scholars and administrators, and the Minnesota Department of Corrections. In this way, students? work in this class and their projects will directly and meaningfully inform the real world and the development of the college in prisons program in ?real time.? As a teaching team with expertise in law, juvenile justice, criminal justice, child welfare, psychology, and public health, Professors Moriearty and Shlafer will highlight examples of successful interdisciplinary collaborations from their own research and practice experience. In addition, students will hear from guest lecturers from multiple disciplines and affiliations (including an Assistant Commissioner and educational expert at the Minnesota Department of Corrections and law, public heath, arts, information technology and sociology instructors from the University) and panels of stakeholders, policy-makers and formerly incarcerated/justice impacted individuals. This is a Grand Challenge Curriculum course.

GCC 5043. Regenerative Game Studio: Playing For the Future. (ENV; 3 cr. ; A-F only; Periodic Spring)

Meeting the interrelated UN Sustainable development goals facing humanity will require imagination and emotional labor of unprecedented scale. We must collectively learn to overhaul our extractive systems with regenerative approaches in which humans are in a mutually beneficial relationship with the earth?s systems. The task of working across SDGs is a grand challenge in itself. Games are an effective way to engage people in understanding complex problems and collaborating toward solutions. Designing games challenges students to examine systems, identify leverage points, confront trade-offs, and be creative. In doing so, it prepares them to become system teachers, leveraging organizations and networks for change. We invite students from a range of backgrounds to apply their disciplinary expertise and interests in new ways. No prior sustainability knowledge or game design experience is needed. This is a Grand Challenge Curriculum course.

GCC 5501. Knowledge to Impact: Creating Action with Your Grand Challenge Project Idea. (; 2 cr. [max 3 cr.] ; A-F only; Periodic Spring)
This course provides an intensive, hands-on experience designing and developing a sustainable intervention to an aspect of a Grand Challenge. In other words, converting knowledge to impact. The target audience is students and student teams who have identified and/or worked on a specific problem in a previous GCC course and wish to dig deeper in developing a project plan. Students should enter the class with a problem statement identifying the challenge they aim to address, a target location or community, and a proposed solution or intervention that they wish to develop. Student solutions should address a problem that is about a broadly defined Grand Challenge; examples of applicable areas include water, immigration and refugees, energy, housing, educational opportunity gap, public health, food and sustainable agriculture. Ideas outside this range are also acceptable. By the end of class, students will create a plausible design and implementation plan for a solution that addresses their self-created Grand Challenge problem statement. This solution or intervention could take many forms, depending on student interest and problem statement. Business or nonprofit plans, policy and advocacy plans, media and awareness campaigns and activism plans are all possible. Determining the correct path(s) is part of the learning objectives for the course. Students will leave the course with a completed preliminary pitch deck for their plan in order to make the case for initial, or seed stage, support. Throughout this document (and course), the terms solution and intervention will be used somewhat interchangeably. This reflects the fact that different disciplines use different words to describe similar aspects of the overall process covered in this class. Understanding some of those differences is part of the learning objectives for the class. This is a Grand Challenge Curriculum course. GCC courses are open to second year undergraduate students and above and graduate students and fulfill an honors experience for University Honors Program students.

Graphic Design (GDES)

GDES 5193. Directed Study in Graphic Design. (; 1-4 cr. [max 8 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Independent study in graphic design under tutorial guidance. prereq: Jr or sr or grad student

GDES 5311. Illustration. (3 cr. ; A-F only; Every Spring)
Image making by hand or digitally for use in design projects. Design development. Mapping out ideas/expressing thoughts visually. Not observational drawing course. prereq: 1311 or ArtS 1101 or PDes 3702 or LA 1301 or Arch 3250 or Arch 2301 or instr consent

GDES 5341. Interaction Design. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Design of interactive multimedia projects. Interactive presentations and electronic publishing. Software includes hypermedia, scripting, digital output. prereq: [[2334 or 2342], design minor] or graphic design major or grad student or instr consent

GDES 5342. Advanced Web Design. (3 cr. ; A-F or Audit; Every Spring)
Internet-based design. Static web pages, embedded media, cascading style sheets. Design and usability of interface between humans and technology. Evaluation of visual elements that control and organize dealings with computers to direct work. Students develop designs, do usability testing. prereq: [[2334 or 2342], design minor] or graphic design major or grad student or instr consent

GDES 5371. Data & Information Visualization. (3 cr. ; A-F only; Every Spring)
Visual articulation of data. Expansive research, meticulous gathering of data, analysis. Develop cohesive graphical narratives/build solid foundation in craft of presenting data.

GDES 5383. Digital Illustration and Animation. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Advanced computer design. Integration of design knowledge with Macintosh computer applications. Students use software to create digital illustration and animations. Adobe Illustrator, After Effects, Flash. prereq: [[2334 or 2342], design minor], [graphic design major or [grad student, experience with computer illustration]]] or instr consent

GDES 5386. Fundamentals of Game Design. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Games of all kinds. Theoretical/practical aspects of making games. Investigation of design process. Rules, strategies, methodologies. Interactivity, choice, action, outcome, rules in game design. Social interaction, story telling, meaning/ideology, semiotics. Signs, cultural meaning. prereq: [[2334 or 2342], design minor] or [[4384 or DHA 4384 or 5341 or DHA 5341], [graphic design major or sr or grad student]] or instr consent

GDES 5388. Graphic Design Research. (; 3 cr. ; A-F or Audit; Periodic Spring)
Experience in Graphic Design research strategies and methods. Applied, theoretical, and human-centered aspects directed at project development. Design prototyping, testing, analysis. prereq: Graphic design major or grad student or instr consent

GDES 8170. Topics in Graphic Design. (; 1-3 cr. [max 6 cr.] ; A-F or Audit; Every Fall & Spring)
In-depth investigation of topic, announced in advance.

GDES 8180. Professional Seminar. (; 1-2 cr. [max 4 cr.] ; A-F or Audit; Every Fall & Spring)
Professional development issues/trends.

GDES 8192. Readings in Graphic Design. (; 1-3 cr. [max 8 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Independent study, review of books/periodicals under tutorial guidance. prereq: instr consent

GDES 8193. Directed Study. (; 1-3 cr. [max 8 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Directed study in graphic design. prereq: instr consent

GDES 8222. Plan B Master's Project. (; 3 cr. ; S-N or Audit; Every Fall & Spring)
Plan B master's project. prereq: [Design or DHA master's student], instr consent

GDES 8361. Color, Design, and Human Perception. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Perceptual and psychological aspects of color and design. Human factors of color variables and design strategies that can enhance human experience of, and interaction with, color. prereq: Basic color theory course or instr consent

GDES 8362. The Nature of Representation in Visual Communication. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Theories of representation and studio production (digital, non-digital) centered around representation in culture.

GDES 8990. MFA Creative Thesis. (; 6 cr. [max 12 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
MFA project. prereq: Completed coursework requirements for MFA in DHA w/multimedia emphasis, instr consent

Greek (GRK)

GRK 5003. Intermediate Greek Prose for Graduate Student Research. (; 4 cr. ; Student Option; Every Fall)
Introduction to Athenian prose authors of 5th/4th centuries BCE. Readings of continuous passages of unadapted Greek texts (history, speeches). Review of grammar/vocabulary. Some discussion of major themes/issues in Greek culture as illustrated by texts. prereq: Grade of at least [C- or S] in [1002 or 5001] or [instr consent, grad student]

GRK 5004. Intermediate Greek Poetry for Graduate Student Research. (; 4 cr. ; Student Option; Every Spring)
Introduction to Greek epic poetry. Readings of selections from Homer's Iliad and Odyssey.

Quantitative meter and poetic devices. Discussion of major themes and issues as developed in Homer's poetry. prereq: dept consent

GRK 5100. Advanced Reading. (; 3 cr. [max 18 cr.] ; Student Option; Every Fall & Spring)
Reading in Greek texts/authors. Texts/authors vary. prereq: [GRK 3004 or equiv], at least two yrs of college level Greek. Must contact Classical and Near Eastern Studies department for permission to register.

GRK 5200. Advanced Readings in Greek Prose. (; 3 cr. [max 6 cr.] ; Student Option; Fall Even Year)
The primary material for this course will be a selection of readings from three or more different Greek prose authors connected by genre (e.g. historical writing, philosophy, oratory, novel), theme (e.g. medicine, Athenian politics of the 5 th /4 th centuries, religious innovation), period (e.g. classical period, Second Sophistic), or the like. Primary readings and critical approach will vary from year to year, making the course repeatable. Some modern secondary reading will be assigned to provide a basis for discussion and a model for student written work. prereq: [GRK 3004 or equiv], at least two yrs of college level Greek. Contact the Classical & Near Eastern Religions & Cultures Department (CNRC) with any questions.

GRK 5701. Prose Composition. (; 3 cr. ; Student Option; Spring Odd Year)
Moving step by step through Ancient Greek grammar, starting with simple sentences and progressing to complex ones. Course ends with students translating short passages of modern English prose into Greek. prereq: Grad student or instr consent

GRK 5705. Introduction to the Historical-Comparative Grammar of Greek and Latin. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Historical/comparative grammar of Greek and Latin from their Proto-Indo-European origins to classical norms.

GRK 5993. Directed Studies. (1-4 cr. [max 18 cr.] ; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. Prereq Grad student or instr consent.

GRK 5994. Directed Research. (1-12 cr. [max 18 cr.] ; Student Option; Every Fall & Spring)
Supervised original research on topic chosen by student. Prereq Grad student or instr consent.

GRK 5996. Directed Instruction. (1-12 cr. [max 20 cr.] ; Student Option; Every Fall & Spring)
Supervised teaching internship. Prereq Grad student or instr consent.

GRK 8100. Readings in Greek Prose. (; 3 cr. [max 18 cr.] ; Student Option; Every Fall & Spring)
Reading and discussion of ancient Greek prose texts. prereq: Advanced grad student

GRK 8120. Greek Text Course. (; 3 cr. [max 15 cr.] ; Student Option; Every Fall & Spring)
Students attend 3xxx Greek courses. Supplementary work at discretion of instructor. prereq: 3111 or dept consent; not for students in dept of Classical and Near East Studies

GRK 8200. Readings in Greek Verse. (; 3 cr. [max 18 cr.] ; Student Option; Every Fall & Spring)
Reading/discussion of ancient Greek poetic texts. prereq: Advanced grad student

GRK 8262. Survey of Greek Literature I. (; 3 cr. ; Student Option;)
Extensive selections from all genres of Greek literature of archaic and early classical periods.

GRK 8263. Survey of Greek Literature II. (; 3 cr. ; Student Option;)
Extensive selections from Greek authors of the classical and Hellenistic eras.

GRK 8300. Readings in Greek Texts. (; 3 cr. [max 18 cr.] ; Student Option; Every Fall & Spring)
Reading/discussion of literary or documentary texts from Greek antiquity. Topics may include subjects that draw on various of sources, genres, or methods. prereq: Advanced grad student

GRK 8400. Readings in Patristic Greek. (; 3 cr. [max 6 cr.] ; Student Option; Fall Odd Year)
Reading/discussion of early Christian texts in Greek. prereq: Advanced grad student

GRK 8910. Seminar. (; 3 cr. [max 30 cr.] ; Student Option; Periodic Fall & Spring)
Various topics in Greek literature examined in depth with emphasis on current scholarship and original student research.

Health Informatics (HINF)

HINF 5115. Interprofessional Healthcare Informatics. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Implications of informatics for practice, including nursing, public health, and healthcare in general. Electronic health record issues. Relates ethical, legislative and political issues informatics. Global and future informatics issues. prereq: Grad student or professional student or instr consent

HINF 5394. Directed Research. (; 1-6 cr. [max 18 cr.] ; Student Option No Audit; Periodic Fall, Spring & Summer)
Directed research arranged with faculty member.

HINF 5430. Foundations of Health Informatics I. (; 3 cr. ; Student Option; Every Fall & Spring)
An introductory survey of health informatics, focusing on foundational concepts. Topics covered include: conceptualizations of data, information, and knowledge; current terminologies, coding, and classification systems for medical information; ethics, privacy, and security; systems analysis, process and data modeling; human-computer interaction and data visualization. Lectures, readings, and exercises highlight the intersections of these topics with electronic health record systems and other health information technology. prereq: Junior, senior, grad student, professional student, or instr consent

HINF 5431. Foundations of Health Informatics II. (; 3 cr. ; Student Option; Every Spring)
An introductory survey of health informatics, focusing on applications of informatics concepts and technologies. Topics covered include: health informatics research, literature, and evaluation; precision medicine; decision models; computerized decision support systems; data mining, natural language processing, social media, rule-based system, and other emerging technologies for supporting 'Big Data' applications; security for health care information handling. Lectures, readings, and exercises highlight the intersections of these topics with current information technology for clinical care and research. prereq: Junior, senior, grad student, professional student, or instr consent

HINF 5436. AHC Informatics Grand Rounds. (; 1 cr. [max 10 cr.] ; A-F or Audit; Every Fall)
Presentation/discussion of research problems, current literature/topics of interest in Health Informatics.

HINF 5440. Foundations of Translational Bioinformatics. (3 cr. ; A-F or Audit; Every Spring)
Translational bioinformatics deals with the assaying, computational analysis and knowledge-based interpretation of complex molecular data to better understand, prevent, diagnose and treat disease. This course emphasizes deep DNA sequencing methods that have persistent impact on research related to disease diagnosis and treatment. The course covers sequence analysis, applications to genome sequences, and sequence-function analysis, analysis of modern genomic data, sequence analysis for gene expression/functional genomics analysis, and gene mapping/applied population genetics. Prerequisites: MS, PhD, or MD/PhD student interested in translational bioinformatics

HINF 5450. Foundations of Precision Medicine Informatics. (3 cr. ; Student Option; Periodic Fall)
The course will provide an introduction into the fundamental concepts of Precision Medicine with a focus on informatics-focused applications for clinical data representation, acquisition, decision making and outcomes evaluation. The student will gain an appreciation of fundamental biomedical data representation and its application to genomic, clinical, and population problems.

HINF 5494. Topics in Health Informatics. (; 1-3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Topics in health informatics. prereq: Professional student or grad student or instr consent

HINF 5496. Internship in Health Informatics. (1-6 cr. [max 18 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Practical industrial experience not directly related to student's normal academic

experience. prereq: HINF student or instr consent

HINF 5499. Capstone Project for the Masters of Health Informatics. (3 cr. ; S-N only; Every Fall, Spring & Summer)
Final opportunity to apply newly acquired knowledge/skills to project involving practical problem in health informatics. Submit written project report in lieu of final examination. prereq: second semester MHI student or instr consent

HINF 5501. US Health Care System: Information Challenges in Clinical Care. (; 1 cr. ; S-N or Audit; Every Fall & Spring)
Health care system/its unique interaction between key health system stakeholders. Relationship between patients, providers, payers, regulatory bodies. Role of information management/challenges of information standardization/exchange. prereq: Junior or senior or professional student or grad student or instr consent

HINF 5502. Python Programming Essentials for the Health Sciences. (; 1 cr. ; S-N or Audit; Every Fall & Spring)
Computer programming essentials for health sciences/health care applications using Python 3. Intended for students with limited programming background, or students wishing to obtain proficiency in Python programming language. prereq: Junior or senior or grad student or professional student or instr consent

HINF 5510. Applied Health Care Databases: Database Principles and Data Evaluation. (; 3 cr. ; A-F or Audit; Every Fall)
Principles of database theory, modeling, design, and manipulation of databases will be introduced, taught with a healthcare applications emphasis. Students will gain experience using a relational database management system (RDBMS), and database manipulation will be explored using Structured Query Language (SQL) to compose and execute queries. Students will be able to critically evaluate database query methods and results, and understand their implications for health care. prereq: Junior or senior or grad student or professional student or instr consent

HINF 5520. Informatics Methods for Health Care Quality, Outcomes, and Patient Safety. (; 2 cr. ; Student Option; Every Spring)
Application/operation of clinical information systems, electronic health records, decision support/application in health care system. Use of clinical information systems/association with health care delivery, payment, quality, outcomes. prereq: Junior or senior or grad student or professional student or instr consent

HINF 5530. Health Care Software Management. (; 2 cr. ; A-F or Audit; Every Spring)
Health care software and unique interaction between key stakeholders in health care software development and implementation. Systems analysis, software development, and software life cycle management for health care applications. prereq: HINF student or instr consent

HINF 5531. Health Data Analytics and Data Science. (; 3 cr. ; A-F or Audit; Every Spring)
Data science methods and techniques for the extraction, preparation, and use of health data in decision making. prereq: Junior or senior or professional student or grad student or instr consent

HINF 5540. Interprofessional Health Informatics. (; 2 cr. ; A-F only; Every Spring)
Informatics applications in various healthcare professions. Clinical specialties. Informatics tools to improve healthcare services/outcomes through lectures/presentations.

HINF 5610. Foundations of Biomedical Natural Language Processing. (3 cr. ; Student Option; Periodic Fall)
The course will provide a systematic introduction to basic knowledge and methods used in natural language processing (NLP) research. It will introduce biomedical NLP tasks and methods as well as their resources and applications in the biomedical domain. The course will also provide hands-on experience with existing NLP tools and systems. Students will gain basic knowledge and skills in handling with main biomedical NLP tasks. Prerequisites graduate student or instructor consent; Experience with at least one programming language (Python or Perl preferred) Recommended: basic understanding of data mining concepts, basic knowledge of computational linguistics

HINF 5620. Data Visualization for the Health Sciences. (3 cr. ; A-F or Audit; Periodic Spring)
An advanced health informatics course, focusing on theoretical and practical aspects of data and information visualization for health care and the health sciences. Topics include classic and novel visualization types; models of human visual perception and cognition; color, text and typography; maps and diagrams; evaluation and testing; and the aesthetic and cultural aspects of visualization. Examples emphasize health sciences applications for clinicians, patients, researchers, and analysts. Modern programming and commercial tools are discussed, including D3, ggplot2, and Tableau. Students will report on and discuss visualization methods, published studies and books, culminating in a final visualization project of the student's choosing.

HINF 5630. Clinical Data Mining. (3 cr. ; Student Option No Audit; Periodic Fall)
This is a hands-on introductory data mining course specifically focusing on health care applications. Analogously to the relationship between biostatistics and statistics, the data and computational challenges, the experiment design and the model performance requirements towards data mining in the clinical domain differ from those in general applications. This course aims to teach the students the most common data mining techniques and elaborate on the differences between general and clinical data mining. Specifically, the course will focus on (i) clinical data challenges and preprocessing; (ii) survey of the most common techniques in the clinical domain; (iii) clinical application touching up on experimental design and collaborations with physicians. The class will meet twice a week, one day dedicated to lectures and one day to a hands-on lab component, where students are expected to apply the techniques to health-related data. Some of the models will be evaluated with the involvement of a physician collaborator. Prerequisites: Basic linear algebra (matrix notation), basic optimization (gradient descent) Graduate level introductory statistics (e.g. STAT 5101-5102) or equivalent or instructor consent

HINF 5640. Advanced Translational Bioinformatics Methods. (3 cr. ; A-F or Audit; Every Fall)
This course is designed to introduce the high throughput platforms to students who are interested in the genomics research and genomics data analysis in the basic and clinical medical science field. The course covers history of the genomics platforms, its revolution and the specifics of the data generated by all existing different platforms. The course will also introduce all existing sequencing platforms and applications to biological science, as well the current trends in this field.

HINF 5650. Integrative Genomics and Computational Methods. (3 cr. ; A-F or Audit; Periodic Spring)
Genome-scale high throughput data sets are a central feature of modern biological research and translational clinical study. Experimental, computational biologists and clinical researchers who want to get the most from their data sets need to have a firm grasp and understanding of genomic data structure characteristics, analytical methodology and the intrinsic connection to integrate. This course is designed to build competence in quantitative methods for the analysis of high-throughput genomic data and data integration.

HINF 5660. Applied Causal Discovery. (; 3 cr. ; Student Option; Every Spring)
Which genes cause cancer? Does cholesterol cause heart attacks? Computational causal discovery (especially from observational data) is a recently developed and developing field at the intersection of statistics and machine learning, with numerous and important untapped applications in scientific and medical research. This course provides a foundation for students to go on to apply causal discovery methods to their own data sets. The focus of this course is on developing the students? ability to identify when and why to use computational causal discovery methods, how to determine what methods are appropriate to use in a given context, and how to interpret and report the results. Students in this course will gain hands-on experience applying causal discovery algorithms, develop an understanding of the computational challenges one faces when using causal discovery algorithms, and learn the best practices for using causal discovery algorithms.

HINF 8220. Computational Causal Analytics. (3 cr. ; A-F or Audit; Every Spring)
Identifying causal relationships and mechanisms is the ultimate goal of natural

sciences. This course will introduce concepts and techniques underlying computational causal discovery and causal inference utilizing both observational and experimental data. Example applications of the above mentioned techniques in the domain of health sciences include reconstructing the molecular pathways underlying a particular disease, identifying the complex and interacting factors influencing a mental health disorder, and evaluating the potential impact of a public health policy. The course emphasizes both on the theoretical foundations and the practical aspects of causal discovery and causal inference. Students will gain hands-on experience with applying major causal discovery algorithms on simulated and real data.

HINF 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

HINF 8405. Advanced Topics in Health Informatics I. (; 1-4 cr. [max 12 cr.] ; Student Option; Every Fall)
Topics may include computer systems design for health sciences, small computer concepts/use, computers for clinical services, computer-aided medical decision making, biomedical image processing, pattern recognition, data mining. Case studies from health sciences. prereq: Professional student or grad student or instr consent

HINF 8406. Advanced Topics in Health Informatics II. (; 1-4 cr. [max 12 cr.] ; Student Option; Every Spring)
This is a topics course. Topics may include, computational causal discovery for health sciences, computer systems design for health sciences, small computer concepts and use, computers for clinical services, computer-aided medical decision making, biomedical image processing, and pattern recognition. Case studies from health sciences.

HINF 8430. Foundations of Health Informatics I Lab. (2 cr. ; A-F or Audit; Every Fall)
The PhD-level lab complement for introductory survey of health informatics, focusing on foundational concepts. Topics covered include: conceptualizations of data, information, and knowledge; current terminologies, coding, and classification systems for medical information; ethics, privacy, and security; systems analysis, process and data modeling; human-computer interaction and data visualization. Lectures, readings, and exercises highlight the intersections of these topics with electronic health record systems and other health information technology.

HINF 8431. Foundations of Health Informatics II Lab. (2 cr. ; Student Option; Every Spring)
The PhD-level lab complement for an introductory survey of health informatics, focusing on applications of informatics concepts and technologies. Topics covered include: health informatics research, literature, and evaluation; precision medicine; decision models; computerized decision support systems; data mining, natural language processing, social media, rule-based system, and other emerging technologies for supporting 'Big Data' applications; security for health care information handling. Lectures, readings, and exercises highlight the intersections of these topics with current information technology for clinical care and research.

HINF 8440. Foundations of Translational Bioinformatics Lab. (2 cr. ; A-F or Audit; Every Spring)
Translational bioinformatics deals with the assaying, computational analysis and knowledge-based interpretation of complex molecular data to better understand, prevent, diagnose and treat disease. This course emphasizes deep DNA sequencing methods that have persistent impact on research related to disease diagnosis and treatment. The course covers sequence analysis, applications to genome sequences, and sequence-function analysis, analysis of modern genomic data, sequence analysis for gene expression/functional genomics analysis, and gene mapping/applied population genetics. Prerequisites: MS, PhD, or MD/PhD student interested in translational bioinformatics

HINF 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

HINF 8492. Advanced Readings or Research in Health Informatics. (1-6 cr. [max 24 cr.] ; Student Option No Audit; Every Fall, Spring & Summer)
Directed readings or research in topics of current or theoretical interest in health informatics. prereq: HINF student or instr consent

HINF 8494. Research in Health Informatics. (; 1-6 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Directed research under faculty guidance. prereq: instr consent

HINF 8525. Health Informatics Teaching. (2 cr. ; A-F only; Spring Even Year)
Use selected teaching techniques to assist in the delivery of course content in health informatics curriculum. Work with a professor who is the course director. From evaluation and feedback on their teaching technique, students develop a teaching philosophy as a final course project. prereq: HINF student or instr consent prereq: HINF student or instr consent

HINF 8535. Advanced Health Informatics Research Methods. (3 cr. ; A-F only; Spring Even Year)
Application of research methods, evaluation. Design, data collection, and data analysis in the context of health informatics, including computational and health data challenges. prereq: HINF student or instr consent

HINF 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

HINF 8770. Plan B Project. (4 cr. ; No Grade Associated; Every Fall, Spring & Summer)
Research project. Topic arranged between student/instructor. Written report required. prereq: Advanced plan B MS student

HINF 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

HINF 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: PhD candidate or department consent. Max 18 credits per semester; 24 credits required

Health Services Management (HSM)

HSM 6350. Special Topics in Health Services Management. (; 1-3 cr. [max 9 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Timely issues and themes in health services management.

HSM 6541. Health Care Finance. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
General principles of financial management for the health care industry. Operational knowledge of financial management theory, especially how hospitals and their departments develop and balance operating and capital budgets for business growth and development. Governmental policies, procedures, and ethical issues controlling the health care industry. HSM 6541 is cross-listed with the undergraduate version of the course (HSM 4541) and contains additional required content at the graduate level. Prereq: Basic accounting knowledge from a course such as ACCT 2050 and knowledge of Microsoft Excel are strongly recommended.

HSM 6582. Practicum in Long Term Care. (; 1 cr. ; A-F or Audit; Every Fall, Spring & Summer)
The Practicum course is the final component of the long term care administrator's education. A broad range of performance parameters are affected by management practices (e.g., employee morale, clinical processes, financial performance, regulatory compliance, quality of life for residents, customer satisfaction, and community/public relations). The course is a transition between the classroom and this executive level of management. Students will undertake a formal practicum project that must be coordinated with 1) the practicum site, 2) a preceptor who is a licensed nursing home administrator at the sponsoring organization, and 3) the course instructor. The intern is expected to make positive contributions to the sponsoring organization. The preceptor

functions as a mentor, coach, and tutor. The intern identifies learning objectives and opportunities to meet both short-range goals for gaining work experience and long-range goals for career development through the development of a learning agreement. HSM 6582 is cross-listed with the undergraduate version of the practicum (HSM 4582) and contains additional required content at the graduate level. prereqs: Most prelicensure courses completed--at a minimum, HSM 4583/6583-LTC Supports and Services; HSM 4585/6585 -LTC Organizational Management; HSM 4589/6589-LTC Human Resource Management; HSM 4593/6593-Gerontology for Health Care Managers.

HSM 6583. Long Term Care Supports and Services. (; 2 cr. ; A-F or Audit; Every Spring)
The Minnesota Board of Examiners for Nursing Home Administrators (BENHA) requires applicants for initial licensure to complete accredited postsecondary academic courses covering key competencies. This course covers the organization, operations, functions, services, and programs of long-term care supports and services, including the following: governing and oversight bodies and their relationship to the administrator; administrative responsibilities and structures; operations and functions of each facility department; functions and roles of professional and nonprofessional staff and consulting personnel. Prerequisites: Some basic knowledge of the long- term care field. Students without this knowledge are encouraged to meet with the instructor to explore preparation strategies.

HSM 6584. Long Term Care Health and Medical Needs. (1 cr. ; A-F or Audit; Every Fall)
The Minnesota Board of Examiners for Nursing Home Administrators (BENHA) requires applicants for initial licensure (and those who are licensed in other states but do not meet Minnesota's regulatory requirements for experience or certification) to complete accredited post-secondary academic courses covering key competencies. This course covers the medical and health needs of nursing facility residents and persons living in community-based settings. Topics include the following: - How anatomic and physiologic changes associated with the aging process affect disease processes and clinical needs - Impact and management of common syndromes associated with aging including vision/hearing impairment, nutrition/malnutrition, and balance and mobility impairment - Prevention and management of common conditions such as pressure ulcers and delirium - Common psychiatric and neurodegenerative disorders such as dementias (including Alzheimer's), depression, anxiety, psychotic disorders, and alcohol and drug abuse - Advance care planning and the role of palliative care and end-of-life care - Basic medical and pharmacological terminology - Innovative medical trends and emergent technologies used in long-term care settings Prerequisite: Basic knowledge of the long-term care field. Students who do not have this knowledge are encouraged to meet with the instructor to discuss strategies for obtaining it prior to registering for this course.

HSM 6585. Long Term Care Organizational Management. (1 cr. ; A-F or Audit; Every Fall)
The Minnesota Board of Examiners for Nursing Home Administrators (BENHA) requires applicants for initial licensure (and those who are licensed in other states but do not meet Minnesota's regulatory requirements for experience or certification) to complete accredited postsecondary academic courses covering key competencies. HSM 6585 covers the following basic management functions: planning and objective setting; organizing and delegating; and observing, monitoring and evaluating outcomes, including customer satisfaction prereq: Basic knowledge of the long term care field. Students without this knowledge are encouraged to consult with the instructor prior to registering to explore preparatory strategies.

HSM 6586. Management in Assisted Living and Senior Care Settings. (; 3 cr. ; A-F or Audit; Every Spring)
HSM 6586 is the graduate version of HSM 4586. Assisted living directors increasingly lead complex organizations that provide many different types of services to residents and their families. This course helps students understand aging as well as the operations and functions of assisted living communities, governance and leadership, administrative structures and responsibilities, and the roles of professional and nonprofessional staff. In 2019, the Minnesota State Legislature passed historic regulatory reform in assisted living, culminating in a new facility license and a new director license. State statute sets forth domains of practice for assisted living directors. Education in these domains is required prior to licensure. This course is designed to meet the Assisted Living Director license requirements of the State of Minnesota Board of Examiners for Long Term Services and Supports. Prerequisites: While there are no formal prerequisites, the successful student must have some basic knowledge of aging services and/or the long term care field. Students who are unfamiliar with this field are encouraged to meet with the instructor prior to registering for this course.

HSM 6587. Long Term Care Regulatory Management. (1 cr. ; A-F or Audit; Every Spring)
The Minnesota Board of Examiners for Nursing Home Administrators (BENHA) requires applicants for initial licensure (and those who are licensed in other states but do not meet Minnesota's regulatory requirements for experience or certification) to complete accredited post-secondary academic courses covering key competencies. HSM 6587 is one of those areas. It covers regulatory and funding provisions and requirements governing operation of long-term care services and related health care programs. Topics include Resident rights, resident choice/ resident risk and protection from maltreatment; Guardianship and conservatorship; Health and safety codes including OSHA and National Life Safety Code; Medicare and Medicaid, standards for managed care and sub-acute care, and third-party payer requirements and reimbursement; Federal and state nursing home survey and compliance regulations and processes; Requirements affecting the quality of care and life of residents; Resident acuity and assessment methodology; Quality assurance and performance improvement. prereq: Basic knowledge of the long term care field. Students without this knowledge are encouraged to meet with the instructor prior to registering to discuss options.

HSM 6588. Long Term Care Quality Management and Performance Improvement. (2 cr. ; A-F or Audit; Every Fall)
This course integrates competencies, knowledge, and skills from three interrelated areas to support evidence-based management decision making in long term care. These areas include 1) problem-solving skills, 2) quality management and quality improvement practices, and 3) data analytics. Classwork consists of preclass readings, online preclass discussion, face-to-face one-day seminar, one-day comprehensive Excel homework assignment, and homework assignments. Prerequisites: Basic knowledge of the long term care field. Students without this knowledge are encouraged to meet with the instructor prior to registering to discuss ways of acquiring it. Skill with Excel is strongly recommended.

HSM 6589. Long Term Care Human Resources Management. (; 2 cr. ; A-F or Audit; Every Fall)
Long term care organizations operate within a dynamic environment of changing care demands, regulatory requirements, and financial constraints. This course is designed to provide students with an overview of leadership principles; organizational governance and change management; advocacy and public relations; and strategic business planning within the context of nursing homes. This course meets national and state requirements for licensure as a nursing home administrator. prereq: None, but knowledge of the long-term care field is very helpful. Students without this knowledge are encouraged to meet with the director of the LTC program prior to registering to discuss strategies for acquiring it.

HSM 6592. Long Term Care Health Care Law. (1 cr. ; A-F or Audit; Every Spring)
The Minnesota Board of Examiners for Nursing Home Administrators (BENHA) requires applicants for initial licensure (and those who are licensed in other states but do not meet Minnesota's regulatory requirements for experience or certification) to complete accredited post-secondary academic courses covering key competencies. HSM 6592 covers legal and regulatory issues, ethical perspectives, public policy advocacy and professional reporting requirements related to the operation of long-term care service delivery organizations. The following topics are covered: Professional and biomedical ethics; Liability, negligence, and malpractice; Data confidentiality, privacy and practices;

Professional licensing, certification and reporting for staff and consulting personnel; and Advocacy for public policies. Prerequisites: Knowledge of the long-term care field. Students who do not have this knowledge are encouraged to meet with the instructor prior to registering to discuss strategies for gaining this knowledge.

HSM 6593. Gerontology for Health Care Managers. (1 cr. ; A-F or Audit; Every Spring)
The Minnesota Board of Examiners for Nursing Home Administrators (BENHA) requires applicants for initial licensure (and those who are licensed in other states but do not meet Minnesota?s regulatory requirements for experience or certification) to complete accredited post-secondary academic courses covering key competencies. This course covers the requirement related to Gerontology. HSM 6593 covers the following: Issues of cultural diversity and human relationships between and among employees and residents of nursing facilities and their family members. Physical, biological, social and psychological aspects of the aging process. Policies and programs designed to meet the needs of a rapidly aging population. Therapeutic programs for individuals with cognitive impairments. Services to support the needs of family caregivers. Prerequisites: Knowledge of the long-term care field. Students without this knowledge are encouraged to meet with the instructor prior to registering to discuss strategies for acquiring it.

HSM 6682. Long Term Care, Services, and Supports. (3 cr. ; A-F or Audit; Every Fall & Spring)
Long term care organizations provide housing, services, and supports to older adults and others with complex medical and health care needs. Part health care facility and part home, skilled nursing facilities need administrators with a core understanding of gerontology and geriatrics. This course is designed to provide an overview of the biological, psychological, and sociological aspects of aging and, in turn, how long term care responds to needs through services and supports. This course meets national and state requirements for licensure as a nursing home administrator. Prerequisites: None.

HSM 6683. Long Term Care Environment and Quality. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Long term care organizations must continue to evolve based on consumer demand and regulatory frameworks. To achieve continuous quality improvement, administrators must understand the fundamentals of quality as well as how the regulatory environment impacts quality. This course is designed to explore the regulatory framework in which skilled nursing facilities operate as well as the concept of quality. It meets national and state requirements for licensure as a nursing home administrator. Prerequisites: None.

HSM 6684. Long Term Care Leadership and Strategy. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Long term care organizations operate within a dynamic environment of changing care demands, regulatory requirements, and financial constraints. This course is designed to provide students with an overview of leadership principles, organizational governance and change management, advocacy and public relations, and strategic business planning within the context of nursing homes. This course meets national and state requirements for licensure as a nursing home administrator. Prerequisites: None.

Hebrew (HEBR)

HEBR 5090. Advanced Modern Hebrew. (; 3 cr. [max 18 cr.] ; Student Option; Every Fall)
Various authentic Hebrew texts. Comprehension/speaking. Conducted entirely in Hebrew. Emphasizes Modern Israeli Hebrew. Grammar, widening vocabulary. Contemporary short fiction, essays, articles on cultural topics, films, Hebrew Internet sites, TV.

HEBR 5200. Advanced Classical Hebrew. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
In-depth reading, analysis, and discussion of classical Hebrew texts. Grammar, syntax. Introduction to text-criticism, history of scholarship, and scholarly tools. Format varies between survey of themes (e.g., law, wisdom, poetry) and extended concentration upon specific classical texts.

HEBR 5300. Post-Biblical Hebrew: Second Temple Period. (; 3 cr. [max 18 cr.] ; Student Option; Periodic Spring)
Readings in late-/post-biblical Hebrew literature of Persian, Hellenistic, and early Roman periods (e.g., Chronicles, Ezra-Nehemiah, Ecclesiastes, Daniel, Dead Sea Scrolls, apocrypha, pseudepigrapha). Focuses on historical development of Hebrew language and literature in relation to earlier biblical sources. prereq: Grad student or instr consent

HEBR 5992. Directed Readings. (1-4 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. Prereq instr consent, dept consent, college consent.

Heritage Studies & Public Hist (HSPH)

HSPH 5001. Disability Justice and Cultural Heritage. (; 3 cr. ; A-F or Audit; Periodic Fall)
This course is designed to prepare advanced undergraduates and graduate students to more effectively engage issues of disability in public history. This class is rooted in activism, taking an intersectional approach, which will push students to reflect on the numerous ways other forms of identity intersect and have been classified as disability. This class is organized as a workshop where students from multiple disciplines will focus on strategies for increasing public awareness and understanding of disability histories as expressed in American buildings and landscapes. The class will be grounded in scholarly and activist perspectives on disability justice connected with various aspects of public history: historic preservation, archival practices, community-engaged work, and exhibition design, among others.

HSPH 8001. Who Owns the Past? Common Concerns and Big Questions in Heritage and Public History. (3 cr. ; A-F or Audit; Every Fall)
Course offers a survey through case studies of the common concerns, concepts and ethics of heritage and public history. Students will learn about the history and social contexts of heritage studies and public history, the stakes and stakeholders, and the conflicts and positive interventions that can be made through the work of these affiliated professions.

HSPH 8002. Core Practices in Heritage Studies and Public History. (3 cr. ; A-F or Audit; Every Fall)
Course is open to all Heritage Studies and Public History (HSPH) graduate students. DGS or Instructor permission required for others. Course offers a survey of how heritage and public history concern and ethics are embedded into practice. Through illustrated lectures, case studies, field trips, readings and class discussion, students will learn about the professional practice of heritage studies and public history, how approaches to practice are aligned to institutional mission, customization of programs for diverse audiences, and professional evaluation and management of financial resources.

HSPH 8003. Race and Indigeneity in Heritage Representation. (3 cr. ; A-F or Audit; Every Spring)
This seminar will explore the changes in how diversity has been represented in historical interpretations in the past, and how practice is changing in response to the contemporary and anticipated social context of the United States. "Diversity" has historically been assumed to derive from categories such as race or culture, concepts constructed in the discipline of anthropology but taken up as the foundation for typologies in other arenas such as art history, architectural history, museums, and public policy. What is problematic in such an approach? What happens to communities defined by shared history, political sovereignty, and disenfranchisement? What are the implications beyond museums for those communities? Finally, how can we think differently about diversity without re-inscribing harmful constructions of difference?

HSPH 8004. Capstone in Heritage Studies and Public History. (3 cr. ; S-N only; Every Spring)
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.

HSPH 8005. Leadership and Future of Historical Organizations. (1 cr. [max 5 cr.] ; S-N only; Every Fall & Spring)
This course will operate as a series of lectures and discussions in which leaders of historical organizations explain how they are navigating major changes and challenges associated with their professional practice. Speakers in this course will be invited and organized by the instructor in coordination with HSPH faculty and colleagues at the Minnesota Historical Society. Topics to be presented by speakers may include: making history accessible and meaningful to increasingly diverse audiences; interpreting difficult or traumatic histories; gathering, storing, and providing access to physical collections in a digital age; engaging the public in historical research and interpretation; the financial management and leadership of historical organizations. The course has several objectives: students will learn from, and have the opportunity to meet, leaders of historical organizations located throughout Minnesota and the United States; it will also be a cohort-building opportunity as students in the first and second years of the program meet regularly in this course to hear from professional practitioners and discuss presentations and readings.

HSPH 8006. Digital Methods for Heritage Studies & Public History. (3 cr. ; Student Option; Every Fall)
Digital technologies are significantly altering the speed and scale of the foundational methodologies of archeology, history, and preservation. Moreover, they are shifting the way the public engages with the past in cultural institutions and across the myriad screens that pervade their daily life. In this course, students will not only learn how emerging digital technologies can enhance their research, but also how those technologies are fundamentally transforming the possibilities for the public presentation of that research. This course privileges hands-on learning and balances deeping essential methodological skills with exposure to a breadth of field-altering technologies. It is structured around five core methodologies--excavation, documentation, reconstruction, interpretation, and exhibition. In each unit, students will be first be tasked with identifying the underlying principles of these methodological approaches. They will then use class time to explore technologies that extend those methods such as high-resolution imaging, relational databases, text mining programs, virtual environments, and content management systems for website building. Bookending the course is a focus on effective collaboration--the foundation of successful digital projects--and public engagement in an increasingly connected yet fractured society.

HSPH 8007. Archives. (3 cr. ; A-F or Audit; Every Spring)
Working in close collaboration with the archivists of the Department of Archives and Special Collections at the University Libraries, this hands-on course will explore how archivists do their work and how a deeper understanding of that work can help scholars in any field grasp the practice of historical research. Rooted in the theory and tradition of archival science, the course will cover the core practices of archivists as well as the emerging issues and technologies changing the way archives are built, maintained, and accessed. In this course, students will gain experience with archival theory, archival ethics, selection, appraisal, arrangement, description, reference, access, preservation, exhibits, and outreach. Through engaging with those topics, students will be prepared to situate archives and archival material within the socio-historical contexts in which they were produced and in which they are maintained, affording them a critical perspective on the historical sources they contain. Each week?s course will be co-taught with an archivist from the Department of Archives and Special Collections at the University Libraries.

HSPH 8010. Topics in Heritage Studies and Public History. (; 1-3 cr. [max 9 cr.] ; A-F only; Periodic Fall & Spring)
Topics in Heritage Studies and Public History explores new and emerging issues in the field that are not examined in other coursework.

HSPH 8101. Internship. (3 cr. [max 6 cr.] ; S-N only; Every Fall, Spring & Summer)
Internships are an opportunity to apply your skills and deepen your understanding of careers in historical sites and museums, community heritage organizations, or preservation/oversight agencies. This experience is for both skill-building and general professional development. Internship placements will be determined through conversations with advisors regarding student areas of interest and career goals, and available professional opportunities within the Minnesota Historical Society or a partnering organization. MHSPH degree students are required to complete two internships, one within MNHS and one outside. There are small stipends paid to students for their internship work, and depending on the site/project there may be funds available for project materials.

HSPH 8992. Directed Readings in HSPH. (1-3 cr. ; Student Option No Audit; Every Fall & Spring)
Directed Readings in Heritage Studies and Public History enable a student to explore new and emerging issues in the field that are not examined in other coursework. Student(s) will work with a member of the HSPH faculty to develop a reading list, schedule, deliverables, meeting times and other expectations, all of which will be recorded using the School of Arch Independent Study contract form.

Hindi (HNDI)

HNDI 5040. Readings in Hindi Texts. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Read authentic materials of various types to improve reading/speaking ability.

HNDI 5993. Directed Study. (1-5 cr. [max 15 cr.] ; Student Option; Every Fall & Spring)
Guided individual reading or study of modern Hindi-Urdu texts. Prereq instr consent, dept consent, college consent.

History (HIST)

HIST 5051. Before Herodotus: History and Historiography of Mesopotamia and the Ancient Near East. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Historical method/sources for ancient Near Eastern history. Historical traditions. Historiographic texts of Mesopotamia and neighboring regions of the ancient Near East, secondary emphasis on their relationship to works of classical historians such as Herodotus. Use of these sources in modern historiography of ancient Near East. prereq: Prev coursework in ancient Near Eastern history recommended

HIST 5053. Doing Roman History: Sources, Methods, and Trends. (; 3 cr. ; Student Option; Fall Even, Spring Odd Year)
Survey of major scholarship in field of Roman history since Mommsen. Political, cultural, social, military, and economic history. Focuses on methodological problems posed by evidence. Ways in which these issues shape research. prereq: Grad student or instr consent

HIST 5264. Imperial Russia: Formation and Expansion of the Russian Empire in the 18th and 19th Centuries. (3 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
Interaction with Europe and Asia; attempts at modernization and reform; emancipation of the serfs and rise of revolutionary movements.

HIST 5265. 20th-Century Russia: The Collapse of Imperial Russia, the Revolutions, and the Soviet Regime. (3 cr. ; Student Option; Every Spring)
Analysis of the factors that led to the collapse of the tsarist regime; discussion of the 1917 revolution, the evolution of the Soviet regime and the collapse of Soviet communism. Emphasis on the role of nationalities and the rise of the Commonwealth of independent states.

HIST 5271. The Viking World: Story, History, and Archaeology. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Viking society and expansion of Viking influence abroad. Viking impact on Western Europe, interactions with Slavic lands, settlement of North Atlantic islands, Western Europe's impact on Scandinavian lands. Analyzes archaeological, historical, linguistic, and numismatic evidence.

HIST 5283. Marx, Capital and History: An Introduction to Marxist Theory and History. (3 cr. ; Student Option; Spring Even Year)
Explore Marx's understanding of capitalism and its history. Marx's argument regarding historical specificity of capitalism as economic/social condition

HIST 5286. Galileo and the Beginnings of Modern Science. (3 cr. ; A-F only; Periodic Fall)
The life and work of Galileo Galilei (1564-1642), often called the ?founder of modern science.? Topics: the Renaissance Italian context for Galileo?s work; the arrangements of authoritative knowledge

that prevailed in 16th-century Tuscany and Venice; the role that universities, the Catholic church, learned academies, and the state played in disciplining knowledge. We consider the episodes of Galileo?s career and read his seminal texts with secondary commentaries upon them. His telescopic observations of 1609-10; his battles with Aristotelian natural philosophy; his experiments and arguments on behalf of experimental and mathematical physics; his defense of Copernican ?heliocentric? cosmology and his trial and condemnation by the Roman Catholic Church for heresy; and his work in mathematics and mathematical physics that paved the way for Newton and Einstein. The goal will be to understand the achievements of Galileo in their specific historical and cultural context and to use these reflections for thinking about the nature of the modern science that he helped to initiate.

HIST 5461. Introduction to East Asia I: The Imperial Age. (3 cr. ; Student Option; Every Fall)
Comparative survey of early history of China, Japan, Korea, and Vietnam. Early Chinese thought. Diffusion of Confucianism, Buddhism, and other values throughout East Asia. Political and social history of region to 1600.

HIST 5462. From Subjects to Citizens: The History of East Asia From 1500 to the Present. (3 cr. ; Student Option; Every Spring)
How Asian states, societies, economies, and cultures linked with one another and with European powers. How period's historical effects still resonate. Covers India, China, Japan, Korea, and Indochina.

HIST 5468. Social Change in Modern China. (; 3 cr. ; Student Option; Every Fall)
Opium War and opening of Treaty Ports in 19th century; missionary activity and cultural influence; changes in education system; women's movement; early industrialization; socialism and collectivization after 1949; industrialization of Taiwan; PRC's entry into the world trading system.

HIST 5478. Tigers and Dragons: The Rise of the East Asian Economies, 1930-Present. (3 cr. ; Student Option; Spring Odd Year)
Rise of East Asian Economies, 1930-Present. prereq: Grad student

HIST 5513. North Africa since 1500: Islam, Colonialism, and Independence. (3 cr. ; Student Option; Spring Odd Year)
History of the Maghrib (Morocco, Algeria, Tunisia, Libya and disputed territories of Western Sahara from time of Ottoman expansion/Sharifian dynasties [Sa'dian/'Alawid]) in 16th/17th Centuries to end of 20th century. Focus on encounter of Islamic cultures/societies of Maghrib and Africa/Europe

HIST 5547. Empire and Nations in the Middle East. (3 cr. ; Student Option; Periodic Fall & Spring)
Modernity in non-Western imperial context. Identity, ideology, economy, environment, language. prereq: Grad student or instr consent

HIST 5708. The Age of Curiosity: Art, Science & Technology in Europe, 1400-1800. (AH,TS; 3 cr. ; Student Option; Periodic Fall & Spring)
Diverse ways in which making of art and scientific knowledge intersected in early modern Europe. Connections between scientific curiosity and visual arts in major artists (e.g., da Vinci, Durer, Vermeer, Rembrandt). Artfulness of scientific imagery/ diagrams, geographical maps, cabinets of curiosities, and new visual technologies, such as the telescope and microscope.

HIST 5711. Cognitive History. (3 cr. ; Student Option No Audit; Periodic Spring)
Cognitive History will examine how research in cognitive neuroscience provides historians with new knowledge and methods for asking questions about the past. It is not a course on the history of the cognitive sciences. Instead, it is about practicing history in the cognitive age, a period that began more than fifty years ago, and an approach to explaining how humans think and act that has been adopted within fields across our universities. The course will combine broad readings and discussions in "Big History" and the shift from behaviorism to cognition with more specific studies about memory, narrative, aesthetics, the body, and violence. Students will have an opportunity to apply a cognitive history approach to a specific topic that emphasizes one of the following topics: Evolution, Behaviorism, Cognitive Cultural Studies, Memory, Narrative, Aesthetics, the Body, and Violence. Students will help guide discussions for the relevant class sessions on these topics and write an essay on the selected theme

HIST 5728. The History of Human Rights. (3 cr. ; Student Option; Periodic Fall)
What are human rights? How and when did they originate? How were such rights promoted, protected and contested at different historical junctures, and by whom? In this course, we will examine the historical processes through which human rights have been conceptualized, codified, violated, and vindicated. Throughout the semester, we will travel across the globe and trace events that span from the eighteenth century to the present day. Our search will take us through the multiple histories that have shaped what we nowadays recognize as the human rights framework ? its institutions, products and norms. Integrating perspectives and readings from the humanities, social sciences and legal studies, this course explores how meanings of human rights have fluctuated in response to historical developments, and how human rights have come to gain their prominent role in contemporary politics, law and culture.

HIST 5797. Methods of Population History. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Standard methods of population analysis. Focuses on methods widely used for historical population research.

HIST 5801. Seminar in Early American History. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Introduction to literature of early American history. Readings selected from some of best scholarship in field. Questions of colonial historians. Theories, methods, sources used in pursuit of those questions.

HIST 5802. Readings in American History, 1848-Present. (3 cr. ; A-F or Audit; Every Fall & Spring)
Readings-intensive course. U.S. history from Mexican-American War to present.

HIST 5831. Cultural Fallout: The Cold War and Its Legacy: Readings. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Culture of the Cold War, its legacy. How it affected/reflected domestic politics, public policies, civic life, gender expectations, sexuality, class relations, racial justice, and civil rights. Impact of domestic anti-communism and of American cultural politics abroad.

HIST 5877. Asian American History. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Introduction to key issues, theoretical frameworks, research, and methodologies of Asian American history. Seminal texts that defined the field. Recent scholarship in history and in related disciplines. Emphasis field's comparative/transnational linkages to ethnic studies, Asian studies, and the Americas.

HIST 5890. Readings in American Indian and Indigenous History. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Students in this course will read recently published scholarship in American Indian and Indigenous history that takes up pressing research questions, promises to push inquiry in new directions, and that theorizes important interventions in our thinking to understand where the field is situated and moving. Reflecting the instinctively interdisciplinary nature of American Indian and Indigenous history, readings will be drawn not just from the discipline of history but across other disciplines such as Anthropology, American Studies, Geography, Literature, Political Science, and Legal Studies. As well, readings will include scholarship that reaches out to embrace the Global Indigenous studies turn. prereq: Advanced undergrad with instr consent or grad student

HIST 5891. American Indian and Indigenous Studies Workshop. (1.5 cr. [max 12 cr.] ; S-N or Audit; Every Fall & Spring)
The American Indian and Indigenous Studies Workshop brings graduate and advanced undergraduate students and faculty together to read and provide intensive feedback (written and oral) on their works in progress. As an interdisciplinary field, AIIS students stand to benefit from ongoing and engaged conversations about that work that will deepen and enhance their professionalization in the field. The readings for the workshop are submissions from the membership of the workshop (which will include participants who are not formally enrolled in the workshop). We read and consider two submissions per week (sometimes more if the submissions are shorter) that are pre-circulated to all participants via the workshop?s listserv. Readings under consideration include research papers, dissertation chapters, article manuscripts, research proposals, conference papers, and other submissions that will benefit

from intensive engagement with the members and will deepen the knowledge of all of the participants. Students will gain experience with the research, writing, and revision process as well as scholarly conversations about original research and writing. The overarching aim of the workshop is to develop research, writing, revision, and scholarly discussion skills as well as community-building in American Indian and Indigenous Studies and professionalization in an increasingly interdisciplinary and global field of study

HIST 5901. Latin America Proseminar: Colonial. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Introduces beginning graduate and advanced undergraduate students to major historical writings on various Latin American themes. prereq: instr consent

HIST 5902. Latin America Proseminar: Modern. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Introduces beginning graduate and advanced undergraduate students to major historical writings on various Latin American themes. prereq: instr consent

HIST 5910. Topics in U.S. History. (; 1-4 cr. [max 20 cr.] ; Student Option; Every Fall & Spring)
Selected topics in U.S. history not covered in regular courses. Taught as staffing permits. prereq: Grad or advanced undergrad student with instr consent

HIST 5932. The Production of Knowledge, Negotiating the Past, and the Writing of African Histories. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Recent scholarship on social history of Africa. Focuses on new literature on daily lives of ordinary people in their workplaces, communities, households.

HIST 5960. Topics in History. (; 1-4 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
Selected topics in history not covered in regular courses. Taught as staffing permits. prereq: [advanced undergrad with instr consent]

HIST 5993. Directed Study. (1-16 cr. [max 20 cr.] ; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. Prereq [Grad student or sr], instr consent, dept consent, college consent.

HIST 5994. Directed Research. (1-16 cr. ; Student Option; Every Fall, Spring & Summer)
Work on a tutorial basis. Prereq [Grad student or sr], instr consent, dept consent, college consent.

HIST 8015. Scope and Methods of Historical Studies. (; 3 cr. ; A-F or Audit; Every Fall)
Development of historical studies over time (especially in 19th and 20th centuries). Methodologies currently shaping historical research. Theoretical developments within the discipline during 19th and 20th centuries.

HIST 8016. Practicum in Historical Writing. (3 cr. ; A-F only; Periodic Fall & Spring)
Facilitate transition from writing seminar papers to writing individual research projects part of dissertation. Practice of making historical arguments in common genres of academic profession, such as grant proposals, prospectus, dissertation chapters.

HIST 8021. History Research Seminar. (; 3 cr. [max 6 cr.] ; A-F or Audit; Every Spring)
The History Research Seminar will help History PhD students to conceptualize and articulate a significant research proposal and to become more effective writers. The course will prioritize the format and expectations of the dissertation prospectus, but with permission of the instructor students may develop a different research project (e.g. a seminar paper to become part of their portfolio, or a chapter of an MA thesis or dissertation). In either case, students will focus on the process of rigorously conceptualizing their research by writing a proposal using a format that is suggested by the Graduate School's Doctoral Dissertation Fellowship application's "Statement of Research" as a model.

HIST 8025. Politics of Historical Memory. (; 3 cr. [max 6 cr.] ; A-F or Audit; Periodic Fall & Spring)
Issues surrounding interaction of memory/ history. Genealogy of historical memory. Individual narratives and circulation of historical memory. Sites/forms of collective memory. Justice and historical memory. Case studies, discussions, research projects.

HIST 8031. Doing Digital History. (3 cr. ; Student Option; Every Fall)
Digital technologies are significantly altering the speed and scale of the foundational methodologies of archeology, history, and preservation. Moreover, they are shifting the way the public engages with the past in cultural institutions and across the myriad screens that pervade their daily life. In this course, students will not only learn how emerging digital technologies can enhance their research, but also how those technologies are fundamentally transforming the possibilities for the public presentation of that research. This course privileges hands-on learning and balances deepening essential methodological skills with exposure to a breadth of field-altering technologies. It is structured around five core methodologies--excavation, documentation, reconstruction, interpretation, and exhibition. In each unit, students will be first be tasked with identifying the underlying principles of these methodological approaches. They will then use class time to explore technologies that extend those methods such as high-resolution imaging, relational databases, text mining programs, virtual environments, and content management systems for website building. Bookending the course is a focus on effective collaboration--the foundation of successful digital projects--and public engagement in an increasingly connected yet fractured society.

HIST 8032. Archives. (3 cr. ; Student Option; Every Spring)
Working in close collaboration with the archivists of the Department of Archives and Special Collections at the University Libraries, this hands-on course will explore how archivists do their work and how a deeper understanding of that work can help scholars in any field grasp the practice of historical research. Rooted in the theory and tradition of archival science, the course will cover the core practices of archivists as well as the emerging issues and technologies changing the way archives are built, maintained, and accessed. In this course, students will gain experience with archival theory, archival ethics, selection, appraisal, arrangement, description, reference, access, preservation, exhibits, and outreach. Through engaging with those topics, students will be prepared to situate archives and archival material within the socio-historical contexts in which they were produced and in which they are maintained, affording them a critical perspective on the historical sources they contain. Each week's course will be co-taught with an archivist from the Department of Archives and Special Collections at the University Libraries.

HIST 8110. Medieval History: Research Seminar. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Research in medieval European history, using primary source material. prereq: instr consent, good reading knowledge of Latin, French, one other European language

HIST 8122. Public Histories. (3 cr. ; A-F or Audit; Every Fall)
This seminar examines the variety of ways that "public history" is produced both within and outside the academy and explores interdisciplinary approaches to the making and critical analysis of public histories. Students will discuss recent scholarship by historians as well as scholars and practitioners in allied fields. Through discussion and collaborative project work, the seminar will also provide a hands-on introduction to the theory, methods, practice and politics of public history.

HIST 8232. Cultural Fallout: The Cold War and Its Legacy: Research. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Student produce research paper on history/ culture of Cold War era as it developed in United States after World War II. Research project builds upon readings from 8231.

HIST 8239. Readings in Gender, Race, Class, and/or Ethnicity in the United States. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Dynamics of gender, racial, class, and ethnic relations in U.S. history; intersections of these forces. prereq: instr consent

HIST 8240. Topics in Research in Gender, Race, Class, or Ethnicity in the United States. (; 3 cr. [max 6 cr.] ; A-F or Audit; Periodic Fall & Spring)
Dynamics of gender, racial, class, and ethnic relations in U.S. history. Intersections of these forces. Topis vary by instructor. prereq: instr consent

HIST 8245. Human Rights: A Global History. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
This course will focus on debates and social movements concerning human rights in the broadest sense, beginning with the seventeenth century and ending in the 1950s. Topics include colonization, slavery,

torture, war crimes, rights to land, women's rights, sexual rights, and indigenous self-determination. The seminar will require a research or historiographical paper.

HIST 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

HIST 8390. Research in American Indian History. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Research/writing skills in American Indian history. Identify research questions, locate sources, conduct original research, produce substantial research paper.

HIST 8434. Health and Healing in African History. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Historiographical, theoretical, and methodological debates concerning health, illness, and healing in African history. Disease ecology, African conceptions of health/healing. Imperialism and origins of tropical medicine. Scientific racism. Colonial conquest and African health. Sexuality, gender, and colonial control. Urbanization. AIDS.

HIST 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

HIST 8464. Research in Yuan, Ming, and Qing History. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Basic skills and resources for doing research in history of late imperial China. Bibliographic exercises; reading and translating primary documents. prereq: Good working knowledge of classical Chinese, background in history of late imperial China

HIST 8465. Research in Yuan, Ming, and Qing History. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Basic skills and resources for doing research in history of late imperial China. Students select, translate, and annotate texts appropriate to their research interests and write a research paper centering on these texts. prereq: Good working knowledge of classical Chinese, background in history of late imperial China

HIST 8540. Topics in Mediterranean Studies. (; 1-4 cr. [max 15 cr.] ; A-F or Audit; Every Fall & Spring)
Mediterranean history from Middle Ages to present. Taught as staffing permits. prereq: Grad student or advanced undergrad with instr consent

HIST 8630. Seminar in World History. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Critical examination of historical literature dealing with theoretical approaches to world history and teaching of world history. prereq: instr consent

HIST 8640. Topics in Legal History Research. (; 3 cr. [max 9 cr.] ; A-F or Audit; Periodic Fall & Spring)
Comparative, methodological, theoretical, and topical courses in legal historical research, from ancient world to present. Offerings rotate.

HIST 8644. Legal History Workshop. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Introduction to legal history and professional socialization. Work-in-progress of leading scholars working in field of legal history. Students can undertake original research. prereq: instr consent

HIST 8645. American Legal History. (3 cr. ; A-F only; Periodic Spring)
This course explores the interaction between law, politics, and culture in American society, concentrating on the period from the Revolution through the New Deal. Topics include: democracy and the rule of law; slavery; the public-private distinction; Civil War and Reconstruction; industrialization; expansion of the federal administrative state; law and the human sciences; crime and punishment; legal education and the role of the lawyer in the American polity. Readings will include primary legal sources, such as treatises, statutes, constitutions, and landmark cases, as well as contemporary religious, scientific, and literary works, which will help to situate the legal materials in broader cultural context. Several secondary sources will also be considered, both for insights into the topics covered, and to illustrate various approaches to legal-historical analysis. The course will encourage critical examination of these sources with the aim of clarifying how law has figured in the history and historiography of the United States. No previous background in American history is assumed.

HIST 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

HIST 8709. Seminar: History of Sexuality. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Theories of sexuality (by, e.g., Foucault, Butler, deLauretis), their application in history. Topics may include: feminist critique of Foucault and the classics, psycoanalytic approaches to religious transformations such as the Reformation, varying forms of gender transgression, sexuality in colonial encounters, operation of sexual metaphors in political conflict, and AIDS and the writing of history.

HIST 8715. Research on European Women's History, 1450-1750. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Research techniques for completing a major research paper based on primary sources. prereq: 5715

HIST 8720. Research Seminar on Central European History. (; 1-4 cr. [max 16 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Broad research theme/problem: in most cases preparation for dissertation. Students identify primary/secondary sources, conduct research, write paper, and read/comment upon each other's drafts. Geographic focus varies with instructor, may include Germany or lands of former Habsburg Austrian empire.

HIST 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

HIST 8801. Seminar in Early American History. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Introduction to literature of early American history. Readings selected from some of best scholarship in field. Questions of colonial historians. Theories, methods, sources used in pursuit of those questions.

HIST 8802. Readings in American History, 1848-Present. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Readings-intensive course. U.S. history from Mexican-American War to present.

HIST 8832. Cultural Fallout: The Cold War and Its Legacy: Research. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Student produces research paper on history/culture of Cold War era in the United States after World War II. Research projects build upon readings from 5831. prereq: 5831

HIST 8857. Seminar: Research in the History of American Women. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Students define a historical problem or area of research on a topic in American women's history they would like to pursue in depth, identify appropriate sources and accomplish research in primary and secondary sources, write a 25 to 35-page scholarly article, and read and comment upon each other's drafts. prereq: 5857, instr consent

HIST 8858. Research in Early American History. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Research and writing skills. With instructor and other participants, students identify their research questions, locate the sources with which to answer these questions, conduct original research, and produce a substantial research paper. prereq: 5801 or instr consent

HIST 8865. Reading Seminar on the History of Race and Class in the United States. (3 cr. ; A-F only; Fall Odd Year)
This graduate reading seminar examines the intersections of race and class in the United States, starting with the establishment of chattel slavery in the colonial era, continuing through westward expansion and the development of industrial capitalism, and ending with the rise and fall of the New Deal order. Reading established classics and important recent scholarship; students will seek to understand how race and class interacted to shape the economic and political development of the United States.

HIST 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 14 cr per semester or summer, 24 cr required

HIST 8900. Topics in European/Medieval History. (; 1-4 cr. [max 20 cr.] ; A-F or Audit; Every Fall & Spring)
Topics not covered in regular courses.

HIST 8905. Topics in European Medieval History. (; 1-4 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
Selected topics in Medieval European history, up to 1500ce.

HIST 8910. Topics in U.S. History. (; 1-4 cr. [max 15 cr.] ; A-F or Audit; Every Fall & Spring)
Topics not covered in regular courses.

HIST 8920. Topics in African History. (; 1-4 cr. [max 20 cr.] ; A-F or Audit; Periodic Fall)
Topics not covered in regular courses.

HIST 8930. Topics in Ancient History. (; 1-4 cr. [max 16 cr.] ; A-F or Audit; Periodic Fall & Spring)
Topics not covered in regular courses.

HIST 8940. Topics in Asian History. (; 1-4 cr. [max 16 cr.] ; A-F or Audit; Periodic Fall)
Topics not covered in regular courses.

HIST 8944. Research Seminar: New Directions in African Social History I. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
First of two-part course. Rradical transformation in field of African social history during past two decades. Students select major research topic and begin preliminary investigation. prereq: instr consent

HIST 8945. Research Seminar: New Directions in African Social History II. (; 3 cr. ; S-N or Audit; Periodic Fall & Spring)
Second of two-part course. Students conceptualize and write major research paper. prereq: 8944, instr consent

HIST 8950. Topics in Latin American History. (; 1-4 cr. [max 16 cr.] ; A-F or Audit; Every Spring)
Topics not covered in regular courses.

HIST 8960. Topics in History. (; 1-4 cr. [max 20 cr.] ; A-F or Audit; Every Fall & Spring)
Topics not covered in regular courses.

HIST 8961. Research Seminar: Intellectual History. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Approaches/methods. Readings on or exemplifying intellectual history. Intellectual history as something broader than history of philosophical thought: a set of approaches of broad cross-disciplinary applicability. Each student prepares a research paper on a topic of intellectual history and present it to class for critique.

HIST 8970. Advanced Research in Quantitative History. (; 3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Students carry out publishable-quality research on quantitative history topic. prereq: Grad student

HIST 8980. Topics in Comparative Women's History. (; 3-4 cr. [max 20 cr.] ; A-F or Audit; Periodic Fall & Spring)
Cross-cultural/thematic explorations in history of women. Gender/colonialism. Women/class formation. Women/religion. Sexuality. Medical construction of gender. Women's narratives as historical sources. Gender/politics. prereq: [advanced undergrad, instr consent]

HIST 8990. Topics in Comparative History-Research. (; 3 cr. [max 15 cr.] ; Student Option; Every Fall & Spring)
Topics vary. Students read/discuss historical works from different geographic areas, develop proposals for comparative research, or pursue comparative research projects. prereq: instr consent

HIST 8993. Directed Study. (; 1-16 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Students work on tutorial basis. Guided individual reading or study. prereq: Grad student, instr consent

HIST 8994. Directed Research. (; 1-16 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Work on a tutorial basis. prereq: instr consent

History of Medicine (HMED)

HMED 5075. Technology and Medicine in Modern America. (; 3 cr. ; A-F or Audit; Fall Odd, Spring Even Year)
How technology came to medicine?s center-stage. Impact on medical practice, institutions, consumers, production of medical knowledge, professionalization, health policy, gender/race disparities in health care. prereq: instr consent

HMED 5940. Topics in the History of Medicine. (; 3 cr. [max 15 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Selected history of medicine topics not covered in regular courses.

HMED 7500. Historical Research for Medical Students. (4 cr. [max 8 cr.] ; H-N only; Every Fall, Spring & Summer)
This course is designed to acquaint third and fourth year medical students with the sources and the methods of historical research in medical topics and to allow them to undertake a short research project on a topic which they help design.

HMED 8001. Foundations in the History of Early Medicine. (; 3 cr. ; A-F only; Every Fall)
History of Western medicine, from professionalization of healing in Greco-Egyptian antiquity to association of postmortem pathology with disease and clinical movement of early 19th-century Paris.

HMED 8002. Foundations in the History of Modern Medicine, 1800-present. (; 3 cr. ; A-F only; Every Spring)
History of Western medicine in Europe and America, from the Paris School and pathological anatomy in early 19c France through germ theories of disease, bacteriological revolution, reform of medical education, pharmaceutical revolution, growth of biomed research establishment, and comparative health care delivery systems.

HMED 8112. Historiography of Science, Technology, and Medicine. (; 3 cr. ; A-F only; Every Fall)
Models of practice, different schools. Work of representative historians of science, technology, and medicine. prereq: instr consent

HMED 8113. Research Methods in the History of Science, Technology, and Medicine. (; 3 cr. ; A-F only; Every Spring)
Introduction to sources, methods, and problems of research in history of science, technology, and medicine. Preparation of major research paper under faculty supervision. prereq: instr consent

HMED 8135. Disease and Debility in History. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
In this graduate seminar we will examine how concepts of disease and health have changed over time and across place. We?ll move from debates over the identity of the Black Death in 14th century Europe to the treatment of infectious diseases in Imperial China and colonial India, and to the contested diagnoses of AIDS and fetal alcohol syndrome in late 20th century United States. Along the way we?ll evaluate the different methodological approaches used by scholars to study the history of disease, and we?ll examine the ways in which social values, cultural assumptions, and political interests have shaped how diseases have been defined, experienced, and treated, and we?ll consider the role that diseases have played in the shaping of health care institutions, policies, and practices. At the same time, we?ll examine the processes of medicalization and demedicalization; colonialism, post-colonialism, and the politics of state-building; the ecological understandings of disease, environmentalism, and the politics of place; and the increasingly visible role of the politicized consumer and patient activist in late 20th century health care politics.

HMED 8220. Seminar: Current Topics in the History of Medicine. (; 3 cr. [max 9 cr.] ; A-F or Audit; Every Fall & Spring)
Topics vary. prereq: instr consent

HMED 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

HMED 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

HMED 8631. Directed Study. (; 1-6 cr. [max 12 cr.] ; A-F or Audit; Every Fall)
tbd prereq: instr consent

HMED 8632. Directed Study. (; 1-6 cr. [max 12 cr.] ; A-F or Audit; Every Spring)
tbd prereq: instr consent

HMED 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

HMED 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

HMED 8830. Topics in the History of Science, Technology, and Medicine. (; 3 cr. [max 9 cr.] ; A-F or Audit; Periodic Fall & Spring)
Historical literature of topics common to history of science, technology, and medicine. prereq: instr consent

HMED 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

History of Science and Tech (HSCI)

HSCI 5211. Biology and Culture in the 19th and 20th Centuries. (CIV; 3 cr. ; Student Option; Every Fall & Spring)
Changing conceptions of life and aims and methods of biology; changing relationships between biology and the physical and social sciences; broader intellectual and cultural dimensions of developments in biology.

HSCI 5242. Navigating a Darwinian World. (; 3 cr. ; Student Option; Every Spring)
In this course we grapple with the impact of Darwin's theory of evolution in the scientific community and beyond. We'll examine and engage the controversies that have surrounded this theory from its inception in the 19th century through its applications in the 21st. What made Darwin a Victorian celebrity, a religious scourge, an economic sage and a scientific hero? We'll look closely at the early intellectual influences on theory development; study the changing and dynamic relationship between science and religion; and critically analyze the application of Darwin's theory to questions of human nature and behavior.

HSCI 5244. Nature's History: Science, Humans, and the Environment. (; 3 cr. ; Student Option; Every Fall)
We examine environmental ideas, sustainability, conservation history; critique of the human impact on nature; empire and power in the Anthropocene; how the science of ecology has developed; and modern environmental movements around the globe. Case studies include repatriation of endangered species; ecology and evolutionary theory; ecology of disease; and climate change.

HSCI 5246. History of (Un)Natural Disasters. (3 cr. ; Student Option; Periodic Spring)
Earthquakes, hurricanes, tsunamis, wildfires, epidemic disease, and technological failures. This course will examine large scale natural events in American and world history, the social, technological, and environmental conditions that underlie them, and their historical consequences. Human societies have long been embedded in physical landscapes where they are subject to specific environmental conditions and physical risks: eight thousand-year-old wall paintings in Turkey depict the eruption of Hasan Dag volcano over the city of Catal Huyuk, for example. But then and now, it takes a certain combination of social conditions and environmental events to create a natural disaster. In this course, we will use historical natural disasters to explore the interconnections between the structures and ideas of human society and environmental forces. Humans have not been simply the random victims of natural disasters; where and how they chose to live influenced the impact of any disastrous event. Examining these events in a historical context will help us see the social, technological, scientific, and environmental systems that have been constantly interacting, but which are normally taken for granted until they break down.

HSCI 5331. Technology and American Culture. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Development of American technology in its cultural/intellectual context from 1790 to present. Transfer of technology to America. Establishment of an infrastructure promoting economic growth. Social response to technological developments.

HSCI 5332. Science in the Shaping of America. (; 3 cr. ; Student Option; Periodic Spring)
The British colonies of North America were founded in precisely the same centuries as a revolution in European?s understanding of nature, transformed by the ideas of Galileo, Newton, and Linnaeus and by the technologies of the industrial revolution. Native Americans and African Americans had their own knowledge of nature, and their close understanding intersected with the increasingly scientific techniques brought with European settlers and enhanced the survival and intellectual capacities of the newcomers. By demonstrating the diversity of scientists in the ever changing demographics of an immigrant nation, the course argues that this diversity and the capacities of newcomers contributed to the national success in science and engineering. The engagement with science at points were used to try to limit access by women or African-Americans, but sciences was also used to discredit false theories through ever expanding emphasis on empiricism as well as attention to the social and economic consequences of innovation. The goal is to demonstrate those historical linkages in particular places and institutions as they influenced and reinforced specific scientific work, while, at the same time, being attentive to how scientific ideas and practices were shaped by American culture.

HSCI 5401. Ethics in Science and Technology. (; 3 cr. ; Student Option; Periodic Fall)
Historical issues involving ethics in science. Ethical problems posed by modern science/ technology, including nuclear energy, chemical industry, and information technologies.

HSCI 5421. Engineering Ethics. (; 3 cr. ; Student Option; Every Fall & Spring)
Engineering ethics in historical context, including the rise of professional engineering societies; ethical problems in engineering research and engineers' public responsibility; ethical implications of advanced engineering systems such as the production of nuclear weapons; development of codes of ethics in engineering.

HSCI 5611. Enlightenment, Revolution, and the Rise of Modern Science. (3 cr. ; Student Option; Periodic Spring)
Understanding the origins of our own culture of Modern Science in the Enlightenment of the eighteenth century. Newton's ambiguous legacy; science as wonder and spectacle; automata and monsters; early theories of sex and gender; empire and scientific expeditions; reshaping the environment; inventing human sciences; Frankenstein and the limits of science and reason.

HSCI 5993. Directed Studies. (; 1-15 cr. ; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. prereq: instr consent

HSCI 5994. Directed Research. (; 1-15 cr. ; Student Option; Every Fall & Spring)
TBD prereq: instr consent

HSCI 8112. Historiography of Science, Technology, and Medicine. (; 3 cr. ; A-F only; Every Fall)
Models of practice, different schools. Work of representative historians of science, technology, and medicine.

HSCI 8113. Research Methods in the History of Science, Technology, and Medicine. (; 3 cr. ; A-F only; Every Spring)
Introduction to sources, methods, and problems of research in history of science, technology, and medicine. Preparation of major research paper under faculty supervision.

HSCI 8124. Foundations for Research in Ancient Science. (; 3 cr. ; A-F or Audit; Periodic Fall)
Development of natural/mathematical science in ancient Near East and Classical Greece. prereq: Grad HSci major or minor or instr consent

HSCI 8125. Foundations for Research in the Scientific Revolution. (; 3 cr. ; A-F or Audit; Fall Even, Spring Odd Year)
Development of sciences/natural philosophy, 1500-1725. prereq: Grad HSci major or minor or instr consent

HSCI 8131. Industrial Revolutions. (; 3 cr. ; A-F only; Spring Even Year)
Development of industrial society, from 1700 through 1850. Emphasizes developments in mechanical/engineering sciences. Scientific, economic, political, and social dimensions of industrialization.

HSCI 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

HSCI 8421. Social and Cultural Studies of Science. (; 3 cr. ; Student Option; Periodic Fall & Spring)

Review of recent work; theoretical and methodological differences among practitioners; selected responses from historians and philosophers of science.

HSCI 8441. Women in Science: Historical Perspectives. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Key literature dealing with patterns of participation in science and medicine since the 18th century. The ways in which modern science is perceived to be gendered, particularly in its practice and in ways that seem to influence theory and applications. prereq: instr consent

HSCI 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

HSCI 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

HSCI 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required (Plan A only)

HSCI 8830. Topics in the History of Science, Technology, and Medicine. (; 3 cr. [max 9 cr.] ; A-F or Audit; Periodic Fall & Spring)
Historical literature of topics common to history of science, technology, and medicine. prereq: instr consent

HSCI 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

HSCI 8900. Seminar: History of Early Physical Science. (; 3 cr. ; Student Option; Periodic Fall & Spring)
For advanced graduate students; topics in development of natural and mathematical science before 1800. prereq: instr consent

HSCI 8910. Seminar: History of Modern Physical Sciences. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
For advanced graduate students; topics in development of physical sciences since 1800. prereq: instr consent

HSCI 8920. Seminar: History of Biological Sciences. (3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
For advanced graduate students; topics in development of natural, biological, and medical sciences from Aristotle to the present. prereq: instr consent

HSCI 8930. Seminar: History of Technology. (3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
For advanced graduate students; topics in development of technology from ancient times to the present. prereq: instr consent

HSCI 8940. Seminar: History of Science and Technology in the Americas. (; 3 cr. ; Student Option; Every Fall & Spring)
For advanced graduate students; topics in development of science and technology, emphasizing the United States and Canada. prereq: instr consent

HSCI 8950. Seminar: Science and Technology in Cultural Settings. (; 3 cr. ; Student Option; Every Fall)
For advanced graduate students; topics in development of science and technology in or across specific geographic regions or particular cultures. prereq: instr consent

HSCI 8993. Directed Studies. (; 1-5 cr. [max 15 cr.] ; Student Option; Every Fall, Spring & Summer)
TBD prereq: instr consent

HSCI 8994. Directed Research. (; 1-5 cr. [max 15 cr.] ; Student Option; Every Fall & Spring)
TBD

Hmong (HMNG)

HMNG 5040. Readings in Hmong Texts. (; 3-4 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Comprehensive, multidimensional overview of Hmong oral forms/traditions. Hmong legends, mythology, folksongs, birth, marriage/funeral rites. History, social/cultural anthropology. Values, life ways of traditional village society. Societal changes resulting from emigration to U.S.

HMNG 5041. Readings in Hmong Social and Cultural Experience. (3 cr. ; Student Option No Audit; Every Spring)
Students read a variety of authentic texts in Hmong, ranging from traditional folklore, folksongs, stories, research, news articles, and more. Utilizing these authentic texts, students will have in-depth discussions on Hmong literature, vocabulary, language applications and social/cultural structures. In-class discussions focus on language use, social interpretations of texts, and social applications. Class is conducted 80% Hmong, and 20% English. prereq: HMNG 3031 or instructor consent

HMNG 5993. Directed Studies. (1-5 cr. [max 15 cr.] ; Student Option No Audit; Every Fall & Spring)
Guided individual study of Hmong language or linguistics. prereq: instr consent, dept consent, college consent

Horticultural Science (HORT)

HORT 5007. Advanced Plant Propagation. (3 cr. ; Student Option; Spring Odd Year)
Control of growth/development in sexual/asexual reproduction of plants. Effects of environment, plant growth substances. Protocols on dormancy, origin, development of adventitious structures. Specialized propagation techniques. Lecture, lab. prereq: 1001 or BIOL 2022

HORT 5023. Public Garden Management. (2 cr. ; Student Option; Every Spring)
Overview of knowledge/skills necessary to manage a public garden. History of public gardens. Development of mission and vision. Planning and design. Operations. Education and research. Fund raising, business management, personnel, marketing, conservation.

HORT 5031. Fruit Production and Viticulture for Local and Organic Markets. (3 cr. ; A-F or Audit; Fall Odd Year)
Principles of fruit production. Temperature fruit crops. Integrated management of fruit cropping systems. Site selection, cultural management practices, taxonomic classification, physiological/environmental control of plant development. Writing. prereq: [1001, 3005] or instr consent

HORT 5033. Growing Fruit & Vegetables for Local and Organic Markets. (4 cr. ; A-F or Audit; Every Spring)
This course will focus on production of fruits and vegetables for local and organic markets in the Upper Midwest. Most fruit and vegetable growers in Minnesota operate diversified production systems for local and organic markets (fresh market--not processing), and so we explore production within this specific framework, although examples from large-scale systems will be highlighted in order to compare and contrast different production features and challenges. During the first two weeks, we will explore the specialty crop industry, trends, consumer behavior, and marketing, including organic regulations and certification programs. We will make distinctions between annual and perennial crop production and climatic considerations-- with an emphasis on the upper Midwest and cold climates. We will explore fruit and vegetable production within the framework of sustainable agriculture, which encompasses agricultural productivity, economic viability, environmental conservation, and social equity, and how this relates to the regulatory framework supporting organic certification. Farms are very diverse, and we will compare and contrast aspects of sustainability within these systems and recognize current challenges in improving sustainability. The systems involved in developing, producing, and marketing fruit and vegetable crops are neither static nor independent?rather, quite dynamic in their relationships. This should be considered as we progress through the various study areas so that you can integrate and explore the connections between them. For example: site selection, land preparation, environmental interaction, specialized equipment, plant reproductive biology and plant genetics, seed selection and seed saving, cultural management practices during crop growth and development, water management, control of insects, diseases and weeds, post-harvest handling and food safety, marketing and commodity use will all be explored. The format of this class is 70% discussion, 30% lecture.

prereq: SOIL 2125 and [HORT 1001 or AGRO 1101 or BIOL 1009 or BIOL 1001 or another applicable biological science equivalent]

HORT 5071. Ecological Restoration. (4 cr. ; Student Option; Every Fall)
Each ecosystem restoration is the product of a myriad of decisions made in response to existing site conditions (biotic and abiotic), anticipated effects from the surrounding landscape, predictions about future events, logistical realities, and, of course, desired conditions. During this course, you will learn about the ecological and social factors that affect ecosystem recovery and how people intervene to reverse ecosystem degradation. The course includes examples from ecosystems around the world, with emphasis on those found in the Midwestern US. Field trips. PREREQUISITES: This course presumes previous courses in basic ecology and plant science.

HORT 5093. Directed Study. (1-4 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
A course in which a student designs and carries out a directed study on selected topics or problems under the direction of a faculty member; eg, literature review. Directed study courses may be taken for variable credit and special permission is needed for enrollment. Students enrolling in a directed study will be required to use the University-wide on-line directed study contract process in order to enroll. Prereq: department consent, instructor consent, no more than 6 credits of directed study counts towards CFANS major requirements.

HORT 5094. Directed Research. (1-4 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
An opportunity in which a student designs and carries out a directed research project under the direction of a faculty member. Directed research may be taken for variable credit and special permission is needed for enrollment.Students enrolling in a directed research will be required to use the University-wide on-line directed research contract process in order to enroll. Prereq: department consent, instructor consent, no more than 6 credits of directed research counts towards CFANS major requirements.

HORT 5114. Knowing and Naming the Plants We Eat. (; 1 cr. ; A-F only; Every Fall)
The 1-credit course HORT 5114 ?Knowing and naming the plants we eat? focuses on identification, taxonomy and characteristics of plants, and plant parts commonly contributing to human diets. Course modules emphasize culinary fruits, vegetables and herbs plus grains, pulses and oilseeds grown for food use. This online course meets synchronously for lecture and discussion on Wednesdays from 5pm to 6pm. Weekly lectures are posted online for asynchronous study. Students develop a portfolio of their course work where they document and reflect upon characteristics and taxonomic relationships among the plants addressed in this course. As a 5xxx-level course, students with less than 60 credits completed in their program (typically underclassmen) will need to request a permission number to enroll. prereqs: junior or senior; Biol 1001 or Biol 1009 or HORT 1001 or HORT 1015

HORT 5131. Student Organic Farm Planning, Growing, and Marketing. (; 3 cr. ; Student Option; Every Fall)
Students plan/implement cropping/marketing strategies for organic produce/flowers from Student Organic Farm on St. Paul campus. prereq: 1001 or AGRO 1101 or AGRO 1103 or BIOL 1001 or BIOL 1009 or instr consent

HORT 5480. Topics in Horticultural Science. (; 1-4 cr. [max 24 cr.] ; Student Option; Every Fall, Spring & Summer)
Topics vary.

HORT 6002. Problem Solving in Horticulture. (; 2-3 cr. [max 4 cr.] ; S-N only; Every Fall)
This course is intended to be a capstone experience that integrates the knowledge gained from coursework, personal research, and the student's academic and professional experiences. Enrollment is usually limited to students who have completed 18 or more credit hours of their required 30 credits, and accounts for 2 of the minimum 30 credits required for the degree. These credits are not considered part of the horticulture core course requirements; an additional 15 credits in Horticulture are required for the MPS Hort degree. Prerequisites: HORT 6101, completion of 18+ towards Master of Professional Studies in Horticulture Degree, and instructor consent.

HORT 6003. Masters of Professional Studies in Horticulture Professional Experience Program: Internship. (; 1-3 cr. [max 6 cr.] ; S-N only; Every Fall, Spring & Summer)
Professional experience in horticulture firms or government agencies attained through supervised practical experience. Students evaluate reports, consult with faculty advisers and with employers. prereq: Masters of professional studies in horticulture student, completed internship contract, instr consent

HORT 6011. Plant Propagation. (; 4 cr. ; A-F only; Every Fall)
Principles/techniques of propagating plants by seeds, cuttings, grafts, buds, layers, and division. Lectures on principles, labs on practice of various propagating techniques. Reading/discussion of related primary literature. prereq: Master of Professional Studies or instr consent

HORT 6101. Introduction to the MPS in Horticulture Program. (; 1 cr. ; A-F only; Every Fall)
This course will introduce you to the MPS Horticulture Program, along with the resources available at the University that can help you successfully complete your MPS degree.
In addition, you will learn more about the research, teaching, and outreach occurring in the Department of Horticultural Science and begin to plan for your required capstone project that occurs at the end of your degree program.
We will meet online each week via Zoom.
Our class time will be used in several ways including large and small group discussions, guest speakers, and workshops.

HORT 6141. Scheduling Crops for Protected Environments. (4 cr. ; A-F only; Every Spring)
The purpose of this course is to acquaint students with the identification, scheduling and cultural requirements of commercially produced potted plants, gain experience in growing them, and conduct experiments to understand current problems. The course builds on knowledge obtained in Hort 1001 or Hort 1015, by adding in additional factors of plant growth coupled with scheduling and growing a of crops which commercial growers would experience. The role of ornamental plants in the human environment will be discussed, with special emphasis on future issues. Writing is an integral component of this course; one major paper is revised and expanded multiple times plus other course writing fulfill the writing intensive requirement. Through the use of interactive learning, field trips, written assignments, and in-class discussions students learn crop requirements and the interactions between the marketing distribution system of breeders, producers, distributors, growers, retailers, and consumers.

HORT 8007. Extension Horticulture Practicum. (; 1-5 cr. ; Student Option; Every Fall, Spring & Summer)
Selected activities that may include development of an extension fact sheet, assistance in Dial-U Clinic, or preparation of a workshop or short course. prereq: 9 grad cr in [ag or bio] science, instr consent

HORT 8023. Evolution of Crop Plants. (; 3 cr. ; A-F only; Spring Even Year)
Origin, distribution, and evolution of cultivated plants; implication of the effects of evolutionary processes on crop breeding for needs of people today. prereq: 9 grad cr in ag or bio sciences

HORT 8044. Manipulation of Plant Growth and Reproduction. (; 2 cr. ; Student Option; Periodic Fall & Spring)
Impact of environmental and genetic factors on crop growth, development, and reproduction. Emphasis on whole plant physiology and plant response to the environment as determined by genotype and its manipulation for the purpose of producing a crop. Lectures, discussion of current literature, and projects. prereq: PBio 5412

HORT 8093. Directed Study. (1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
A course in which a student designs and carries out a directed study on selected topics or problems under the direction of a faculty member; eg, literature review. Directed study courses may be taken for variable credit and special permission is needed for enrollment. Graduate students enrolling in a directed study will need to follow the designated graduate student directed study enrollment procedure found on the Plant Science and Food Systems websites (plantscience.umn.edu and foodsystems.umn.edu). Prereq: department consent, instructor consent, no more than

6 credits of directed study counts towards CFANS major requirements.

HORT 8094. Directed Research. (1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
A course in which a student designs and carries out a directed research on selected topics or problems under the direction of a faculty member; eg, literature review. Directed research courses may be taken for variable credit and special permission is needed for enrollment. Graduate students enrolling in a directed research will need to follow the designated graduate student directed research enrollment procedure found on the Plant Science and Food Systems websites (plantscience.umn.edu and foodsystems.umn.edu). Prereq: department consent, instructor consent, no more than 6 credits of directed research or directed study counts towards CFANS major requirements.

HORT 8280. Current Topics in Applied Plant Sciences. (; 1 cr. ; S-N or Audit; Every Fall & Spring)
Topics presented by faculty or visiting scientists. prereq: Grad major in [hort or applied plnt sciences or ent or agro or plnt brdg or plnt path or soil] or instr consent

HORT 8900. Advanced Discussions. (; 1-3 cr. [max 36 cr.] ; Student Option; Every Fall & Spring)
Special workshops or courses in applied plant sciences. prereq: instr consent

Housing Studies (HSG)

HSG 5193. Directed Study in Housing Studies. (; 1-4 cr. [max 8 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Independent study in Housing Studies under tutorial guidance. prereq: Jr or sr or grad student

HSG 5462. Housing and Community Development. (3 cr. ; A-F only; Every Fall)
An examination of the linkages between housing and community development. The process of residential neighborhood change and the impact of housing on neighborhood conditions is explored. The course considers theories of neighborhood change, trends in residential development, and concepts of community building in the built environment. Private sector, community-based, and governmental efforts at neighborhood revitalization and their effectiveness will be studied. Related issues such as racial discrimination in housing, gentrification and the displacement of low-income residents are discussed. Course includes an engaged group project to access housing and amenities in a specified neighborhood.

HSG 5463. Housing Policy. (; 3 cr. ; A-F or Audit; Every Spring)
Institutional/environmental settings that make up housing policy in the United States. Competing ideas about solving housing problems through public intervention in the market. Federal/local public sector responses to housing problems. prereq: [[2401 or DHA 2401], [2463 or DHA 2463]] or instr consent

HSG 5467. Housing and the Social Environment. (; 4 cr. ; A-F or Audit; Every Fall)
Housing choices in context of social environment. Emphasizes special needs of elderly, disabled, minorities, large families, female-headed households, and low-income households. Students conduct a post-occupancy evaluation of housing.

HSG 8192. Readings in Housing Studies. (; 1-3 cr. [max 8 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Independent study, review of books, and periodicals under tutorial guidance. prereq: instr consent

HSG 8193. Directed Study. (; 1-3 cr. [max 8 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Directed study in housing studies. prereq: instr consent

HSG 8222. Plan B Master's Project. (; 3 cr. ; S-N or Audit; Every Fall & Spring)
Plan B master's project. prereq: [DHA or design master's] student, instr consent

Human Factors (HUMF)

HUMF 5001. Foundations of Human Factors/ Ergonomics. (3 cr. ; A-F or Audit; Periodic Fall)
Variability in human performance influenced by interaction with designs of machines/ tools, computers/software, complex technological systems, jobs/working conditions, organizations, sociotechnical institutions. Conceptual, empirical, practical aspects of human factors/ergonomics. prereq: Grad HumF major or minor or instr consent

HUMF 5193. Directed Study in Human Factors and Ergonomics. (1-4 cr. [max 8 cr.] ; A-F only; Every Fall, Spring & Summer)
Independent study in human factors/ ergonomics under tutorial guidance. prereq: instr consent

HUMF 5211. Human Factors and Work Analysis. (; 4 cr. ; A-F or Audit; Every Fall)
Human factors engineering (ergonomics), methods engineering, work measurement. Displays, controls, instrument layout, supervisory control. Anthropometry, work physiology, biomechanics. Noise, illumination, toxicology. Operations analysis, motion study, time standards.

HUMF 5874. Human Centered Design to Improve Complex Systems. (4 cr. ; A-F or Audit; Every Spring)
Class participants will work together using design thinking frameworks to discover, define, develop, and propose solutions to help solve complex system problems. The class will use cognitive design methods and research to guide in developing prototypes that foster improved experiences in information delivery, processes of systems, and technology. Teams, will tackle complex real-world problems. Projects may focus on a variety of areas ranging from retail to health care. Coursework will primarily focus on team-based projects. Participants will immerse themselves the following activities while working towards remediating their chosen problems. ? insights gathering/research methods ? cognitive design methods and principles ? identifying strengths/ weaknesses in actual vs. proposed systems ? implementation (prototyping) considerations/ strategies The course will be highly interactive with little lecture. It will strive to foster critical thinking and will offer an environment where creativity can thrive. Students are expected to come to class fully prepared to interact during class time with the readings and research consumed outside class. Material from course readings will focus on cognitive design, systems thinking principles and will be interwoven during the discussions and class activities. This course is designed for students from a variety of backgrounds and programs, including students from Human Factors, the Academic Health Center, Graphic Design, Product Design, Retail, Interior Design, Landscape Architecture, Architecture, Biomedical Engineering, Mechanical Engineering, Industrial Engineering, and the Carlson School. Human Factors students working toward a Plan C Master?s degree may use this course as one of the two courses required to be 50% project-based.

HUMF 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
FTE: master's. prereq: Master's student, adviser consent, DGS consent

HUMF 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
FTE: doctoral. prereq: Doctoral student, adviser consent, DGS consent

HUMF 8541. Decision Support Systems. (; 4 cr. ; A-F or Audit; Every Fall & Spring)
Students build a decision support system for a problem of their choice. How to identify appropriate problems. Styles of DSSs, evaluating their effectiveness. prereq: Undergrad-level computer programming course or instr consent; programming skills recommended

HUMF 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Doctoral pre-thesis credits. prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr

HUMF 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Thesis credits: master's. prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

HUMF 8794. Human Factors Research. (; 1-4 cr. ; S-N only; Every Fall, Spring & Summer)
Human factors research.

HUMF 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Thesis credit: doctoral. prereq: Max 18 cr per semester or summer; 24 cr required

HUMF 8901. Graduate Seminar in Human Factors and Ergonomics. (1 cr. [max 3 cr.] ; A-F only; Every Fall)
Exploration of current topics, methods, and findings related to the field of Human Factors and Ergonomics (HFE).

Human Resources/Indus Rel (HRIR)

HRIR 5000. Topics in HRIR. (; 2 cr. [max 8 cr.] ; Student Option; Every Fall, Spring & Summer)
Topics in human resources/industrial relations. HRIR MA student must register A-F, 3021, [CSOM or HRD junior or senior or dept consent]

HRIR 5222. Creating and Managing Diversity and Inclusion. (2 cr. ; Student Option; Every Fall & Spring)
This course covers the challenges and rewards associated with managing today?s increasingly diverse workforce. Diversity has the potential to benefit employees and organizations alike, yet the benefits of diversity are only realized in organizations with effective diversity management practices. In this course, we will discuss the power of inclusion as it relates to the employee experience. We will study effective strategies for building diverse and inclusive companies, and will address the barriers that can often exist. We will look at approaches to organizational design that limit unconscious bias and produce more objective decisions across the employee experience? from engaging and hiring candidates to retaining employees and helping them thrive. Finally, we will dive into how to create inclusive cultures and a sense of belonging, across local and global contexts. Student engagement and willingness to share diverse perspectives are critical to the success of this course. prereq: HRIR MA student must register A-F, 3021, [CSOM or HRD junior or senior or dept consent]

HRIR 5252. Employment and Labor Law for the HRIR Professional. (2 cr. ; Student Option; Every Fall & Spring)
Application of statutes/case law to work settings. Civil rights/equal opportunity. Discrimination/harassment. Compensation/ benefits. Employee protection/privacy. Labor relations. Emphasizes application/ability to recognize legal aspects of HRIR issues. prereq: HRIR MA student must register A-F, 3021, [CSOM or HRD junior or senior or dept consent]

HRIR 5442. Employee Performance Management: Strategies, Systems, and Skills. (2 cr. ; Student Option; Every Fall)
Performance management strategies. Components of effective performance management systems. Alignment with HR strategy. Integration with HR practices. Measurement/appraisal. Feedback, coaching. Legal issues. prereq: HRIR MA student must register A-F, 3021, [CSOM or HRD junior or senior or dept consent]

HRIR 5443. Principles of Effective Coaching. (2 cr. ; A-F only; Every Fall)
Skills/competencies required to coach, mentor, develop employees/leaders. Managing coaching process. Planning coaching relationship. Coaching as leadership development strategy. Coaching executives. prereq: HRIR MA student must register A-F, [CSOM or HRD junior or senior or dept consent] with HRIR 3021

HRIR 5450. Change in the Workplace. (; 2 cr. ; A-F only; Every Spring)
Change is the only constant in our world today. This course focuses on how to lead in a VUCA world of Volatility, Uncertainty, Complexity, and Ambiguity. Specifically, this course covers models & frameworks, strategies, best practices, and challenges to leading change management. We will discuss preparing and planning for change, implementing change, communicating change, and sustaining & reinforcing change. We will also explore how to apply these concepts in various personal & professional situations.

HRIR 5655. Public Policies on Work and Pay. (3 cr. ; Student Option; Every Spring)
Analysis of public policies regarding employment, unions, labor markets. Public programs affecting wages, unemployment, training, worker mobility, security, quality of work life. Policy implications of changing nature of work. prereq: HRIR MA student must register A-F, ECON 1101, [CSOM or HRD junior or senior or dept consent]

HRIR 5662. Personnel Economics. (2 cr. ; Student Option; Every Fall & Spring)
Application of economic tools to issues in human resources/industrial relations. Incentives/imperfect information. Incentive-based pay. Promotions/tournaments. Human capital/training. Screening/signaling. Applications/limitations. prereq: Prereq- HRIR MA student must register A-F, ECON 1101, [CSOM or HRD junior or senior or dept consent]

HRIR 5992. Independent Study in Human Resources and Industrial Relations. (1-8 cr. ; Student Option; Every Fall, Spring & Summer)
Individual readings or research topics. prereq: dept consent or instr consent

HRIR 6000. Graduate Topics in Human Resources and Industrial Relations. (; 1-8 cr. ; A-F only; Every Fall & Spring)
Selected graduate topics of current relevance to human resource management/industrial relations. prereq: HRIR MA student or dept consent

HRIR 6001. Business Principles for the HRIR Professional. (4 cr. ; A-F only; Every Fall)
Nature/functions of business corporations. Role of HRIR in business. Markets, competition, profitability, employment, investment. Introduction to finance/accounting. Global business pressures/HRIR. Trends for future. prereq: MHRIR student or dept consent

HRIR 6009. Introduction to Human Resources and Industrial Relations. (3 cr. ; A-F only; Every Fall)
Human resource professional as strategic partner in managing organizations. Human resource management in achieving organizational performance. Legal environment. Job analysis. Recruiting/ selection. Training/development. Performance management. Total rewards. Global HR. Labor relations. Ethical issues. prereq: HRIR MA student or dept consent

HRIR 6111. Using Data and Metrics in Human Resources and Industrial Relations. (4 cr. ; A-F only; Every Fall & Spring)
Theory/applications of methods of data analysis for using data in HRIR decision-making. Descriptive/inferential statistics, especially hypothesis tests/confidence intervals. Regression analysis. Identification of appropriate techniques. Avoiding unreliable inferences. Introduction to HRIR metrics. prereq: HRIR MA student or dept consent

HRIR 6112. People Analytics. (; 2 cr. ; A-F only; Every Spring)
This course integrates data visualization, domain knowledge in human resources/ people management, and data science tools. The course aims to give you exposure to core concepts in machine learning, including prediction, classification, and segmentation, in order to be able work with data scientists to solve business challenges using employee data. A key tenet of the course is learning how to use HR domain knowledge to inform the analysis and visualization of employee data in order to generate insights and inform decisions.

HRIR 6114. Human Resource Information Systems. (2 cr. ; A-F only; Every Fall & Spring)
Integrating human resources practices with information technology to effectively support organizational needs. Determining HRIS needs. HRIS implementation/acceptance. HRIS applications in HR administration/operations, recruitment/selection, talent management, other HR areas. Emerging trends. prereq: HRIR MA student or dept consent

HRIR 6145. Organizational Development, HR Metrics, and the Balanced Scorecard. (2 cr. ; A-F only; Every Spring)
Nature/conduct of organizational change. Enhancing organizational effectiveness, improving quality of work life, increasing productivity, facilitating problem solving through diagnostics, interventions, metrics, scorecards. Intervention/evaluation strategies/processes. HR professional as consultant. prereq: 6441 or dept consent

HRIR 6223. International Human Resource Management. (2 cr. ; A-F only; Every Fall)
Strategies for effective management. Analysis of cross-cultural differences in values, norms, practices. How they affect organizational behavior/performance. Implications for designing HR practices in multinational organizations/international contexts. prereq: HRIR MA student or dept consent

HRIR 6301. Staffing, Training, and Development. (4 cr. ; A-F only; Every Fall)
Developing plans for hiring to facilitate strategic goals, attracting talent, selecting best

candidates, helping new employees onboard, developing knowledge/skills over time, keeping talented people. Evaluation of staffing, training, development effectiveness. prereq: HRIR MA student or dept consent

HRIR 6302. Staffing and Selection: Strategic and Operational Concerns. (2 cr. ; A-F or Audit; Every Fall & Spring)
Theory/practice related to staffing decisions. Recruitment, selection, promotion, transfer, dismissal, layoff, retirement in organizations. Legal environment in which staffing decisions are made. Staffing from strategic/organizational perspectives. prereq: 6301 or dept consent

HRIR 6303. Employee Training: Creating a Learning Organization. (2 cr. ; A-F only; Every Fall)
Theory, research, practice related to design/implementation of employee training programs. Needs analysis. Training outcomes. Instructional design/training techniques. Program evaluation/costing. Role of employees, firm policies/practices in training. prereq: 6301 or dept consent

HRIR 6304. Employee Development: Creating a Competitive Advantage. (2 cr. ; A-F only; Every Spring)
Career development/planning. Employee/management development techniques, organizational/employee concerns related to socialization, cross-cultural assignments, change, engagement, performance management. prereq: 6301 or dept consent

HRIR 6401. Organizational Theory Foundations of High-Impact HRIR. (2 cr. ; A-F only; Every Fall & Spring)
Economic aspects of individual and group behavior in organizations. Individual and collective rationality, information, incentives, coordination problems, and contracts. Impacts on HRIR decisions and outcomes. Solutions and approaches to problems in organizations at micro and macro levels. prereq: dept consent

HRIR 6402. HR Practices, HRM Strategy, and Organizational Performance. (2 cr. ; A-F only; Every Fall)
Analysis of how different organizational practices/combinations thereof affect organizations in competitiveness, profitability, workplace safety, employment stability, wages. Coherence/consistency of system of organizational practices in relation to various contingencies. prereq: 6401 or dept consent

HRIR 6403. Comparative Organizations and HRM Systems. (2 cr. ; A-F only; Every Spring)
Variations in organizational practices related to variations in ownership. Profit, nonprofit, government, cooperatives, economic systems, culture, technology, market structure. Organizational practices. Employee empowerment, job enrichment, profit sharing, employee stock ownership, individual incentives, international comparisons. prereq: 6401 or dept consent

HRIR 6441. Organizational Behavior Foundations of High-Impact HRIR. (2 cr. ; A-F only; Every Fall & Spring)
Psychological aspects of individual/group behavior in organizations. Individual motivation, attitudes/job satisfaction. Leadership. Organization design/culture. Impacts on HRIR decisions/outcomes. Solutions/approaches to problems in organizations at micro/macro levels. prereq: HRIR MA student or dept consent

HRIR 6444. Employee Motivation, Engagement, and Well-being. (2 cr. ; A-F only; Every Spring)
Employee motivation, behavior, job attitudes. How they can be channeled into productive/unproductive behaviors/employee well-being. How work behavior is influenced by individuals, groups, features of organizations. prereq: 6441 or MBA 6110 or dept consent

HRIR 6484. Management of Teams. (2 cr. ; A-F only; Every Fall, Spring & Summer)
Factors that influence performance, well-being of groups in organizations. Group dynamics, norms, culture, structure, leadership, decision-making, problem-solving. Managing dynamics, learning, performance, creativity of groups. Intergroup relations, incentives, effect of environment. prereq: HRIR grad student.

HRIR 6501. Compensation and Benefits. (4 cr. ; A-F only; Every Spring)
The objective of this course is to provide students a foundation for designing and implementing a complete compensation plan. Through cases, lectures, and simulations, we examine how organizations set up the base compensation, incentive structures, equity awards, and benefits programs that attract, retain, and motivate the people who will execute the organization?s strategy. Topics include job analysis, labor markets, pay structures, merit raises, short-term incentives, long-term incentives (e.g. stock options), benefits, and compliance issues (e.g. the FLSA). Regular cases illustrate the type of strategic, technical, and interpersonal issues confronted by compensation and benefits professionals. prereq: HRIR Masters student or dept consent

HRIR 6502. Rewards Management Strategies. (2 cr. ; A-F only; Every Spring)
This course focuses on strategies for defining, measuring and rewarding employee contributions to organizational success. Concepts, principles and techniques for effectively managing employee performance and rewards will be explored. This course will utilize cases to illustrate real-world conflicts and the application of compensation principles and practices to arrive at their proper analysis and resolution. prereq: 6501 or dept consent

HRIR 6503. Employer-Sponsored Employee Benefit Programs. (2 cr. ; A-F only; Every Spring)
Design, administration, management of non-mandatory compensation benefit programs, including health/dental care plans/insurance, retirement plans, disability benefits, paid time off, accommodation benefits. Effects of providing benefits on workers' incentives for performance. Psychological foundations of employee benefits. Role of benefits in employee recruitment/retention. prereq: 6501 or dept consent

HRIR 6504. Executive Compensation. (2 cr. ; A-F only; Every Spring)
Course emphasizes understanding and appreciation of the complexities of executive compensation. Course will develop your knowledge of analysis and design of executive compensation, teach you to read and understand executive compensation disclosures, develop an awareness of trends, issues and challenges and give you an idea of how accounting, tax regulations, and other regulations shape executive compensation. Through the use of cases, class discussions and interactive experiential activities this course will develop your intellectual ability to critically examine, analyze, and deal with the complexity and ambiguity of executive compensation. prereq: A-F only; prereq MBA or HRIR MA student

HRIR 6664. Topics in Labor Market Analysis. (; 2-4 cr. ; A-F only; Periodic Fall & Spring)
May include micro aspects of unemployment, implicit contracts/efficiency wages, investment in human capital, occupational choice, job search, job matching/turnover, migration, labor force participation, government program evaluation. prereq: 6001, 6111, [Business Admin PhD student or dept consent]

HRIR 6701. Labor Relations and Collective Bargaining. (4 cr. ; A-F only; Every Spring)
Evolution of U.S. labor unions/public policy, bargaining environment/structure, goals/negotiations, contract administration/results. International comparisons, labor-management cooperation, newly emerging issues. prereq: HRIR MA student or dept consent

HRIR 6702. Contemporary Issues in Labor Relations. (2 cr. ; A-F only; Every Fall)
Focused issues of particular concern to various actors in contemporary labor relations. Topics vary. prereq: 6701 or dept consent

HRIR 6703. Dispute Resolution: Labor Arbitration. (2 cr. ; A-F only; Every Fall)
Arbitration to resolve grievances/impasses arising out of collective bargaining agreement's administration/negotiation. Arbitration law/legal issues, procedures/practices, case presentation, management rights, discipline/discharge, evidence, contract language interpretation, remedies. Newly emerging approaches. prereq: 6701 or dept consent

HRIR 6801. HRIR in Practice: Strategy, Execution, and Ethics. (2 cr. ; A-F only; Every Spring)
Types of strategies. Developing/executing HRIR strategies. Project management. Ethical frameworks, issues, considerations in HRIR. prereq: [6001, 6111, 6301, 6401, 6441, 6501, 6701] or dept consent

HRIR 6802. Capstone Project. (2 cr. ; A-F only; Every Spring)
Application of related knowledge, concepts, methods to practical problem in human resources/industrial relations. Benchmarking of related best practices in research/practice. Full development, analysis, proposed recommendations for implementation or improvement of selected problem. prereq:

[6001, 6111, 6301, 6401, 6441, 6501, 6701] or dept consent

HRIR 6805. HRIR Leadership Practicum. (0.5-1 cr. ; S-N only; Every Fall & Spring)
This course is designed to help build a foundation for HRIR students to be leaders in the HR profession. The course will consist of leadership training, cross-cultural agility assessments and development, scenario-base exercises, and reflection by the student on themselves as an HR global leader.

HRIR 6822. Field Project. (4 cr. ; Student Option; Every Fall & Spring)
Teams formulate/execute study of actual business problem faced by business, non-profit, or governmental organization, generally in Twin Cities. prereq: [6001, 6111, 6301, 6401, 6441, 6501, 6701] or dept consent

HRIR 6992. Independent Study in Applied Human Resources and Industrial Relations. (1-8 cr. ; S-N only; Every Fall, Spring & Summer)
Individual readings, research topics, projects in applied settings. prereq: dept consent

HRIR 8041. Design and Management of Organizations. (; 4 cr. ; Student Option; Every Fall)
Introduction to micro through macro organizational issues at individual, dyadic, group, organizational, and environmental levels; their implications for organizational design, control, coordination, and development. prereq: Econ 1101, Econ 1102, Psy 1001 or instr consent, grad HRIR major or dept consent; grad majors must enroll A-F only

HRIR 8063. Human Resources and Organizational Performance. (; 2 cr. ; Student Option; Every Fall)
Impact of human resource policies and practices on organizational productivity and effectiveness. Role of government, unions, and private sector institutions on organizational effectiveness. prereq: 8061 or instr consent, grad HRIR major or dept consent; grad majors must enroll A-F only

HRIR 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: HRIR MA student, dept consent

HRIR 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

HRIR 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

HRIR 8801. Core Seminar: Fundamentals of Economic Analysis for Work and Organizations. (4 cr. ; Student Option; Periodic Fall & Spring)
Theoretical/empirical approaches in labor/organizational economics. Labor supply/demand. Monopoly/institutional features of labor markets. Compensation, incentives sorting, training. Approaching topics/questions in work/organizations from economic perspective. prereq: [Business Admin PhD student or dept consent], grad majors must enroll A-F

HRIR 8802. Core Seminar: Organizational Behavior. (4 cr. ; Student Option; Periodic Fall)
Major theories/current research on individuals in organizations. Job attitudes/motivation. Personality/individual differences. Team effectiveness. Antisocial/pro-social behavior. Emotions. Justice.

HRIR 8803. Core Seminar: Fundamentals of HR Research. (4 cr. ; Student Option; Periodic Fall & Spring)
Major theories/current research on human resources/industrial relations practices/institutions. Recruitment, selection, job performance. Training/development. Compensation. Other practices/institutions. prereq: [Business Admin PhD student or dept consent], grad majors must enroll A-F

HRIR 8812. Core Seminar: Research Methods in Work and Organizations. (4 cr. ; Student Option; Periodic Spring)
Application in research projects. prereq: [Business Admin PhD student or dept consent], grad majors must enroll A-F

HRIR 8820. Seminar: Special Topics in Work and Organizations Research. (; 2 cr. [max 12 cr.] ; Student Option; Every Spring)
Contemporary theories/research on specific topics in work/ organizations. Topics vary. prereq: [Business Admin student or dept consent], grad majors must enroll A-F

HRIR 8825. Research Practicum/Workshop. (1 cr. [max 4 cr.] ; S-N only; Every Fall & Spring)
Experience in conducting research/other doctoral student activities.

HRIR 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

HRIR 8991. Independent Study in Human Resources and Industrial Relations. (; 1-8 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Individual readings and/or research projects. prereq: instr consent

Human Sexuality (HSEX)

HSEX 6001. Foundations of Human Sexuality. (; 3 cr. ; A-F or Audit; Every Fall)
Foundations of Human Sexuality covers topics in human sexuality, including biology and sexuality; sexuality across the lifespan, cultures and history; religions, epidemiology and clinical issues; and sexuality and legal/social aspects. Using readings, discussion forums, peer review, and an applied final project, students will understand the interactions between biological, social, and individual factors in producing variations in human sexuality.

HSEX 6011. Policy in Human Sexuality: Cutting Edge Analyses. (; 3 cr. ; A-F or Audit; Every Fall)
Policy in Human Sexuality: Cutting Edge Analyses offers an overview of United States and international policy related to gender and sexuality. The course will present the content and impact of such policies across human life stages, from youth reproductive health to aging LGBTQ folks; and a variety of contexts including education, military service, employment, and criminal legal systems. Using readings, multimedia sources, discussion forums, peer review, and an applied final project, students will understand the theory, process, and central actors in policy development and implementation, and the real-world effects of these processes.

HSEX 6013. Perspectives and Practices in Sexual Health Education. (; 3 cr. ; A-F or Audit; Every Spring)
This course covers the history of sexuality education, primarily in the US with international comparison, as well as current and emerging issues in sexual health education. Using readings, discussion forums, peer review, and an applied final project, students will understand the temporal changes in sexual health education in the US and abroad and the empirical, theoretical, and educational foundations of sexual health education.

HSEX 6015. Sexual Pleasure & Intimacy. (; 3 cr. ; A-F only; Every Summer)
This course will provide information on sexual intimacy, pleasure, and sexual well-being. It will explore the theoretical understandings of pleasure, and the historical and cultural considerations in understanding sexual pleasure and intimacy. This course will also cover emerging issues as they pertain to intimacy, pleasure, and sexual well-being. This course will utilize readings, discussion forums, and an applied final project to foster students? theoretical, empirical, and sociocultural understanding of sexual intimacy, pleasure, and well-being.

HSEX 6211. Dimensions of Sexual Functioning. (; 3 cr. ; A-F or Audit; Every Spring)
This course covers various aspects of sexual function and dysfunction as well as an in-depth overview of sexual health as it pertains to the general public. Using readings, discussion forums, peer review, and an applied final project, students will understand the range of sexual responses people may experience, diagnostic categories of sexual functioning, and the range of therapies available.

HSEX 6212. Sex and Relationship Therapy. (; 3 cr. ; A-F only; Every Fall)
This course will focus on the fundamentals and clinical application of sex therapy for couples and individuals. Course materials will address assessment, diagnosis, and treatment of the broad spectrum of sexual health concerns. In addition, it will address theories of practice,

and implications for special populations, with emphasis on biopsychosocial dimensions of health.

HSEX 6213. Sexual Trauma and Trauma Informed Care. (; 3 cr. ; A-F or Audit; Every Spring)
This course will provide information on sexual trauma, including theoretical understandings of sexual trauma, historical and cultural considerations in understanding sexual trauma, psychological, sociological, and cultural effects of sexual trauma, and considerations in treating sexual trauma. This course will also cover emerging issues as they pertain to sexual trauma. This course will utilize readings, discussion forums, and an applied final project to foster students? theoretical, empirical, and sociocultural understanding of sexual trauma.

HSEX 6311. Introduction to Healthcare for Transgender and Gender Diverse Adults. (; 3 cr. ; A-F only; Every Fall)
Introduction to Healthcare for Transgender and Gender Diverse Adults seeks to define trans healthcare through a historical, analytical, and and concern-based curriculum. The first half of the course will explore the components of sexual identity through an intersectional lens, the systemic marginalization of gender-diverse populations, and the historical pathologization of non-conforming sexual identities in the history of healthcare. The second half of this course seeks to define trans healthcare through a tripartite lens of care preceding and during transition, care for non-conforming people, and healthcare for trans concerns before analyzing the historicity of the World Professional Association for Transgender Health (WPATH) standards of care and relevant ongoing care for gender-diverse patients. Students will engage in a discussion-rich curriculum that focuses on destabilizing of race, class, and gender-centric assumptions surriounding the topics of gender identity, sexual orientation, birth-assigned sex, and gender expression. They will also complete a number of case studies to critically engage with topics such as broader trans representation, non-binary healthcare options, historical advances in trans health, and reproductive justice for trans communities. The course will culminate in a student-directed final project that asks them to reflect on how they might apply this knowledge to their specific career trajectory.

HSEX 6312. Intersectional and Decolonizing Approaches to Transgender Health. (; 3 cr. ; A-F only; Every Spring)
This foundational course seeks to provide the groundwork for understanding intersectional and decolonizing pedagogy and theory and application to transgender health. Theories will also focus on examining historical, analytical, and community-informed factors that influence access to care. This course explores the components of identity development through an intersectional lens, systemic marginalization of gender-diverse populations, and historical pathologization of diverse gender and sexual identities in healthcare. Students will be exposed to discourse that focuses on destabilizing biases and western assumptions surrounding the topics of gender identity, sexual orientation, sex assigned at birth, and gender expression. Overall, this course aims to prepare students to engage in reflexive thinking about systems-level interventions in transgender health.

HSEX 6313. Gender Diversity, Sexuality, & Sexual Health. (; 3 cr. ; A-F only; Every Fall)
This course seeks to introduce the core conceptual and theoretical approaches to applied sexual health care. The first portion of the course will provide an overview of the components of sexual identity, including gender identity, sex assigned at birth, sexual orientation, and gender expression. The second portion of the course will introduce the theoretical and empirical literature within public health, epidemiology, sex therapy, and sexology fields regarding sexual health issues with TGD communities. The course will provide deeper exploration of these broader introductory topics from a sex positive and pleasure oriented framework including medical and relational impacts of medical transition, sex therapy interventions, gender euphoria and gender dysphoria, and gender embodiment. Students will complete a number of case studies to critically engage and apply learnings from the course as well as be exposed to empirical and conceptual readings from an interdisciplinary gender affirming perspective. The course will culminate in a student-directed final project that asks them to reflect on how they might apply this knowledge to their specific career trajectory.

HSEX 6314. Healthcare for Transgender & Gender Diverse Children & Adolescents. (; 3 cr. ; A-F only; Every Summer)
This course will examine the healthcare (broadly defined) needs and care of transgender and gender diverse children and adolescents. To lay the groundwork, we will discuss the importance of a well-balanced, nuanced, and thoughtful approach to the available research, clinical knowledge, and dilemmas in the field. This course will also cover emerging issues and controversies as they pertain to care for trans and gender diverse children and adolescents. Themes discussed will include the WPATH standards of care and gender-affirming practices. This course will utilize readings, discussion forums, and an applied final project to foster students? theoretical, empirical, and sociocultural understanding of healthcare for trans and gender diverse children and adolescents.

HSEX 6950. Topics in Sexuality and Sex Education. (; 1-3 cr. [max 12 cr.] ; A-F only; Periodic Fall, Spring & Summer)
Topics in Sexuality and Sex Education.

HSEX 6993. Directed Studies in Sexual Health. (; 1-3 cr. [max 12 cr.] ; S-N only; Every Fall, Spring & Summer)
Directed Studies in Sexual Health.

HSEX 6994. Directed Research in Sexual Health. (; 1-3 cr. [max 12 cr.] ; S-N only; Every Fall, Spring & Summer)
Directed Research in Sexual Health

Industrial Engineering (IE)

IE 5012. Discrete Optimization Methods and Applications. (4 cr. ; A-F only; Every Spring)
Discrete and combinatorial optimization techniques; heuristics; dynamic programming; handling uncertainty in optimization models. Applications in logistics, healthcare, data analysis. (Previously offered as IE 3012.) prereq: (i) MATH 2374, MATH 2142 or MATH 2373 or equivalent, (ii) Upper Division CSE, (iii) CSCI 1133 or equivalent

IE 5080. Topics in Industrial Engineering. (; 1-4 cr. [max 8 cr.] ; Student Option; Periodic Fall & Spring)
Topics vary each semester.

IE 5111. Systems Engineering I. (; 2 cr. ; A-F or Audit; Every Fall)
Overview of systems-level thinking/techniques in context of an integrated, design-oriented framework. Elements of systems engineering process, including lifecycle, concurrent, and global engineering. Framework for engineering large-scale, complex systems. How specific techniques fit into framework. prereq: CSE upper div or grad student

IE 5113. Systems Engineering II. (; 4 cr. ; A-F or Audit; Every Spring)
Systems engineering thinking/techniques presented in 5111. Hands-on techniques applied to specific problems. Topics pertinent to effectiveness of design process. Practices and organizational/reward structure to support collaborative, globally distributed design team.

IE 5441. Financial Decision Making. (4 cr. ; A-F only; Every Fall, Spring & Summer)
Cash flow streams, interest rates, fixed income securities. Evaluating investment alternatives, capital budgeting, dynamic cash flow process. Mean-variance portfolio selection, Capital Asset Pricing Model, utility maximization, risk aversion. Derivative securities, asset dynamics, basic option pricing theory. prereq: CSE upper div or grad student

IE 5511. Human Factors and Work Analysis. (; 4 cr. ; A-F or Audit; Every Fall)
Human factors engineering (ergonomics), methods engineering, and work measurement. Human-machine interface: displays, controls, instrument layout, and supervisory control. Anthropometry, work physiology and biomechanics. Work environmental factors: noise, illumination, toxicology. Methods engineering, including operations analysis, motion study, and time standards. prereq: Upper div CSE or grad student

IE 5513. Engineering Safety. (; 4 cr. ; A-F or Audit; Every Fall & Spring)
Occupational, health, and product safety. Standards, laws, and regulations. Hazards and their engineering control, including general principles, tools and machines, mechanics and structures, electrical safety, materials handling, fire safety, and chemicals. Human behavior and safety, procedures and training, warnings and instructions. prereq: Upper div CSE or grad student

IE 5522. Quality Engineering and Reliability. (; 4 cr. ; Student Option; Periodic Fall & Spring)
Quality engineering/management, economics of quality, statistical process control design of experiments, reliability, maintainability, availability. prereq: [4521 or equiv], [upper div or grad student or CNR]

IE 5524. Process Transformation through Lean Tools. (2 cr. ; A-F only; Every Fall)
Lean is a systematic methodology that improves processes by identifying and removing sources of waste in an organization. Lean tools, such as value stream mapping, Kaizen, kanban systems, visual systems, and 5S, improve processes by identifying and removing sources of waste. In this course, you will learn and utilize key Industrial Engineering methodologies to identify opportunities, prioritize these opportunities, develop solutions and create cost models of the solutions effectiveness. Applications of lean process improvement in areas such as manufacturing, healthcare, service operations, and business processes will be considered.

IE 5531. Engineering Optimization I. (; 4 cr. ; Student Option; Every Fall)
Linear programming, simplex method, duality theory, sensitivity analysis, interior point methods, integer programming, branch/bound/dynamic programming. Emphasizes applications in production/logistics, including resource allocation, transportation, facility location, networks/flows, scheduling, production planning. prereq: Upper div or grad student or CNR

IE 5532. Stochastic Models. (4 cr. ; Student Option; Every Fall)
Introduction to stochastic modeling and stochastic processes. Probability review, random variables, discrete- and continuous-time Markov chains, queueing systems, simulation. Applications to industrial and systems engineering including production and inventory control. prereq: Undergraduate probability and statistics. Familiarity with computer programming in a high level language.

IE 5533. Operations Research for Data Science. (3 cr. ; A-F only; Periodic Fall)
This course combines data, modeling, and decision-making to provide students with experience solving practical problems in a variety of application areas, including healthcare and medical decision-making, supply chains and e-commerce, and finance and revenue management. To this end, case studies will be used to illustrate the sequence of problem definition, data analysis, model building, and decision support. The example problems are realistic in terms of size and complexity and the data sets are realistic in that the quality of the data is less-than-perfect. The first part of the course focuses on deterministic models while the second part of the course covers stochastic models. A high-level programming language such as R is used for data manipulation and for predictive analytics. An algebraic modeling language such as AMPL is used for models that require linear/integer programming. The solutions and their sensitivity to changes in parameters are interpreted to aid decision-makers. Throughout the course, the methodologies are kept in perspective with the overall goal of making better decisions.

IE 5541. Project Management. (; 4 cr. ; A-F only; Every Fall & Spring)
Introduction to engineering project management. Analytical methods of selecting, organizing, budgeting, scheduling, and controlling projects, including risk management, team leadership, and program management. prereq: Upper div or grad student

IE 5545. Decision Analysis. (; 4 cr. ; Student Option; Periodic Fall & Spring)
Single-person and group decision problems. Structuring of decision problems arising in personal, business, and public policy contexts. Decision-making under uncertainty, value of information, games of complete information and Nash equilibrium, Bayesian games, group decision-making and distributed consensus, basics of mechanism design. prereq: 3521 or equiv

IE 5551. Production and Inventory Systems. (; 4 cr. ; Student Option; Every Spring)
Inventory control, supply chain management, demand forecasting, capacity planning, aggregate production and material requirement planning, operations scheduling, and shop floor control. Quantitative models used to support decisions. Implications of emerging information technologies and of electronic commerce for supply chain management and factory operation. prereq: CNR or upper div or grad student

IE 5553. Simulation. (; 4 cr. ; Student Option; Periodic Fall & Spring)
Discrete event simulation. Using integrated simulation/animation environment to create, analyze, and evaluate realistic models for various industry settings, including manufacturing/service operations and systems engineering. Experimental design for simulation. Selecting input distributions, evaluating simulation output. prereq: Upper div or grad student; familiarity with probability/statistics recommended

IE 5561. Analytics and Data-Driven Decision Making. (4 cr. ; Student Option; Every Spring)
Hands-on experience with modern methods for analytics and data-driven decision making. Methodologies such as linear and integer optimization and supervised and unsupervised learning will be brought together to address problems in a variety of areas such as healthcare, agriculture, sports, energy, and finance. Students will learn how to manipulate data, build and solve models, and interpret and visualize results using a high-level, dynamic programming language. Prerequisites: IE 3521 or equivalent; IE 3011 or IE 5531 or equivalent; proficiency with a programming language such as R, Python, or C.

IE 5571. Reinforcement Learning and Dynamic Programming. (4 cr. ; Student Option; Fall Odd Year)
Topics are methods for solving problems in sequential decision making. We will introduce the modeling framework of Markov Decision Processes (MDP), and the classic solution approach of dynamic programming. We will discuss the traditional solution approaches to dynamic programming of value and policy iteration. We will then move onto model free methods of finding optimal policies for MDPs such as Monte Carlo and Temporal Difference methods. We will discuss the extension of these methods to problems with large state spaces where it is necessary to introduce parametric approximations such as deep neural networks. Examples will be drawn from problems in navigation, medicine, game play, and others. Prerequisites: Knowledge of probability, optimization, and linear algebra at the undergraduate level.

IE 5773. Practice-focused Seminar. (1 cr. ; S-N or Audit; Every Fall)
Industry and academic speakers, topics relevant to analytics practice.

IE 5801. Capstone Project. (4 cr. ; A-F only; Every Fall)
Students work on ISyE Analytics Track capstone project in small teams of two or three. Projects are supervised by industry mentor and faculty adviser. Projects involve application of techniques from Analytics Track curriculum. Prerequisites: ISyE Analytics Track MS Student; IE 5531; IE 5561; Stat 5302; CSci 5521 or 5523.

IE 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

IE 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

IE 8521. Optimization. (4 cr. ; Student Option; Every Fall)
Theory and applications of linear and nonlinear optimization. Linear optimization: simplex method, convex analysis, interior point method, duality theory. Nonlinear optimization: interior point methods and first-order methods, convergence and complexity analysis. Applications in engineering, economics, and business problems. prereq: Familiarity with linear algebra and calculus.

IE 8531. Discrete Optimization. (4 cr. [max 8 cr.] ; Student Option; Every Fall & Spring)
Topics in integer programming and combinatorial optimization. Formulation of models, branch-and-bound. Cutting plane and branch-and-cut algorithms. Polyhedral combinatorics. Heuristic approaches. Introduction to computational complexity.

IE 8532. Stochastic Processes and Queuing Systems. (; 4 cr. ; Student Option; Every Fall)
Introduction to stochastic modeling and processes. Random variables, discrete and continuous Markov chains, renewal processes, queuing systems, Brownian motion, and elements of reliability and stochastic simulation. Applications to design, planning, and control of manufacturing and production systems. prereq: 4521 or equiv

IE 8533. Advanced Stochastic Processes and Queuing Systems. (; 4 cr. ; Student Option; Periodic Spring)
Renewal and generative processes, Markov and semi-Markov processes, martingales, queuing theory, queuing networks, computational methods, fluid models, Brownian motion. prereq: 8532 or instr consent

IE 8534. Advanced Topics in Operations Research. (; 1-4 cr. [max 8 cr.] ; Student Option; Every Fall & Spring)
Special topics determined by instructor. Examples include Markov decision processes, stochastic programming, integer/combinatorial optimization, and queueing networks.

IE 8535. Introduction to Network Science. (4 cr. ; Student Option; Every Fall)
Topics include deterministic and random networks, network flows, matching, game theory, distributed decision making in networks, cooperation in networks, cascades in networks, wisdom of crowds, applications in voting, prediction markets, consumer behavior modeling, revenue management, inventory control and finance. This course is offered to graduate students. Undergraduate students must get permission from the instructor for registering. Prerequisites include probability and optimization (5531 and 8532) but students who have taken similar courses or have the mathematical background can register by instructor permission.

IE 8536. Advanced Topics in Engineering Management. (; 4 cr. [max 8 cr.] ; A-F or Audit; Periodic Spring)
Areas such as financial engineering, revenue management, management of health systems, service operations, management of technology, and public policy.

IE 8538. Advanced Topics in Information Systems. (; 4 cr. ; A-F or Audit; Periodic Fall)
Decision support methods. Case studies of specific systems. Methods for testing usability/performance. Trust/over-reliance, their impact on system performance. System-level issues, general planning, design, information analysis, problem paradigms. How to frame problems. Techniques to combine engineering and information technology. prereq: 8541, college-level computer programming course

IE 8541. Decision Support Systems. (; 4 cr. ; A-F or Audit; Every Spring)
Decision Support Systems (DSSs) to assist people in making better decisions, interpreting complex information, and managing complex situations safely/effectively. Principles of human-centered design, cognitive engineering, and evaluation. Applications in projects of students' own choosing.

IE 8552. Advanced Topics in Production, Inventory, and Distribution Systems. (; 4 cr. [max 8 cr.] ; Student Option; Periodic Fall & Spring)
Cutting edge research issues in production, inventory, distribution systems. Stochastic models of manufacturing systems, stochastic inventory theory, multi-echelon inventory systems/supply chains, supplier-retailer/supplier-manufacturer coordination, supplier/warehouse networks, business logistics, transportation. prereq: 5551

IE 8554. Advanced Production and Inventory Systems. (4 cr. ; Student Option; Every Spring)
Introduction to quantitative methods for managing production, inventory, and distribution systems. Topics covered include demand modeling and forecasting, inventory management, supply chain coordination, revenue management, production planning and scheduling, and management of manufacturing operations.

IE 8564. Optimization for Machine Learning. (4 cr. ; Student Option; Every Fall)
Machine learning has been widely used in many areas such as computer vision, search engines, speech recognition, robotics, recommender systems, bioinformatics, social networks, and finance. It has become an important tool in prediction and data analysis. This course provides a comprehensive overview of important optimization models for machine learning. It also systematically provides a theoretical and computational study on various optimization methods for solving these models and more general problems.

IE 8571. Advanced Reinforcement Learning and Dynamic Programming. (4 cr. ; Student Option; Fall Odd Year)
Topics are methods for solving problems in sequential decision making. We will introduce the modeling framework of Markov Decision Processes (MDP), and the classic solution approach of dynamic programming. We will discuss the traditional solution approaches to dynamic programming of value and policy iteration. We will then move onto model free methods of finding optimal policies for MDPs such as Monte Carlo and Temporal Difference methods. We will discuss the extension of these methods to problems with large state spaces where it is necessary to introduce parametric approximations such as deep neural networks. Examples will be drawn from problems in navigation, medicine, game play, and others. We will discuss the convergence proofs for a variety of the algorithms in the so-called 'tabular setting', e.g., policy iteration, value iteration, Q-learning, and Sarsa. Prerequisites: Knowledge of probability, optimization, and linear algebra at the undergraduate level. Knowledge of Markov chains at level of IE 8532 or equivalent. Ability to read and write mathematical proofs.

IE 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

IE 8773. Graduate Seminar. (; 1 cr. ; S-N or Audit; Every Fall & Spring)
Recent developments.

IE 8774. Graduate Seminar. (; 1 cr. ; S-N or Audit; Every Fall & Spring)
Recent developments. prereq: 8773

IE 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required (Plan A only)

IE 8794. Industrial Engineering Research. (; 1-6 cr. [max 10 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed research. prereq: instr consent

IE 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

IE 8951. Plan B Course. (; 1 cr. ; S-N or Audit; Every Fall)
Structured environment in which students can complete M.S. Plan B project.

IE 8953. Plan B. (; 2 cr. ; A-F or Audit; Every Spring)
Structured environment in which students can complete M.S. Plan B project. prereq: 8951

IE 8991. Curricular Practical Training. (; 1-2 cr. [max 6 cr.] ; S-N only; Every Fall, Spring & Summer)
Industrial work assignment involving advanced mechanical engineering. Review/approval by faculty member/director of graduate studies. Final report covering work assignment.

Information and Decision Sci (IDSC)

IDSC 6003. Accounting and Information Systems. (; 2 cr. [max 4 cr.] ; A-F only; Periodic Fall & Spring)
IS/IT infrastructure assessment methods, technology solutions, management issues. Digital data sources. Systems design in accounting and financial reporting information systems. Internal control requirements of Sarbanes-Oxley Act of 2002. Experiential learning, hands-on use of accounting enterprise software other packages.

IDSC 6041. Information Technology Management. (2 cr. ; A-F only; Every Fall, Spring & Summer)
Management of information systems, information technology (IT) in global organization. Strategic uses of IT. Alignment of IT, organizational strategy, internet/Web technologies, e-commerce customer services. Integration of e-business applications, interorganizational systems, systems implementation. Management of information as resource. Lecture, case analysis, classroom discussion. Prereq MBA student.

IDSC 6051. Information Technologies and Solutions. (; 2 cr. ; A-F only; Every Fall & Spring)
Current/emerging technologies in modern Net-enhanced organizations. Internet/Web technologies, including Internet fundamentals, Web communications, Web 2.0/social media,

information security, cloud computing, IT-driven innovation, emerging IT trends.

IDSC 6421. Financial Information Systems and Technology. (; 2 cr. ; A-F only; Every Spring)
IT-focused business models of financial firms. Industry/firm technology infrastructures, applications, and in-firm control technologies. IT in financial markets and investment management. E-brokerage, digital quote vendors, Web-based IPOs. Web-based and home banking systems, traditional/Internet-based e-payment solutions, e-bill payment/ presentment. Hands on experience with software. prereq: MBA student

IDSC 6423. Enterprise Systems. (; 2 cr. ; A-F only; Every Fall & Spring)
Enterprise Systems are the information core of diverse organizations and play a major role in their management and performance. This course provides the context of Enterprise Systems role in organization's journey of Digital Transformation. It examines Enterprise System's structural aspects such as governance, program & change management, sourcing, development (programming), testing, operations, and regulatory compliance. Business cases provide real world examples across these subjects and focus on specifics such as labor multi-sourcing and A/B testing strategies.

IDSC 6442. E-Sourcing and E-Auctions. (; 2 cr. ; A-F only; Every Fall & Spring)
Traditional firms' planning process to establish e-business operational, sales, and Web-based marketing capabilities. Bundling, aggregation, digital product pricing policies. Technology standards, sponsored technologies. Industry infrastructures for e-commerce. Enabling technologies in business-to-business contexts. Web server and content management. Design issues. Hands-on with software development tools.

IDSC 6444. Business Analytics for Managers I. (; 2 cr. ; A-F only; Every Spring)
Use of information technologies to organize and analyze data to help managers make decisions about their business and the way they serve customers. Focused on data mining, the course also provides an orientation to statistical modeling, programming, and the design and testing of prototype systems and evaluation models, and an introduction to basic techniques in visualization, association rules, clustering, classification, regression, and elementary natural language processing. prereq: [IDSC 6041 or IDSC 6051 or MBA 6241], MBA student

IDSC 6446. Business Analytics for Managers II. (; 2 cr. ; A-F only; Every Spring)
This course builds upon IDSC 6444 ?Business Analytics for Managers I? course. While IDSC 6444 focuses on the fundamental and most widely used data mining/analytics techniques, IDSC 6446 ?Business Analytics for Managers II? delves into a number of other current and emerging data mining/analytics areas that are becoming increasingly important for modern organizations. Such areas include advanced elements of predictive modeling process, cost-aware data mining/analytics, mining text and Web data, advanced data mining techniques, and other advanced topics. This course promotes practical data-analytic thinking and decision making, covers a number of fundamental issues, and introduces students to a number of analytics techniques in the aforementioned areas. The students will be able to apply these techniques to design and test data mining models in different settings, using real world datasets. This course will also discuss the value of advanced data mining/ analytics in a variety of organizational contexts and business applications.

IDSC 6455. Web 2.0: The Business of Social Media. (2 cr. ; A-F only; Every Fall)
Business use of social media, peer production, strategies and tactics of social media marketing, social media crisis, open innovation, use of social media to engage employees and foster collaboration, risks and challenges of social media prereq: MBA student

IDSC 6465. Emerging Technologies and Digital Transformation: Changes to Work, Capability Sourcing and Innovatio. (; 4 cr. ; A-F only; Every Spring)
Outsourcing IT and IT enabled services. Sourcing business/knowledge processes: finance/accounting, human resources, engineering services, data analytics. Strategic global sourcing planning/implementation. Managing offshore service relationships. prereq: [IDSC 6041 or IDSC 6051 or MBA 6241], MBA student

IDSC 6471. Knowledge Management. (; 2 cr. ; A-F only; Every Fall)
Design, evaluation, use of knowledge in organizations. Leveraging knowledge in workers, structures, processes. Assessment of knowledge needs. Evaluation of key decision processes, information demands, usage patterns, content requirements. Behavioral/ cultural barriers. Use of technology for knowledge management. prereq: MBA student

IDSC 6481. Managerial Decision Making. (; 2 cr. ; A-F only; Every Fall)
Frameworks for making decisions as a manager, knowledge worker, or individual. How policies area adopted. Poor decision making. Learning from mistakes. Bounded rationality, system thinking, concepts of learning. prereq: MBA student

IDSC 6490. Advanced Topics in MIS. (; 2 cr. [max 10 cr.] ; A-F only; Periodic Fall & Spring)
Discussion and analysis of topics and developments in managing information systems.

IDSC 6491. Independent Study in Information Systems. (; 1-4 cr. [max 8 cr.] ; A-F only; Periodic Fall, Spring & Summer)
Independent study in Information Systems. prereq: instr consent

IDSC 8003. Accounting and Information Systems. (; 4 cr. ; A-F only; Every Fall)
IS/IT infrastructure assessment methods, technology solutions, management issues. Digital data sources. Systems design in accounting and financial reporting information systems. Internal control requirements of Sarbanes-Oxley Act of 2002. Experiential learning, hands-on use of accounting enterprise software other packages. prereq: IDSC 3001 or equivalent

IDSC 8511. Conceptual Topics and Research Methods in Information and Decision Sciences. (3 cr. ; Student Option; Every Fall)
Relationships to underlying disciplines; major research streams; seminal articles, survey literature, and major researchers. Provides framework for organizing knowledge about information and decision sciences. prereq: instr consent

IDSC 8521. System Development. (3 cr. ; Student Option; Spring Even Year)
Why it is hard to develop efficient/effective information systems, what can be done to improve situation. Defining efficiency/ effectiveness in development process and in systems. Producing/evaluating artifacts (constructs, models, methods, tools) that enable more efficient/effective information systems to be developed. prereq: Business admin PhD student or instr consent

IDSC 8531. Organizational Theory and Research in Information Systems. (3 cr. ; A-F only; Spring Even Year)
Introduction, adoption, use/exploitation of information systems in organizations. Critically examine empirical work. Formulate research questions. Conduct research. prereq: PhD student in Business Administration

IDSC 8541. Introduction to Economics of Information Systems. (3 cr. ; A-F only; Spring Odd Year)
Classical research questions. Methods/findings that form backbone of economics of IS. Online auctions, electronic markets, offshoring, human capital issues. prereq: PhD student in Business Administration or instr consent

IDSC 8620. Data Mining and Personalization. (3 cr. ; A-F only; Spring Even Year)
IDSC 8620 is intended primarily for research-oriented graduate students who are interested in learning about current data mining / machine learning methodologies and how to use them in research. The course will provide a comprehensive overview of the exploratory and predictive analytics techniques, focusing on the fundamentals but covering a number of advanced issues as well, and will demonstrate how these techniques can be applied various application areas (including the increasingly important areas of text analytics and recommender systems). The course puts significant emphasis on practical, hands-on experience applying data mining techniques in different settings using real-world datasets, but will also discuss the use and value of data mining in a variety of research contexts.

IDSC 8630. Social Media and Online Communities. (2 cr. ; A-F only; Spring Odd Year)
The purpose of this course is to equip you with theories and methods to critically think and theorize around phenomena related to social media and online communities. We will cover

key topics in motivation, contribution, identity, collaboration and innovation, electronic word-of- mouth and social networks, community dynamics, leadership, and evolution. We will also review a wide range of commonly used research methods, both qualitative and quantitative ones, discuss the choice of appropriate methods for a given research question, and explore some of the latest methodological trends. Toward the end of the course, you will formulate your own opinion about the breadth and significance of the phenomena and develop your own research project.

IDSC 8721. Behavioral Decision Theory. (3 cr. ; Student Option; Periodic Fall & Spring)
Traditional/current research. Major models/ methodologies. Issues of preference, judgment, and choice under conditions of certainty/ uncertainty. Seminar format. prereq: Business admin PhD student or instr consent; offered alt yrs

IDSC 8722. Heuristic Decision Making. (; 2 cr. ; Student Option; Periodic Fall)
How decisions are made, how knowledge is stored/used, how knowledge of variability/ feedback influence decisions. Decisions at strategic, operational, individual level. Exceptional performance, pathologies of decision making. Basis for "best practice." How knowledge is managed in decisions, decision failure. Folly, normal accidents, decision problems in which individuals manipulate information to influence/deceive others. prereq: Business Admin PhD student or instr consent; offered alt yrs

IDSC 8800. Research Seminar in Information and Decision Sciences. (; 4 cr. [max 20 cr.] ; Student Option; Periodic Fall & Spring)
Topics, which vary by semester, are selected from new areas of research, research methods, and significant issues. prereq: Business admin PhD student or instr consent

IDSC 8801. Research Seminar in Information and Decision Sciences. (; 2 cr. [max 20 cr.] ; Student Option; Every Spring)
New areas of research, research methods, issues. prereq: Business Admin PhD student or instr consent

IDSC 8892. Readings in Information and Decision Sciences. (; 1-8 cr. [max 16 cr.] ; S-N only; Every Fall, Spring & Summer)
Readings useful to a student's individual program and objectives that are not available through regular courses. prereq: Business admin PhD student or instr consent

IDSC 8894. Graduate Research in Information and Decision Sciences. (1-8 cr. [max 16 cr.] ; Student Option; Every Fall, Spring & Summer)
Individual research on an approved topic appropriate to student's program and objectives. prereq: Business admin PhD student or instr consent

Infrastructure Sys Mgmt Eng (ISME)

ISME 8333. FTE: Master's. (1 cr. ; No Grade Associated; Every Fall & Spring)
FTE: Master's Prereq Master's student, adviser approval, DGS approval.

Insurance and Risk Management (INS)

INS 6101. Employee Benefits. (2 cr. ; A-F only; Every Fall)
Design/administration of employee benefit plans/pension. Health insurance, disability plans. Salary reduction/deferred compensation programs. Multiple employer trusts. Alternative funding methods, including self-insurance. Ethical issues, legal liability, compliance.

INS 6105. Corporate Risk Management. (2 cr. ; A-F only; Every Fall & Spring)
Theory applied to corporate risk management and insurance practices. Identification, measurement, and treatment of an organization.s financial risks integrated with its property, liability, workers compensation, and human resource risks. Selection and application of risk control and risk financing tools: risk retention, reduction and transfer, including insurance.

INS 6200. Insurance Theory and Practice. (2 cr. ; A-F only; Every Spring)
Risk theory is applied to practices in health, liability, life, property, and workers compensation insurance. Insurance marketing, pricing, underwriting, and claims administration, with adverse selection and moral hazard effects. Policy issues of tort versus no-fault compensation systems. Self-insurance and integrated risk financing methods.

Integrated Behavioral Health (IBH)

IBH 6002. Portfolio Review. (; 1 cr. ; S-N only; Every Fall, Spring & Summer)
Required one credit registration for portfolio completion. Permission to register for IBH 6002 is dependent on submission of the Portfolio.

IBH 6011. Foundations in Differential Diagnosis. (3 cr. ; A-F only; Every Fall & Summer)
Concepts, theories, research in neuropsychology. Brain-behavior relationships through study of neurologic disorders. Processes related to learning/decision-making. Neuropsychological assessment using actual patient material.

IBH 6021. Methods and Models III: Synthesis Seminar in Client Centered Care. (2 cr. ; A-F only; Every Fall)
Chronic substance use disorders or co-occurring combination. Applying step-wise, individualized, recovery oriented evidence-based practices for risk reduction, relapse prevention, recovery maintenance. Use case studies to evaluate/apply risk reduction/ personalized interventions.

IBH 6022. Foundations of Psychological Assessment. (2 cr. ; A-F only; Every Fall & Spring)
Course focuses on major concepts and principles of educational and psychological assessment and the use of standardized instruments with differing populations.

IBH 6031. Methods and Models IV: Trauma and Anxiety, Assessment and Treatment Intervention. (; 2 cr. ; A-F only; Every Fall)
Basic/applied research on trauma/anxiety. Assessing/treating anxiety/post-trauma reactions in adults. Definition of anxiety, traumatic events. Assessment methods, PTSD assessment interview. Theory/techniques of evidence-based treatments. Field placement component.

IBH 6032. Advanced Multicultural Practice. (1 cr. ; A-F only; Every Fall & Summer)
Incorporate various sources of knowledge/ content to provide deepening perspective on multiple layers of diversity/counseling individuals with substance use/co-occurring mental health disorders. Aspects of various cultural experiences (i.e., race/ethnicity, class status, sexual/affectional orientation, gender, religion) as they impinge upon client, counselor, counseling relationship. prereq: ADDS 5081 or equivalent

IBH 6036. Trauma Focused Approaches and Crisis Intervention. (2 cr. ; A-F only; Every Spring & Summer)
This course will give students a foundation for assessing and treating post-trauma responses in various populations through the exploration of current theory, conceptualization, and models related to trauma and crisis intervention. Major treatment approaches to be covered will include Stress-Inoculation Therapy (SIT), Cognitive Processing Therapy (CPT), Seeking Safety, and Eye-Movement Desensitization and Reprocessing (EMDR). Special emphasis will be given to survivors of various types of trauma (e.g. Historical trauma, Abuse/Neglect) and Post-Traumatic Stress Disorder (PTSD).

IBH 6041. Prolonged Exposure Therapy for PTSD. (; 2 cr. ; A-F only; Periodic Spring)
Advanced practice methods and interventions for working with trauma and co-occurring disorders. Emerging and evidence-based practices presented, practiced, and applied.

IBH 6051. Advanced Group Practice. (2 cr. ; A-F only; Every Fall)
Advanced Group Practice is a graduate level course designed to allow students to apply previously learned group theories and concepts in an experiential environment. Students will explore a variety of theoretical orientations (cognitive behavioral therapy, existentialism, psychodynamic, and person centered) through readings, short papers, and in-class group exercises, in addition to participating in structured inpatient group experience. Students will be expected to lead groups with a peer co-leader in class and co-lead therapeutic groups with the instructor outside of class. An important emphasis of this course will be in-class processing of group leadership skills, interventions, group dynamics, ethical dilemmas, documentation of process notes, and reactions to clients within the groups.

IBH 6061. Applied Advanced Diagnostics I. (2 cr. [max 3 cr.] ; A-F only; Every Spring & Summer)
Diagnosing individuals with chronic/persistent mental health disorders, personality disorders, associated substance use disorders. Case studies, field placement with multidisciplinary team.

IBH 6062. Applied Advanced Diagnostics II. (2 cr. ; A-F only; Summer Even Year)
Applied Advanced Diagnostics II. prereq: 6061, must be admitted IBH student

IBH 6071. Advanced Professional Issues: Ethics. (3 cr. ; A-F only; Every Fall & Spring)
Develop ethical decision model that incorporates five moral principles. ACA/ NAADAC codes of ethics/statutes/regulations that apply to mental health/substance abuse counseling. Case studies.

IBH 6081. Human Lifespan Development and Behavioral Health. (; 3 cr. ; A-F only; Every Fall & Summer)
Human development across life span. Implications for direct clinical practice. Theories of human development. Co-occurring mental health/substance use disorders. Normative changes, individual differences, typical/atypical patterns of development.

IBH 6091. Intersection of Career and Mental Health. (2 cr. ; A-F only; Every Spring & Summer)
Vocational choice theory, lifestyle choices, occupational/educational information, career exploration, assessment tools. Diverse populations/ethical standards. Employment/ career concerns for persons with mental health, substance use, previously incarcerated.

IBH 6101. Family Dynamics and Therapy. (3 cr. ; A-F only; Every Fall)
Family dynamics/life cycle, communication patterns, multi-generational patterns. Systems theory/interventions for appropriate use of family resources to enhance intervention, treatment, family/individual functioning/ maintenance processes.

IBH 6111. Research and Evaluation Methods. (3 cr. ; A-F only; Every Fall & Spring)
Models of program evaluation. Use of research findings for program modification. Elements of research process, types of designs, program evaluation. Ethical considerations of research. Measurement concepts.

IBH 6112. Mental Health and Addiction Management and Administration. (2 cr. ; A-F only; Periodic Summer)
State/regulatory standards rules/statutes. Health care financing/reimbursement. prereq: ADDS 5091 or ADDS 4001

IBH 6121. Professional Seminar 2: Portfolio Development. (; 1 cr. ; S-N only; Every Fall, Spring & Summer)
The purpose of this seminar is to provide the groundwork for the development of the professional portfolio and should be taken 1 to 2 semesters before you plan to register for the IBH 8002 portfolio. Discussion and practice will focus on the main components to be included in the student's professional portfolio such as professional statements and clinical competencies. IBH 6121 should be taken after completion of 50 credits.

IBH 6221. Applications of Counseling Theories. (3 cr. ; A-F only; Every Fall & Spring)
This graduate level course explores grand theories, practice theories, and practice models in counseling. Students will engage in comparing and contrasting theoretical applicability across differing clinical circumstances. They will develop theoretical orientation and build case conceptualization skills as well as connections between theory and practice. Students completing this course will be able to evaluate and apply foundational theories in counseling practice in case conceptualization, analyze the impact of counseling theory on intervention and outcome, articulate different ?grand? theories of counseling from practice theories with understanding from implication for practice, and explore and integrate individual?s contributions to counseling theory.

IBH 6222. Adolescents and Co-occurring Substance Use and Mental Health Disorders. (; 3 cr. ; A-F only; Every Fall)
Adolescents differ from adults physiologically, cognitively, and emotionally. Therefore, it is important for professionals who come into regular contact with this population to be familiar with the developmental issues and current trends in adolescent substance use. It is also essential to be able to recognize the risk and protective factors, biopsychosocial effects, and signs of potential substance use problems in adolescents.

IBH 6227. Supervision Models and Methods in Integrated Behavioral Health. (3 cr. ; A-F only; Every Summer)
Supervision Models/Methods in Integrated Behavioral Health.

IBH 6230. Clinical Application in Prolonged Exposure Therapy. (3 cr. ; A-F only; Periodic Fall, Spring & Summer)
Clinical Application in Prolonged Exposure Therapy.

IBH 6232. Sexual Health and Gender. (; 3 cr. ; A-F only; Periodic Fall)
This is a graduate level course that is meant to broaden your understanding of issues regarding sexual health and gender that you may encounter in the therapy session. A large part of this course is focused on increasing your comfort and competence in having conversations about sexual health and gender with your clients, as well as knowing when to intervene and when to refer. Additional attention will be given to developing and keeping appropriate boundaries with clients when addressing issues of sexual health and gender. Theoretical frameworks regarding human sexuality, sexual disorders, normative vs. non-normative sexual behavior, issues of gender identity and expression, and applicable therapeutic interventions will be discussed. Specific focus will also be given to the co-occurrence of sexual and gender concerns with mental health and substance use disorders, including discussions regarding prevalence and potential presentations. Please be aware that in the process of this course, you will be asked to engage in dialogue about and reflect upon your own beliefs and values around issues of sex, sexuality, relationships, gender identity, etc. It is expected that you be willing to challenge yourself to critically examine course discussions and materials, particularly as they may apply to your future work as a counselor. This course combines the use of lectures, group discourse, group presentations, clinical role-plays, readings, self-reflective activities, and additional experiential exercises to aid you in expanding your knowledge base and competence in managing these issues as they may arise in the therapy session.

IBH 6233. DBT Skills Training: Group Practices and Treatment Modalities. (2 cr. ; A-F only; Every Fall & Spring)
This course focuses on teaching the delivery of Dialectical Behavior Therapy (DBT) Treatment: Skills Training in a group format. This opportunity allows students to learn the skills taught in a DBT Program as well as learn the treatment components involved in a behavioral therapy orientation. Students will explore the core skill of mindfulness, behavioral therapy, dialectics and cognitive behavioral therapy in a group and experiential format. Students will be expected to participate in weekly group discussion and assignments. Discussion will assist students with learning how this treatment is delivered to clients. Weekly assignments will provide experiential learning of skills group and mindfulness, the foundation skill in a DBT Program.

IBH 6234. Counseling Grief and Loss. (2 cr. ; A-F only; Every Summer)
This course will provide students with an overview of current conceptualizations of grief and loss. It will prepare students with specialized knowledge and skills for understanding and identifying the process/ progress of how people deal with loss. Special attention will be given to theoretical foundations of grief and loss, different types of loss, impact of loss, and cultural considerations. Additional strategies will be presented for intervening with those who have been impacted by loss.

IBH 6910. Topics in Integrated Behavioral Health. (; 1-4 cr. [max 32 cr.] ; A-F only; Periodic Fall, Spring & Summer)
Topics in Integrated Behavioral Health.

IBH 6950. Topics in Multicultural Practice. (; 1-3 cr. [max 18 cr.] ; A-F only; Periodic Fall, Spring & Summer)
Topics in multicultural practice.

IBH 6993. Directed Study in Integrated Behavioral Health. (1-3 cr. [max 6 cr.] ; A-F only; Every Fall, Spring & Summer)
Directed study. prereq: Must be admitted IBH student, dept consent

IBH 6994. Directed Research in Integrated Behavioral Health. (1-3 cr. [max 6 cr.] ; A-F only; Every Fall, Spring & Summer)
Directed research. prereq: Must be admitted IBH student, dept consent

IBH 6996. Internship for Integrated Behavioral Health. (1 cr. [max 8 cr.] ; S-N only; Every Fall, Spring & Summer)
Culminating field experience of MPS-IBH. On-site placement in public or private mental health, addictions/integrated treatment setting. Bridge between training/professionalism. prereq: dept consent

Integrated Food Systems Ldrshp (IFSL)

IFSL 7001. Keys to Authentic and Effective Leadership. (; 2 cr. ; A-F only; Every Fall)
Learn authentic and effective leadership skills and how to transition them into the workplace. Students will explore strategies for a 24/7 world, navigating crucial conversations, leading across organizations, situational awareness and cascading effects, emotional awareness, decision-making, strategic thinking, and their personal leadership style.

IFSL 7011. Food Production Farm to Fork. (; 2 cr. ; A-F only; Every Fall)
Explore the complexity and diversity within the food system using different food products, from on-farm production through processing and distribution to the consumer, including the impact of global supply chains. Learn how the agricultural-based food system from farm to fork impacts the quality, safety, and security of the foods produced.

IFSL 7021. Food Governance, Policy, and Regulation. (; 2 cr. ; A-F only; Every Fall)
Learn to navigate the regulatory system for food product formulation, manufacturing, labeling, and advertising including the jurisdiction and complex interaction of regulatory agencies. Gain insight into how regulations, and the underlying food governance and policy, are affected by scientific developments and changing societal values and concerns.

IFSL 7031. Food Security, Safety, and Defense. (; 2 cr. ; A-F only; Every Spring)
This course will provide students with an understanding of the basic principles of food security including the availability, accessibility, affordability, safety, and nutritional value of food. It will allow students to differentiate food security, food safety, and food defense, and to grasp the complexity of ethical and science trade-offs affecting decision-making across food security, food safety, and food defense. These principles will be highlighted through a variety of historical food security, safety, and defense incidents. At the conclusion of the course, students will evaluate a current, major food-borne disease outbreak using concepts learned from past outbreaks. This course requires program approval/consent to register.

IFSL 7041. Food Business, Marketing, and Product Development. (; 2 cr. ; A-F only; Every Spring)
Evaluate the economic implications of decisions made at each stage of the agricultural and food production system and how they relate to current food system issues. Explore current food system issues and opportunities related to business, marketing, and product development, including issue breadth, complexity, scientific advances, and new ideas.

IFSL 7051. Leading Across Integrated Food Systems. (; 2 cr. ; A-F only; Every Spring)
Integrate the concepts from food production, policy, security, and business using real-world case studies. Explore the impact that decisions, policies, and unforeseen circumstances can have as they ripple across the food system. Prepare a case-study that demonstrates a food systems approach to a current issue.

IFSL 7070. Communications and Critical Thinking. (1 cr. ; A-F only; Every Fall)
This is the second of two in-person Leadership Focused Course in the Integrated Food Systems Leadership Certificate Program. Students will spend four (4) consecutive days on the University of Minnesota campus, with a focus on communication and critical thinking as using a food systems approach while working across disciplines in industry, academia, government agencies, and inter-governmental organizations. Enrollment is limited to students accepted into the Integrated Food Systems Leadership Certificate Program.

Interdisciplinary Archaeologic (INAR)

INAR 8200. Directed Readings. (; 1-7 cr. ; Student Option; Every Fall & Spring)
tbd prereq: InAr grad major or instr consent

INAR 8300. Directed Research. (; 1-7 cr. ; Student Option; Every Fall, Spring & Summer)
tbd prereq: InAr grad major or instr consent

INAR 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

INAR 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

INAR 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

INAR 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required (Plan A only)

INAR 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Interdisciplinary Medicine (INMD)

INMD 6001. Directed Study I. (1-6 cr. [max 12 cr.] ; P-N only; Every Fall, Spring & Summer)
Directed study, directed readings and directed research courses are opportunities for students to work individually with a faculty member to earn credit for individually designed content. The Medical School Directed Study course is available only for medical students during their foundational curriculum (years 1 and 2). To register for a directed study course the student and faculty member must complete and sign this contract prior to submitting to the Medical School Registrar for processing.

INMD 6120. Foundations of Preventive Medicine. (; 2 cr. ; P-N or Audit; Every Summer)
An introduction to the determinants and distribution of disease, the prevention of disease and promotion of health, medical research design and statistical analysis of data, and important aspects of health care delivery and public health. prereq: enroll med

INMD 6555. The Healer's Art: Awakening the Heart of Medicine. (; 1 cr. ; P-N only; Every Spring)
Developing a sense of personal/professional satisfaction from and ongoing commitment to the profession. prereq: Registered medical student

INMD 6755. Volunteer Community Outreach Experience. (; 0 cr. ; No Grade Associated; Every Fall, Spring & Summer)
The purpose of volunteer community outreach experiences are to provide medical trainees an opportunity to observe and/or assist in the provision of health care services to populations that are diverse in age, ethnicity, social environment, and need, as well as to experience unique clinical settings outside of the Medical School.

INMD 6802. Science of Medical Practice. (; 5 cr. [max 7 cr.] ; P-N only; Every Fall)
Genetic and biochemistry workings of the human body as they relate to normal daily function, including nutritional aspects.

INMD 6803. Essentials of Clinical Medicine Part 1. (; 6 cr. ; P-N only; Every Fall)
Introduction to clinical medicine, including basic patient interview and hypothesis-driven physical exam. Basics of "doctoring." Students' first clinical experiences.

INMD 6804. Essentials of Clinical Medicine Part 2. (; 3 cr. ; P-N only; Every Spring)
Clinical medicine, including basic patient interview and hypothesis-driven physical exam. Basics of "doctoring." Students' first clinical experiences.

INMD 6805. Essentials of Clinical Medicine Part 3A. (; 4 cr. [max 5 cr.] ; P-N only; Every Summer)
Clinical medicine, including basic patient interview and hypothesis-driven physical exam. Basics of "doctoring." Students first clinical experiences.

INMD 6806. Essentials of Clinical Medicine Part 3B. (; 5 cr. ; P-N only; Every Fall)
Clinical medicine, including basic patient interview and hypothesis-driven physical exam.

Basics of "doctoring." Students first clinical experiences.

INMD 6807. Essentials of Clinical Medicine Part 3C. (; 4 cr. [max 5 cr.] ; P-N only; Every Spring)
Clinical medicine, including basic patient interview and hypothesis-driven physical exam. Basics of "doctoring." Students first clinical experiences.

INMD 6808. Human Health & Disease - Cardio & Resp. (5 cr. ; P-N only; Every Fall)
Pathophysiology of cardio-respiratory system, including infectious disease, pathologic/ pharmacologic principles.

INMD 6809. Human Health & Disease - Rheum, Derm & Opth, Ortho & Otol. (4 cr. ; P-N only; Every Spring)
Pathophysiology of rheumatology, dermatology, ophthalmology, orthopaedics/ otolaryngology disciplines, including infectious disease. Pathologic/pharmacologic principles.

INMD 6810. Human Health & Disease - Renal & Endo/Repro. (8 cr. ; P-N only; Every Spring)
Pathophysiology of endocrine/reproductive systems, including laboratory medicine/ infectious disease. Pathologic/pharmacologic principles.

INMD 6811. Human Health & Disease - GI & Heme. (6 cr. ; P-N only; Every Fall)
Pathophysiology of circulatory/gastrointestinal systems, including laboratory medicine/ infectious disease. Pathologic/pharmacologic principles.

INMD 6812. Micro Biology and Immunology. (; 6 cr. ; P-N only; Every Spring)
Major bacterial, viral, fungal, and parasite diseases, including their life cycles and transmission, virulence factors, types of associated illnesses and diagnosis, general principles of treatment, and methods of prevention. Innate and acquired immunity, including cellular interactions, mechanisms, derangements, and serological use in diagnosis.

INMD 6813. Neuroscience. (; 4 cr. ; P-N only; Every Spring)
Human neuroscience. Survey of molecular cellular systems neuroscience as related to medicine.

INMD 6814. Physiology. (; 4 cr. ; P-N only; Every Spring)
Systems physiology. General physiology, endocrine, circulatory, respiratory, digestive, energy metabolism, and renal physiology examined at molecular, cellular, and organ level. Homeostasis and basic regulatory aspects of physiological processes of organ systems.

INMD 6815. Human Behavior. (; 1 cr. ; P-N only; Every Summer)
Human activities, including those hidden from view such as cognition, feelings, and decision making. Focus on being a patient or a physician.

INMD 6816. Human Sexuality. (; 1 cr. ; P-N only; Every Summer)
Basic and clinical skills. Teaching students the process of how to help provide patients with information and helpful suggestions concerning sexuality and referring patients who require more specialized forms of health care.

INMD 6817. Principles of Pathology. (; 3 cr. ; P-N only; Every Summer)
General principles of human pathology.

INMD 6818. Principles of Pharmacology. (; 1 cr. ; P-N only; Every Summer)
General principles of pharmacology.

INMD 6819. Human Health & Disease - Neuro & Psych. (3 cr. ; P-N only; Every Fall)
Pathophysiology of neurology/psychiatry disciplines, including infectious disease, along with pathologic/pharmacologic principles.

INMD 6820. Medical Gross Anatomy & Embryology. (7 cr. ; P-N only; Every Fall)
This course is a study of human gross anatomy with emphasis upon the anatomical structure (and a bit of function) of the components of the human body. It relies heavily on laboratory dissection in the approach to learning anatomy.

INMD 6821. Human Histology. (4 cr. ; P-N only; Every Fall)
Histology puts biochemistry, molecular biology and physiology in the context of cell structure and function. This lecture and laboratory course covers the microscopic structure of the body, using light and electron microscopic techniques, with an emphasis on the relationship of structure to function.

INMD 6822. Human Health & Disease - Dermatology, Orthopedics, Rheumatology. (3 cr. ; P-N only; Every Fall)
Pathophysiology of dermatology/orthopedics/ rheumatology disciplines, including infectious disease, along with pathologic/pharmacologic principles.

INMD 6823. Human Health & Disease - Neurology, Psychiatry, Otolaryngology, Ophthalmology. (5 cr. ; P-N only; Every Spring)
Pathophysiology of neurology/psychiatry/ otolaryngology/ophthalmology disciplines, including infectious disease, along with pathologic/pharmacologic principles.

INMD 6824. Foundations of Clinical Thinking 1A. (1 cr. ; P-N only; Every Fall)
A case-based course that links clinical scenarios and scientific foundations components of the curriculum through small group, facilitator supported sessions. Students develop a patient-centered approach to analyzing clinical situations, one that is informed by the literature and considers multiple perspectives and issues across the biopsychosocial-cultural continuum. Students develop reflective practices and comfort with the ambiguity that exists in clinical practice. The course enhances students? ability to work together in teams and highlights the importance of teamwork throughout their medical career.

INMD 6825. Foundations of Clinical Thinking 1B. (1 cr. ; P-N only; Every Spring)
A case-based course that links clinical scenarios and scientific foundations components of the curriculum through small group, facilitator supported sessions. Students develop a patient-centered approach to analyzing clinical situations, one that is informed by the literature and considers multiple perspectives and issues across the biopsychosocial-cultural continuum. Students develop reflective practices and comfort with the ambiguity that exists in clinical practice. The course enhances students? ability to work together in teams and highlights the importance of teamwork throughout their medical career.

INMD 6826. Foundations of Clinical Thinking 1C. (1 cr. ; P-N only; Every Summer)
A case-based course that links clinical scenarios and scientific foundations components of the curriculum through small group, facilitator supported sessions. Students develop a patient-centered approach to analyzing clinical situations, one that is informed by the literature and considers multiple perspectives and issues across the biopsychosocial-cultural continuum. Students develop reflective practices and comfort with the ambiguity that exists in clinical practice. The course enhances students? ability to work together in teams and highlights the importance of teamwork throughout their medical career.

INMD 6827. Foundations of Clinical Thinking 2A. (1 cr. ; P-N only; Every Fall)
A case-based course that links clinical scenarios and scientific foundations components of the curriculum through small group, facilitator supported sessions. Students develop a patient-centered approach to analyzing clinical situations, one that is informed by the literature and considers multiple perspectives and issues across the biopsychosocial-cultural continuum. Students develop reflective practices and comfort with the ambiguity that exists in clinical practice. The course enhances students? ability to work together in teams and highlights the importance of teamwork throughout their medical career.

INMD 6828. Foundations of Clinical Thinking 2B. (1 cr. ; P-N only; Every Spring)
A case-based course that links clinical scenarios and scientific foundations components of the curriculum through small group, facilitator supported sessions. Students develop a patient-centered approach to analyzing clinical situations, one that is informed by the literature and considers multiple perspectives and issues across the biopsychosocial-cultural continuum. Students develop reflective practices and comfort with the ambiguity that exists in clinical practice. The course enhances students? ability to work together in teams and highlights the importance of teamwork throughout their medical career.

INMD 7000. Interdisciplinary Research. (2-12 cr. [max 24 cr.] ; H-N only; Every Fall, Spring & Summer)
Clinical or basic science research.

INMD 7002. Interdisciplinary Research-3. (; 2-6 cr. ; H-N only; Every Fall, Spring & Summer)
Clinical or basic science research. prereq: 3rd or 4th year medical student

INMD 7008. Foundations of Health Equity. (; 4 cr. ; P-N only; Periodic Spring & Summer)

This course prompts students to delve into the study of health equity, focusing on the bidirectional relationship between medicine and social factors, the development and propagation of disparities, and physicians' role in advocacy work. Modules consist of presentations from experts, interactive activities, small group discussions, and reflection assignments. Students will do a final project on a health equity organization of their choice on which they will write a short paper and present to a small group.

INMD 7019. Health Policy and Advocacy Elective. (; 4 cr. ; P-N only; Every Spring)
Description: The four week course will be offered as an elective for third and fourth year medical students during the Minnesota legislative session. This course will offer students a hands-on opportunity to learn more about health policy and advocacy, and how the Minnesota Medical Association (MMA) functions as a unified voice of physicians for advancing the practice of medicine, the profession and patient health. This course will provide medical students with experience in the following areas: Physician involvement in health policy Legislative process State/ regulatory policy development. Role of the courts and federal policy development Grassroots To accomplish this goal, students will write and present a health policy issue brief to MMA staff, engage with policy makers and community stakeholders, write a letter to the editor, and at the end of the rotation, students will complete a reflection piece on what they have learned about the health policy process. (see below). Justification: Health policy is a topic medical students are increasingly passionate about, but there is little opportunity in the 3rd and 4th year curriculum to gain exposure. Exposure to the various components of health policy is needed in order to fully understand how health policy affects physicians and their patients.

INMD 7020. USMLE Step 1 Structured Preparation Course. (; 2-4 cr. ; P-N only; Periodic Summer)
In this independent study course, students will engage in full-time review for their national USMLE Step 1 examination. Although the components of the course are designed for self-directed learning, students will have the opportunity for regular knowledge check ins and for one-on-one meetings with learner development staff on an as-needed basis. The focus of the course is to prepare for a passing score, not to achieve a high score. Specifically, students will: Work with the Office of Learner Development (OLD) to create and submit a study plan based on the CQA model [template to be provided] Take a minimum of two NBME (CBSSA) Step 1 self-assessments during the course and share results with OLD Submit weekly progress reports based on the C-Q-A process

INMD 7021. USMLE Step 2CK Structured Preparation Course. (; 2-4 cr. ; P-N only; Periodic Fall & Summer)
In this independent study course, students will engage in full-time review for their national USMLE Step 2CK examination. Although the components of the course are designed for self-directed learning, students will have the opportunity for regular knowledge check ins and for one-on-one meetings with learner development staff on an as-needed basis. The focus of the course is to provide students with a systematic preparation approach to attain an optimal passing score outcome. Specifically, students will: Work with the Office of Learner Development (OLD) to create and submit a study plan based on the C-Q-A model [template to be provided] Submit weekly progress reports based on the C-Q-A process to track progress toward goal outcome. Prereq: Successful completion of all MS1 and MS2 courses, Step 1 examination

INMD 7050. Research in Health Care Management I. (; 4 cr. ; P-N or Audit; Periodic Fall)
Students select a topic of importance in health care management, formulate a problem, and carry out research. prereq: Registered in MD/ MBA dual degree program

INMD 7051. Research in Health Care Management II. (; 2-4 cr. [max 2 cr.] ; P-N or Audit; Periodic Fall)
Students select a topic of importance in health care managmennt, formulate a problem, and carry out research. prereq: Registered in MD/ MBA dual degree program

INMD 7100. Development of Clinical Skills. (; 0-6 cr. [max 12 cr.] ; H-N only; Every Fall, Spring & Summer)
History, physical exam, assessment, and management skills related to patient care.

INMD 7101. Becoming a Doctor I. (1 cr. ; P-N only; Every Fall)
Opportunity to provide standard curriculum across school now grounded in substantial clinical experience (e.g., integrated basic science curriculum). Opportunity for new or existing institutional assessments to happen in short time frame for all students (not interfering with clinical rotations). Opportunity for co-curricular activities (Service Learning, FA group reflections, eg) to become curricular and standard in timing, again, not interfering with clinical rotations. Transition into role of professional.

INMD 7102. Becoming a Doctor II. (1 cr. ; P-N only; Every Spring)
Opportunity to provide standard curriculum across school now grounded in substantial clinical experience (e.g. integrated basic science curriculum). Opportunity for new or existing institutional assessments to happen in short time frame for all students (not interfering with clinical rotations). Opportunity for co-curricular activities (Service Learning, FA group reflections, eg) to become curricular and standard in timing, again, not interfering with clinical rotations. Transition into role of professional.

INMD 7103. Becoming a Doctor III. (1 cr. ; P-N only; Every Fall)
Opportunity to provide standard curriculum across school now grounded in substantial clinical experience (eg integrated basic science curriculum). Opportunity for new or existing institutional assessments to happen in short time frame for all students (not interfering with clinical rotations). Opportunity for co-curricular activities (Service Learning, FA group reflections, etc.) to become curricular and standard in timing, again, not interfering with clinical rotations. Transition into role of professional.

INMD 7104. Becoming a Doctor IV. (1 cr. ; P-N only; Every Spring)
Opportunity to provide standard curriculum across school now grounded in substantial clinical experience (e.g., integrated basic science curriculum). Opportunity for new or existing institutional assessments to happen in short time frame for all students (not interfering with clinical rotations). Opportunity for co-curricular activities (Service Learning, FA group reflections, etc.) to become curricular and standard in timing, again, not interfering with clinical rotations. Transition into role of professional.

INMD 7110. REACH LIC Medicine. (8 cr. ; P-N only; Every Fall, Spring & Summer)
Regions-based internal medicine clerkship with experiences in both inpatient and outpatient internal medicine. The course will emphasize diagnostic approaches to patient problems and acquisition of knowledge and skills while working with internal medicine hospitalists in the inpatient setting and attending physicians in the primary care clinics.

INMD 7112. REACH LIC Psychiatry. (4 cr. ; P-N only; Every Fall, Spring & Summer)
Regions-based psychiatry clerkship that will prepare medical students to recognize, diagnose and care for patients with psychiatric disorders encountered in most medical practices. Students will be working one-on-one with a psychiatrist in the outpatient setting and will follow patients to the inpatient setting.

INMD 7113. REACH LIC Neurology. (4 cr. ; H-N only; Every Fall, Spring & Summer)
Regions- based neurology clerkship that will increase clinical skills in diagnosing and treating neurologic illnesses. This will occur in the clinic and on the inpatient neurology consult service.

INMD 7114. REACH LIC Ob/Gyn. (4 cr. ; P-N only; Every Fall, Spring & Summer)
Regions-based ob/gyn clerkship in which students will work with attending physicians while learning various responsibilities of ob/gyn care.

INMD 7116. REACH LIC Pediatrics. (0 cr. ; H-N only; Every Fall, Spring & Summer)
Regions-based pediatric clerkship which provides basic pediatric skills and knowledge necessary for each student, no matter what field of medicine they select.

INMD 7117. REACH LIC Emergency Medicine. (4 cr. ; P-N only; Every Fall, Spring & Summer)
Regions-based rotation provides first-hand experience in dealing with emergency problems in a Level I trauma center. Students work with emergency medicine residents under supervision by board certified attending staff.

INMD 7118. REACH LIC QI/Population Health Elective. (2-3 cr. [max 5 cr.] ; H-N only; Every Fall, Spring & Summer)
Specialized curricula that will focus on QI, health disparities, population health, and advocacy with extra focus and training on the social determinants of health.

INMD 7119. REACH LIC Plus - Elective. (; 2-5 cr. ; H-N only; Every Fall, Spring & Summer)
The REACH LIC Plus elective is a two-week long focused experience that is meant to enhance the longitudinal integrated clerkship. The specialty area chosen by the student is built upon a specific interest encountered within the LIC.

INMD 7120. REACH LIC Essentials of Surgery. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This is the REACH LIC version of the required surgery clerkship. Regions-based General Surgery Clerkship in which students will work directly with attending physicians, while learning various responsibilities of surgical care and achieve competency in core surgical areas.

INMD 7122. REACH Surgery Elective. (4 cr. ; H-N only; Every Fall, Spring & Summer)
REACH LIC students interested in general surgery and surgical subspecialties will have the opportunity to care for patients with surgical disease processes. This will aid in both discernment and preparation for surgical acting internships and future clinical care.

INMD 7204. Rural Physician Associate Program (RPAP): Surgery. (; 8 cr. ; P-N only; Every Fall, Spring & Summer)
Community-based required course with extensive primary care (surgery) experience in a rural setting. Student works with family physicians and local or visiting specialists. Problem-based learning, hands-on clinical experience, one-to-one teaching.

INMD 7205. Rural Physician Associate Program (RPAP): Obstetrics and Gynecology. (; 4 cr. ; P-N only; Every Fall, Spring & Summer)
Community-based required course with extensive obstetrics/gynecology experience in a rural setting. Student works with family physicians and local or visiting specialists. Problem-based learning, hands-on clinical experience, one-to-one teaching.

INMD 7206. Rural Physician Associate Program (RPAP): Pediatrics. (4 cr. ; P-N only; Every Fall, Spring & Summer)
Community-based required course with extensive pediatrics experience in a rural setting.

INMD 7208. RPAP: Emergency Medicine. (; 4 cr. ; P-N only; Every Fall, Spring & Summer)
Community-based required course with extensive emergency medicine experience in a rural setting.

INMD 7213. MetroPAP: Surgery. (8 cr. ; H-N only; Every Fall, Spring & Summer)
Community-based required course with extensive surgery experience in a metropolitan setting.

INMD 7214. MetroPAP: OB/Gyn. (; 4 cr. ; P-N only; Every Fall, Spring & Summer)
Community-based required course with extensive obstetrics and gynecology experience in a metropolitan setting.

INMD 7217. MetroPAP: Emergency Medicine. (4 cr. ; P-N only; Every Fall, Spring & Summer)
Community-based required course with extensive emergency medicine experience in a metropolitan setting.

INMD 7218. MetroPAP: Psychiatry Externship. (4 cr. ; P-N only; Every Fall, Spring & Summer)
To prepare the medical student to recognize, diagnose, and care for patients with psychiatric disorders encountered in most medical practices. This experience is set up in two parts: a 2-week experience of inpatient pediatric care at a site near the Duluth or Twin Cities campus prior to the MetroPAP orientation, and a 2-week experience in ambulatory behavioral health completed during the 9-mo LICexperience in a rural setting.

INMD 7219. Metropolitan Physician Associate Program: Pediatrics. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This experience is set up in two parts: a 2-week experience of inpatient pediatric care at a traditional Twin Cities or Duluth clinical site prior to the orientation, and a 2-week experience in ambulatory behavioral health completed during the 9-month LIC experience in an urban setting.

INMD 7220. MetroPAP Primary Care Introduction Clerkship. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This portion of the overall LIC curriculum occurs during the first three months of MetroPAP and is integrated with the other core disciplines encompassed within the LIC.

INMD 7221. MetroPAP Primary Care Intermediate Clerkship. (3-10 cr. ; P-N only; Every Fall, Spring & Summer)
This portion of the overall LIC curriculum occurs during the second three months of MetroPAP and is integrated with the other core disciplines encompassed within the LIC.

INMD 7222. MetroPAP Acting Internship Primary Care. (8 cr. ; H-N only; Every Fall, Spring & Summer)
This portion of the overall LIC curriculum occurs during the final three months of MetroPAP and is integrated with the other core disciplines encompassed within the LIC.

INMD 7223. RPAP Primary Care Introduction Clerkship. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This portion of the overall LIC curriculum occurs during the first 3 months of RPAP and is integrated with the other core disciplines encompassed within the LIC.

INMD 7224. RPAP Primary Care Intermediate Clerkship. (3-10 cr. ; P-N only; Every Fall, Spring & Summer)
This portion of the overall LIC curriculum occurs during the second three months of RPAP and is integrated with the other core disciplines encompassed within the LIC.

INMD 7225. RPAP Acting Internship Primary Care. (8 cr. ; H-N only; Every Fall, Spring & Summer)
This portion of the overall LIC curriculum occurs during the final three months of RPAP and is integrated with the other core disciplines encompassed within the LIC.

INMD 7228. Rural Physicians Associate Program: Psychiatry. (4 cr. ; P-N only; Every Fall, Spring & Summer)
To prepare the medical student to recognize, diagnose, and care for patients with psychiatric disorders encountered in most medical practices. This experience is set up in two parts: a 2-week experience of inpatient pediatric care at a site near the Duluth or Twin Cities campuses prior to the RPAP orientation, and a 2-week experience in ambulatory behavioral health completed during the 9-mo LIC experience in a rural setting.

INMD 7229. RPAP Essentials of Surgery. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This is the RPAP version of the required surgery clerkship. Community-based required course with extensive primary care (surgery) experience in a rural setting. Student works with family physicians and local or visiting specialists. Problem-based learning, hands-on clinical experience, one-to-one teaching.

INMD 7230. RPAP Advanced Surgery and Procedures. (2-4 cr. ; P-N only; Every Fall, Spring & Summer)
Students interested in caring for patients in rural communities will have the opportunity to evaluate and participate in procedures and surgical care for a variety of conditions in various settings depending on rural site placemement

INMD 7236. MetroPAP Essentials of Surgery. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This is the MetroPAP version of the required surgery clerkship. Community-based required course with extensive surgery experience in a metropolitan setting.

INMD 7237. MetroPAP Advanced Surgery and Procedures. (2-4 cr. ; P-N only; Every Fall, Spring & Summer)
Students interested in caring for patients in a community context will have the opportunity to evaluate and participate in procedures and surgical care for a variety of conditions in various settings depending on site placement

INMD 7300. Medical Education. (; 2-4 cr. [max 8 cr.] ; H-N only; Every Fall, Spring & Summer)
"Academic credit (1 credit per week ""non-hands-on"") will be awarded for satisfactory completion of a medical education project at the University of Minnesota Medical School. The student must have an education mentor prearranged and submit a short description of the project through the application. No retroactive credit will be approved. See consent requirement below for the application and scheduling details." prereq: Students must have successfully completed the course that

they would like to do a MedEd project for. Students can also participate in projects for new courses.

INMD 7301. Medical Anthropology I: The Normal and the Pathological. (; 1 cr. ; P-N or Audit;)
Beliefs/practices concerning human affliction, health, and healing in cross cultural perspective. Body as biologically given and culturally/historically located. Meanings that individuals and social groups attach to health, sickness, suffering, and healing. The normal and the pathological in comparative perspective.

INMD 7302. Medical Anthropology II: International Health, Colonialism, and Emerging Diseases. (; 2 cr. ; P-N or Audit;)
Beliefs/practices concerning human affliction, health, and healing in cross cultural perspective. Body as biologically given and culturally/historically located. Meanings that individuals and social groups attach to health, sickness, suffering, and healing.

INMD 7303. Medical Anthropology III: Comprehending Human Affliction and Healing Cross Culturad Anthropology III. (; 4 cr. ; P-N or Audit;)
Beliefs/practices concerning human affliction, health, and healing in cross cultural perspective. Body as biologically given and culturally/historically located. Meanings that individuals and social groups attach to health, sickness, suffering, and healing. Ways in which diverse social groups cope with human affliction and seek to achieve health.

INMD 7309. VALUE LIC Psychiatry - Part B. (2 cr. ; H-N only; Periodic Fall, Spring & Summer)
VA based Psychiatry clerkship that will prepare medical students to recognize, diagnose and care for patients with psychiatric disorders encountered in most medical practices. Students will be working one-on-one with a psychiatrist in the outpatient setting and will follow patients to the inpatient setting. This is the clinical (Part B) portion of the required course that was created in response to COVID for 2020-2021. Students completed ADPY 7510 Psychiatry A for the structured curriculum portion of the requirement.

INMD 7310. VALUE LIC - Medicine I. (8 cr. ; P-N only; Every Fall, Spring & Summer)
VA based Internal Medicine clerkship with experiences in both inpatient and outpatient Internal Medicine. The course will emphasize diagnostic approaches to patient problems and acquisition of knowledge and skills while working with internal medicine hospitalists in the inpatient setting and attending physicians in the primary care clinics.

INMD 7312. VALUE LIC - Psychiatry. (4 cr. ; P-N only; Every Fall, Spring & Summer)
VA based Psychiatry clerkship that will prepare medical students to recognize, diagnose and care for patients with psychiatric disorders encountered in most medical practices. Students will be working one-on-one with a psychiatrist in the outpatient setting and will follow patients to the inpatient setting.

INMD 7313. VALUE LIC - Neurology. (4 cr. ; P-N only; Every Fall, Spring & Summer)
VA based Neurology clerkship that will increase clinical skills in diagnosing and treating neurologic illnesses. This will occur in the clinic and on the inpatient neurology consult service.

INMD 7314. VALUE Acting Internship Primary Care. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This clinical curriculum takes place longitudinally throughout the duration of the VALUE LIC. Students work directly with a primary care physician preceptor to provide care to veteran patients in the context of the VA Patient Aligned Care Team (PACT), the VA-based patient-centered medical home model.

INMD 7317. VALUE LIC QI/EBM/ Interprofessional Care. (4-6 cr. ; P-N only; Every Fall, Spring & Summer)
VALUE elective that will train medical students in patient-centered and inter-professional care that will lead to improved patient care and satisfaction. The experience will prepare students to meet the contemporary requirements of residency programs and future practice in a rapidly changing health care environment.

INMD 7319. VALUE LIC Radiology. (2 cr. ; P-N only; Every Fall, Spring & Summer)
This clerkship presents an overview of the various imaging modalities and image interpretation. Lectures cover fundamentals of image interpretation, nuclear medicine, computerized tomography, ultrasound, and magnetic resonance imaging. This is an opportunity to observe the procedures and read films with staff and residents. Emphasis is on normal anatomy and basic pathologic patterns. There are also multiple opportunities to follow longitudinal patients through the radiology department. The clerkship will also focus on how radiology interfaces with other disciplines but attendance at multidisciplinary conferences; Morbidity and Mortality, Gastroenterology Multidisciplinary Conference, Pulmonary Tumor Board, ENT tumor Board, Liver Tumor Board, Breast Conference, and Vascular and Neurology/Neuroradiology conference.

INMD 7320. VALUE Specialty Choice Elective. (; 2 cr. [max 4 cr.] ; P-N only; Every Fall, Spring & Summer)
The VAMC LIC Plus elective is a two-week long focused experience that is meant to enhance one aspect of the 'just completed' VALUE longitudinal integrated clerkship at the V.A. Medical Center. The area chosen by the student is built upon a specific interest encountered within the previous VALUE LIC. Student is responsible for finding the supervising preceptor (clinician) who will determine both the depth and breadth of the experience along with the student's assessment throughout the two weeks. Both the student and the preceptor must sign an agreement prior to the start of the experience as to final elective expectations.

INMD 7324. VALUE Essentials of Surgery. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This is the VALUE LIC equivalent to the required SURG 7550 course. VA based General Surgery Clerkship in which students will work directly with attending physicians while learning various responsibilities of surgical care and achieve competency in core surgical areas.

INMD 7325. VALUE Surgical Subspecialty. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This course is the VALUE LIC equivalent to the SURG 7552 Surgical Subspecialty Elective.

INMD 7350. HCMC LIC Internal Medicine. (8 cr. ; P-N only; Every Fall, Spring & Summer)
HCMC based Internal Medicine clerkship with experiences in both inpatient and outpatient Internal Medicine. The course will emphasize diagnostic approaches to patient problems and acquisition of knowledge and skills while working with internal medicine hospitalists in the inpatient setting and attending physicians in the primary care clinics.

INMD 7352. HCMC LIC Psychiatry. (4 cr. ; P-N only; Every Fall, Spring & Summer)
HCMC based Psychiatry clerkship that will prepare medical students to recognize, diagnose and care for patients with psychiatric disorders encountered in most medical practices. Students will be working one-on-one with a psychiatrist in the outpatient setting and will follow patients to the inpatient setting.

INMD 7354. HeLIX Acting Internship Primary Care. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This clinical curriculum takes place longitudinally throughout the duration of the HeLIX LIC. Students work directly with a primary care physician preceptor in the Internal Medicine clinic.

INMD 7355. HCMC LIC Obstetrics & Gynecology. (4 cr. ; P-N only; Every Fall, Spring & Summer)
HCMC based Ob/Gyn clerkship in which students will work with attending physicians while learning various responsibilities of Ob/Gyn care.

INMD 7356. HCMC LIC Pediatrics. (4 cr. ; P-N only; Every Fall, Spring & Summer)
HCMC based Pediatric Clerkship which provides basic pediatric skills and knowledge necessary for each student, no matter what field of medicine they select.

INMD 7357. HCMC LIC Health Disparities/ Social Determinants. (3-4 cr. ; P-N only; Every Fall, Spring & Summer)
Students will have didactic sessions which emphasize the underpinnings of health disparities, social determinants of health, and utilizing public policy to address those issues. In addition, students will participate in a multidisciplinary project addressing one specific issue/goal and present their work and results in some form (poster, publication, etc).

INMD 7358. HCMC LIC Emergency Medicine. (4 cr. ; P-N only; Every Fall, Spring & Summer)
HCMC based rotation provides first-hand experience in dealing with emergency problems in a Level I trauma center. Students work with emergency medicine residents under supervision by board certified attending staff. Students act as primary physician,

including initial assessment, minor procedures, interpretation of lab/x-ray, and preparation for admission to inpatient services. Opportunities to observe critical resuscitation.

INMD 7359. HeLIX Essentials of Clinical Neurology. (2 cr. ; P-N only; Every Fall, Spring & Summer)
This course is the HeLIX LIC equivalent of the Neurology Essentials course (NEUR 7511).

INMD 7360. HeLIX Neurology Apprenticeship. (2 cr. ; P-N only; Every Fall, Spring & Summer)
This course is the HeLIX version of NEUR 7512. The goals of the neurology clerkship are to increase clinical skills in diagnosing and treating neurologic illnesses, to stimulate interest in clinical neurosciences, and to increase awareness of the role of the neurologist. Upon completion of the course, the student will be familiar with common neurological disorders and will have a sense for when neurologic consultation is appropriate.

INMD 7361. HeLIX Essentials of Surgery. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This course is the HeLIX LIC equivalent of the required Essentials of Surgery clerkship. Hennepin-based General Surgery Clerkship in which students will work directly with attending physicians, while learning various responsibilities of surgical care and achieve competency in core surgical areas.

INMD 7362. HeLIX Surgical Subspecialty. (2 cr. ; P-N only; Every Fall, Spring & Summer)
This course is the HeLIX equivalent of SURG 7552 but is worth 2 credits instead of 4. Students will spend 2 weeks on surgical subspecialty services. Clinic, consultation service, and OR experiences will be available.

INMD 7363. HeLIX Neurology. (4 cr. ; P-N only; Every Fall, Spring & Summer)
Hennepin-based neurology clerkship that will increase clinical skills in diagnosing and treating neurologic illnesses. This will occur in the clinic and on the inpatient neurology consult service.

INMD 7401. Hospitalist Rotation. (1-8 cr. [max 12 cr.] ; P-N only; Every Fall, Spring & Summer)
One on one clinical educational experience with an internal medicine or medicine/pediatric hospitalist.

INMD 7403. EPAC Essentials of Clinical Neurology. (2 cr. ; P-N only; Every Fall, Spring & Summer)
This course is the EPAC LIC equivalent of the required NEUR 7511. The goals of the neurology clerkship are to increase clinical skills in diagnosing and treating neurologic illnesses, to stimulate interest in clinical neurosciences, and to increase awareness of the role of the neurologist. Upon completion of the course, the student will be familiar with common neurological disorders and will have a sense for when neurologic consultation is appropriate.

INMD 7410. Education in Pediatrics Across the Continuum LIC - Medicine I. (8 cr. ; P-N only; Every Fall, Spring & Summer)
A longitudinal Internal Medicine clerkship based at the University of Minnesota Medical Center as a part of the Education in Pediatrics Across the Continuum Longitudinal Integrated Clerkship (EPAC LIC). The course emphasizes the acquisition of knowledge, skills and attitudes in Internal Medicine while working with a continuity preceptor in outpatient Internal Medicine; tracking patients to inpatient, subspecialty, or interdisciplinary arenas; and through inpatient burst experiences with the hospitalist team at the University of Minnesota Medical Center.

INMD 7412. Education in Pediatrics Across the Continuum LIC: Psychiatry. (4 cr. ; P-N only; Every Fall, Spring & Summer)
A longitudinal psychiatry clerkship based at the University of Minnesota Masonic Medical Center as a part of the Education in Pediatrics Across the Continuum Longitudinal Integrated Clerkship (EPAC LIC). The course emphasizes the acquisition of knowledge, skills and attitudes in psychiatry while working with a continuity preceptor in outpatient psychiatry; and tracking patients to inpatient, subspecialty, or interdisciplinary arenas.

INMD 7413. Education in Pediatrics Across the Continuum LIC ? Neurology. (4 cr. ; P-N only; Every Fall, Spring & Summer)
A longitudinal neurology clerkship based at the University of Minnesota Medical Center as a part of the Education in Pediatrics Across the Continuum Longitudinal Integrated Clerkship (EPAC LIC). The course emphasizes the acquisition of knowledge, skills and attitudes in neurology while working with a continuity preceptor in outpatient neurology and tracking patients to inpatient, subspecialty, or interdisciplinary arenas.

INMD 7414. EPAC Acting Internship Primary Care. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This portion of the LIC curriculum occurs in the spring semester of the EPAC LIC and is integrated with the other core disciplines encompassed within the LIC.

INMD 7415. Education in Pediatrics Across the Continuum LIC ? Family Medicine. (4 cr. ; P-N only; Every Fall, Spring & Summer)
A longitudinal Family Medicine clerkship based at Smiley?s Family Medicine Clinic/ University of Minnesota Medical Center as a part of the Education in Pediatrics Across the Continuum Longitudinal Integrated Clerkship (EPAC LIC). The course emphasizes the acquisition of knowledge, skills and attitudes in Family Medicine while working with a continuity preceptor in Family Medicine, tracking with them for both inpatient and outpatient experience, and by tracking patients to inpatient, subspecialty, or interdisciplinary arenas.

INMD 7416. Education in Pediatrics Across the Continuum LIC: Obstetrics/Gynecology. (4 cr. ; P-N only; Every Fall, Spring & Summer)
A longitudinal Obstetrics and Gynecology clerkship based at the University of Minnesota Medical Center as a part of the Education in Pediatrics Across the Continuum Longitudinal Integrated Clerkship (EPAC LIC). The course emphasizes the acquisition of knowledge, skills and attitudes in Obstetrics and Gynecology while working with a continuity preceptor in Obstetrics and Gynecology in both the inpatient and outpatient setting and tracking continuity patients across their experiences at the University of Minnesota Medical Center.

INMD 7417. Education in Pediatrics Across the Continuum LIC: Pediatrics. (4 cr. ; P-N only; Every Fall, Spring & Summer)
A longitudinal pediatrics clerkship based at the University of Minnesota Masonic Children's Hospital and Fairview Children's Clinic as a part of the Education in Pediatrics Across the Continuum Longitudinal Integrated Clerkship (EPAC LIC). The course emphasizes the acquisition of knowledge, skills and attitudes in pediatrics while working with a continuity preceptor in outpatient pediatrics; and tracking patients to inpatient, subspecialty, or interdisciplinary arenas.

INMD 7418. Education in Pediatrics Across the Continuum LIC ? Emergency Medicine. (4 cr. ; P-N only; Every Fall, Spring & Summer)
A longitudinal Emergency Medicine clerkship based at the University of Minnesota Masonic Children?s Hospital as a part of the Education in Pediatrics Across the Continuum Longitudinal Integrated Clerkship (EPAC LIC). The course emphasizes the acquisition of knowledge, skills and attitudes in Emergency Medicine while working with a continuity preceptor in Emergency Medicine; tracking patients to inpatient, surgical or outpatient arenas as able; and through simulation experiences.

INMD 7421. Education in Pediatrics Across the Continuum LIC - Enrichment Elective. (2-8 cr. [max 24 cr.] ; P-N only; Every Fall, Spring & Summer)
The EPAC enrichment elective is a focused experience with the goal of furthering a student?s developmental progress towards entrustment without direct supervision in one or more areas of professional development. In general the assessment framework are the Core Entrustable Professional Activities for Entering Residency (CEPAER). The student will work with the Course Director and EPAC leadership team to identify and assign an experience that is likely to facilitate the developmental goals. This could include direct patient care or not. The student and course director must sign an agreement prior to the start of the experience as to the final elective expectations.

INMD 7422. Education in Pediatrics Across the Continuum - Independent Study. (2-8 cr. [max 24 cr.] ; P-N only; Every Fall, Spring & Summer)
The EPAC independent study elective is a semester long experience meant to complement patient care in pediatric medicine by developing a student?s non-direct patient care knowledge, skills and attitudes. The student will work with the course director to plan an independent study project; examples include a quality improvement project, drafting/ submitting for presentation a case report, etc. They will identify a supervising preceptor. The

student, course director and the supervising preceptor will sign an agreement prior to the start of the experience as to the final elective expectations. This elective may be repeated up to a total of three times, to move on to the next phase in a project in progress or to do a new project.

INMD 7423. Education in Pediatrics Across the Continuum - Medical Education Independent Study. (12 cr. ; P-N only; Every Fall, Spring & Summer)
As a part of participation in the EPAC undergraduate medical education curricular experience, EPAC students will, in the EPAC Medical Education Independent Study: ? Actively participate in educational quality improvement of the local EPAC program ? Contribute to the national data used to evaluate the national EPAC project and test feasibility ? Actively participate in formal, documented self-assessment and feedback beyond that explicitly required for traditionally tracked medical students at the University of Minnesota Medical School To this end, EPAC students will, at a minimum, attend weekly meetings during the EPAC LIC curriculum, complete all required local and national assessments, and keep their diagnosis and procedure tracker up to date.

INMD 7424. EPAC LIC Essentials of Surgery. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This is the EPAC LIC version of the required SURG 7550 course. A longitudinal surgery clerkship based at the University of Minnesota Masonic Children?s Hospital and University of Minnesota Medical Center as a part of the Education in Pediatrics Across the Continuum Longitudinal Integrated Clerkship (EPAC LIC). The course emphasizes the acquisition of knowledge, skills, and attitudes in general pediatric surgery while working with a continuity preceptor in outpatient surgery and tracking patients to inpatient, subspecialty, or interdisciplinary arenas.

INMD 7425. EPAC LIC Surgical Subspecialty. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This is the EPAC version of the SURG 7552 elective.

INMD 7433. EPAC Neurology Apprenticeship. (2 cr. ; P-N only; Every Fall, Spring & Summer)
This course is the EPAC LIC equivalent to the Neurology Apprenticeship course (NEUR 7512). The goals of the neurology clerkship are to increase clinical skills in diagnosing and treating neurologic illnesses, to stimulate interest in clinical neurosciences, and to increase awareness of the role of the neurologist. Upon completion of the course, the student will be familiar with common neurological disorders and will have a sense for when neurologic consultation is appropriate.

INMD 7450. Hospice & Palliative Care. (; 4 cr. ; P-N only; Every Fall, Spring & Summer)
Interdisciplinary course. Hospice, palliative medicine.

INMD 7500. ICU Translational Science. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
Year 4 students who want to experience how basic science concepts can be translated to quality care of patients requiring intensive care.

INMD 7508. Clerkship: Primary Care Medicine. (; 4 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Participation in patient care in outpatient primary care settings located at internal medicine, family practice, pediatric, and geriatric clinics. prereq: 6104

INMD 7509. Clerkship II: Primary Care Medicine. (; 4 cr. ; H-N or Audit; Every Fall, Spring & Summer)
N/A prereq: 6508

INMD 7520. Interdisciplinary Health Education in a Community Setting. (; 4 cr. ; P-N or Audit; Periodic Fall)
Students work with instructor and coordinator at one of three community sites. prereq: Health science student

INMD 7523. Occupational and Environmental Medicine Elective. (4 cr. ; H-N only; Every Fall, Spring & Summer)
By the end of this rotation, students will be able to: 1) identify unique problems associated with occupationally and environmentally-related illness and injury; 2) obtain and organize a thorough occupational or environmental history; 3) formulate appropriate work/activity restrictions based on a specific illness or injury; 4) describe the role of preventive medicine, both patient-focused & programmatic, in individual wellness and overall population health.

INMD 7526. Medicine and the Arts. (2 cr. ; P-N only; Every Fall)
Students will work with the course directors to tailor a course of study that will immerse them in forms of art and creative expression (such as literature, film, visual art, music, etc.) that reflect--and are inspired by--the practice of medicine.

INMD 7540. Ambulatory Clinic for the Physcian-Scientist. (; 1-6 cr. [max 12 cr.] ; H-N or Audit; Every Fall, Spring & Summer)
Students develop/refine ambulatory patient evalatuion and management skills. prereq: Med student

INMD 7542. Clinical Continuity Experience for Physician Scientists I. (3 cr. [max 6 cr.] ; H-N only; Every Fall)
Students paired with active physician scientist who serves as MSTP Clinical Mentor. One-on-one meetings between student/MSTP clinical mentor averaging one-half day per month. Mentors provide ongoing clinical opportunities/ teach clinical care skills.

INMD 7545. Clinical Continuity Experience for Physician Scientist II. (3 cr. [max 6 cr.] ; H-N only; Every Fall)
Students paired with active physician scientist who will serve as MSTP Clinical Mentor. One-on-one meetings between student/MSTP clinical mentor. Mentors provide ongoing clinical opportunities, teach clinical care skills, expose student to translational research questions.

INMD 7548. Clinical Foundations for the Physician Scientist. (4 cr. [max 8 cr.] ; H-N only; Every Fall, Spring & Summer)
Students paired with active physician scientist who serves as MSTP Clinical Mentor. One-on-one meetings between student/MSTP clinical mentor in clinic averaging one day per week for 9 weeks. Hands-on clinical experience.

INMD 7549. MSTP Directed Study. (3-6 cr. ; P-N only; Every Fall, Spring & Summer)
This course is for MD/PhD students to pursue independent research under the directed supervision of a research faculty mentor. The student must have a research mentor prearranged and approved by the MD/PhD program prior to taking the course.

INMD 7552. Traditional Indian Medicine Clerkship. (; 2-6 cr. [max 2 cr.] ; H-N or Audit; Every Fall, Spring & Summer)
Clinical experience in major hospital/center in approved (through Medical School Curriculum Affairs) Indian Health Service area. prereq: Med student, dept consent

INMD 7553. Elective Away at Centers for Disease Control (CDC). (; 2-8 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Full-time experience in section of CDC. prereq: Med student, dept consent

INMD 7554. Elective Away for Credit: Not Hands On. (; 1-4 cr. [max 12 cr.] ; H-N only; Every Fall, Spring & Summer)
Academic credit is awarded for satisfactory completion of virtual electives that are directly sponsored by and offered at other LCME-accredited U.S. medical schools. Students may earn up to 4 weeks of credit in Years 3 and 4 for these activities. Approval to take an elective away for credit with registration at the University of Minnesota for INMD 7554 must be done in advance before beginning the elective away for credit. Students will be registered for INMD 7554 to receive credit. Health insurance and malpractice insurance will be covered if credit is received. Applications must be completed for all categories below. Retroactive credit is not given. Category 1: Established electives offered through LCME-accredited U.S. medical schools will be automatically approved for eligible students. Students must complete the application for registration and are subject to any pre-rotation legal or administrative processes.* Category 2: Established electives offered through teaching hospitals in the Twin Cities (not through the University of Minnesota Medical School) will be automatically approved for eligible students. Students must complete the application for registration. Category 3: For established electives at any other sites, students must complete the application to be reviewed for approval by a panel of medical education administrators. Applications for individualized rotations will also be reviewed by the Assistant Dean for Curriculum. *An affiliation agreement is a legal document that may be required by the host institution to allow for your participation in their visiting student program. An affiliation agreement is a contract between the UMN Medical School and the host institution that establishes a partnership for the purpose of

providing educational experiences to UMN medical students. Affiliation agreements may take two months or more to process.

INMD 7555. Elective Away for Credit - Hands On. (; 2-8 cr. [max 32 cr.] ; H-N only; Every Fall, Spring & Summer)
Catalog Description: Academic credit is awarded for satisfactory completion of clinical electives that are directly sponsored by other LCME-accredited U.S. medical schools. Students may earn up to 8 weeks of credit in Years 3 and 4 for these activities. Electives must be regularly offered courses at other LCME-accredited medical schools and should be listed and described in the school catalog. Approval to take an elective away for credit with registration at the University of Minnesota for INMD 7555 must be done in advance before beginning the elective away for credit. Students will be registered for INMD 7555 to receive credit. Health insurance and malpractice insurance will be covered if credit is received. Applications must be completed for all categories: Category 1: Established electives offered through LCME-accredited U.S. medical schools will be automatically approved for eligible students who apply at least two months prior to the rotation start date. Students must complete the application for registration and are subject to any pre-rotation legal or administrative processes.* Category 2: Established electives offered through teaching hospitals in the Twin Cities (not through the University of Minnesota Medical School) will be automatically approved for eligible students who apply at least two months prior to the rotation start date. Students must complete the application for registration. Category 3: For established electives at any other sites, students must complete the application to be reviewed for approval by a panel of medical education administrators. Applications for individualized rotations will also be reviewed by the Assistant Dean for Curriculum. *An affiliation agreement is a legal document that may be required by the host institution to allow for your participation in their visiting student program. An affiliation agreement is a contract between the UMN Medical School and the host institution that establishes a partnership for the purpose of providing educational experiences to UMN medical students. Affiliation agreements may take two months or more to process.

INMD 7564. Pathology for Primary Care. (2 cr. ; P-N only; Every Fall, Spring & Summer)
The student will explore and identify how autopsies advance the understanding of diseases and disease processes, demonstrate an understanding of how to correlate clinical findings with gross and microscopic findings, and learn the epidemiologic importance of accurate death certification. Direction of the course will be primarily by student-set goals; depending on interests, areas of focus may include participation in autopsies, observation of field work with medicolegal death investigators, exploration of the ecological impact of burials/cremations, ethical considerations in death investigations, medical and/or forensic case studies, and exploration of the team approach to managing unexpected deaths in rural areas. The student will have a didactic component to the rotation and will have assistance in developing the student-specific goals. Some supplemental on-line learning may be used as well.This course is managed by the Medical School Duluth Campus.

INMD 7565. Global Health Abroad. (; 4-8 cr. [max 24 cr.] ; P-N only; Every Fall, Spring & Summer)
Student-arranged, structured, approved (through Medical School Global Health Abroad Office) clinical experience in foreign medical institution.

INMD 7568. Clinical Experience in International Medicine II. (; 2-6 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Student-arranged, structured, approved (through Medical School Curriculum Affairs) clinical experience in foreign medical institution. prereq: Med student, dept consent

INMD 7579. Rural Hawaii Public Health Elective. (; 2-6 cr. ; H-N only; Every Fall, Spring & Summer)
Six week rotation. Public health issues, multi-cultural focus. Students participate in North Hawaii Outcomes Project. Design of outcome measures, data collection, data analysis, program development/implementation. Stroke prevention, chemical use, motor vehicle accidents, teenage pregnancy.

INMD 7580. Integrative Healing in Hawaii. (; 2 cr. ; H-N only; Every Spring)
This course is a two-week elective rotation designed to provide medical students with the opportunity to gain knowledge and exposure to Integrated Healing modalities.

INMD 7581. Applied Integrative and Functional Medicine. (; 2 cr. ; H-N only; Every Fall)
During this 2-week rotation, the 3rd / 4th year student will experience how INFM is practiced as embedded with in a conventional family medicine training program by certified MD/PA/NP practitioners in Family Medicine, Integrative Medicine and Functional Medicine. Students will have the opportunity to: a. Rotate with a chiropractor and acupuncturist who work in a large health system; b. Participate in at least 1 shared medical visit conducted by one of the INFM faculty; and c. Shadow, at least 1 and up to 3, solo INFM practitioners in the Twin Cities who do not participate in insurance-based health care, and who work with patients with complex, chronic health conditions. The student will write a reflection paper at the end of the 2-weeks, that includes both the above objectives and a personal aspect (i.e.: discovery, idea, experience, self-awareness, etc.).

INMD 7650. Flex 5 Individualized Sub-Internship. (2-8 cr. [max 24 cr.] ; H-N only; Every Fall & Summer)
Students accepted into the Flex 5 program may need additional sub-internship experiences for their portfolio. In the case where there is not another specialty-specific course in the medical school catalog for which the Flex 5 student can enroll, the Interdisciplinary Flex 5 Individualized Sub-internship will provide an option for an additional experience in the student?s chosen specialty. Experiences under this course will build upon the knowledge and skills learned during their core clerkships and previous advanced experiences, and further improve their clinical skills in their specialty of choice.

INMD 7700. Primary Care Clinic: Minnesota Community Engagement Program (MNCEP). (; 4 cr. ; P-N only; Every Fall, Spring & Summer)
One month clerkship in rural or urban under-served community (initially will pilot in rural settings) Clinical experience with community physician. Participation in projects to address community health outcomes.

INMD 7710. M Health Fairview Interprofessional LIC Internal Medicine. (8 cr. ; P-N only; Every Fall, Spring & Summer)
This is the FLIIC LIC version of the required MED 7500. This is the core clinical clerkship that provides the critical foundations for not only adult inpatient medicine but also for the care of the acutely ill patient. Students will be part of inpatient care teams that will include interns, residents, and faculty. Students will learn through case discussions and presentations, didactics, independent study, and in the daily care of their patients. Students are expected to care for their patients as their primary point of contact, to begin to assume the responsibility for caring for, and coordinating care for, their patients. In addition, students on MED 7500 are expected to develop the basic skills of patient care in an academic environment. These skills include working across disciplines and professions on a health care team, effectively documenting and relaying patient care information between other care providers, and learning how to gather information to create a well-formulated assessment and plan. The skills learned on MED 7500 provide the foundation for patient care that students will use across disciplines for the remainder of medical school, into residency, and beyond.

INMD 7711. M Health Fairview Interprofessional LIC Essentials of Surgery. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This is the FLIIC LIC equivalent of the required Essentials of Surgery clerkship. MHealth/Fairview based General Surgery Clerkship in which students will work directly with attending physicians, while learning various responsibilities of surgical care and achieve competency in core surgical areas.

INMD 7712. M Health Fairview Interprofessional LIC Obstetrics & Gynecology. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This is the FLIIC LIC version of the required OBST 7500 clerkship. This is the core clinical course in Ob/Gyn for Year Three medical students consisting of a four-week experience in obstetrics and gynecology. All students will meet for Problem-Based Learning sessions addressing clinical aspects involved in common obstetric and gynecological problems twice

during the 4-week period. Students will participate in clinical procedures, deliveries and surgical operations. Students may be on a day/night float schedule or traditional call during L&D.

INMD 7713. M Health Fairview Interprofessional LIC Pediatrics. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This is the FLIIC LIC version of the required PED 7501 clerkship. The Pediatric 7501 clerkship is designed to provide basic pediatric skills and knowledge necessary for all students, no matter what field of medicine they select. Students will develop a basic understanding of normal growth and development, the influence of the environment on health, the impact of hospitalization on the child/family unit, and basic principles of common diseases affecting children. Students will be assigned patients on wards and, at some sites, newborn nurseries. Teaching rounds and conferences will review work-ups, discuss problems, and evaluate progress.

INMD 7714. M Health Fairview Interprofessional LIC Emergency Medicine. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This is the FLIIC LIC version of the required EMMD 7500 course. The student will have the opportunity to work with Emergency Medicine faculty and residents who for direction. Under their supervision, the student is expected to act as the primary physician for Emergency Department (ED) patients, including initial assessment, performance of minor procedures, interpretation of lab and x-ray, and preparation for admission to inpatient services. The student will also have the opportunity to observe critical resuscitations.

INMD 7716. M Health Fairview Interprofessional LIC Acting Internship Primary Care. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This clinical curriculum takes place longitudinally throughout the duration of FLIIC. Students work directly with primary care preceptors in the MHealth Fairview Eagan Internal Medicine-Pediatrics Clinic. Special emphasis is given to care by interdisciplinary teams. In addition, students will work on a longitudinal systems project within the outpatient realm of MHealth Fairview.

INMD 7717. FLIIC Interprofessional Leadership Seminar. (2 cr. [max 4 cr.] ; P-N only; Every Fall, Spring & Summer)
The leadership component of the Fairview Longitudinal Interprofessional Integrated Clerkship seeks to enhance the delivery of care through a better understanding of individual learning and leadership styles. Working interprofessionally, a small cohort of students will dive into the personal aspects of leadership as they impact the clinical experience.

INMD 7718. FLIIC General Surgery Subspecialty. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This course is the FLIIC equivalent to SURG 7551. Students interested in general surgery subspecialties will have the opportunity to care for patients with surgical disease processes and aid in both discernment and preparation for surgical acting internships

INMD 7719. FLIIC Specialty Plus Elective. (2-4 cr. ; P-N only; Every Fall, Spring & Summer)
The FLIIC Specialty Plus elective is a two- to four-week long focused experience that is meant to enhance the longitudinal integrated clerkship. The specialty area chosen by the student is built upon a specific interest encountered within the LIC.

INMD 7850. HYBRID Longitudinal Trauma Informed Care Clerkship I. (2 cr. ; P-N only; Every Fall, Spring & Summer)
The Longitudinal Trauma informed Care Clerkship I weaves lectures, small group reflections, patient care simulations and a well-established Trauma-Informed Care course into the HYBRID program. These added didactics will explore the nuances and complications of caring for a vulnerable population in a safety net hospital. Each didactic will be offered a few times during the year and students' time will be protected to attend these while on campus. The Trauma Informed Care course will introduce the concept to the students, while sessions, lectures, and simulations will support the students in treating patients with complex trauma and medical histories. Mentorship will also be offered through faculty interactions.

INMD 7860. Reflective Writing. (2-4 cr. ; P-N only; Every Fall, Spring & Summer)
This elective aims to develop students ability to appraise and create medical reflective writing as a form of scholarship and creative expression. Students will be assigned daily readings of published medical reflection and spend time reflecting and creating their own medical reflections. Students are expected to complete at least two final pieces of written reflection for submission for dissemination through publication in a medical or literary journals/magazines and/or public storytelling events.

INMD 7900. Flexible MD Independent Study. (; 3-6 cr. [max 18 cr.] ; P-N only; Every Fall, Spring & Summer)
Independent exploration of path toward doctorate of medicine Serving the needs of patients/communities. prereq: Registered medical student accepted into FlexMD Program

INMD 7901. Flexible MD Independent Study. (; 3-6 cr. ; P-N only; Every Fall, Spring & Summer)
Exploration of path toward doctorate of medicine, serving needs of patients/communities. prereq: Registered medical student accepted into FlexMD Program

INMD 7902. Flexible MD Independent Study. (; 3-6 cr. ; P-N only; Every Fall, Spring & Summer)
Exploration of path toward doctorate of medicine, serving needs of patients/communities. prereq: Registered medical student accepted into FlexMD Program

INMD 7910. Acting Internship MED ICU. (4 cr. ; P-N only; Every Fall, Spring & Summer)
Goal is to prepare medical students for internship and residency, through a clinically-focused experience focusing on higher acuity patients (ICU, IMC), clinical care, and emphasizing tasks necessary for internship. Students will use knowledge of pathophysiology and clinical epidemiology in order to develop a reasoned differential diagnosis. Finally, students will plan a logical and practical diagnostic evaluation, using the principles of evidence-based medicine.

INMD 7911. Acting Internship SURG ICU. (4 cr. ; P-N only; Every Fall, Spring & Summer)
Goal is to prepare medical students for internship and residency, through a clinically-focused experience focusing on higher acuity patients (ICU, IMC), clinical care, and emphasizing tasks necessary for internship. Students will use knowledge of pathophysiology and clinical epidemiology in order to develop a reasoned differential diagnosis. Finally, students will plan a logical and practical diagnostic evaluation, using the principles of evidence-based medicine.

INMD 7912. Acting Internship PED ICU. (4 cr. ; P-N only; Every Fall, Spring & Summer)
Goal is to prepare medical students for internship and residency, through a clinically-focused experience focusing on higher acuity patients (ICU, IMC), clinical care, and emphasizing tasks necessary for internship. Students will use knowledge of pathophysiology and clinical epidemiology in order to develop a reasoned differential diagnosis. Finally, students will plan a logical and practical diagnostic evaluation, using the principles of evidence-based medicine.

INMD 7913. Acting Internship PED NICU. (4 cr. [max 8 cr.] ; P-N only; Every Fall, Spring & Summer)
Goal is to prepare medical students for internship and residency, through a clinically-focused experience focusing on higher acuity patients (ICU, IMC), clinical care, and emphasizing tasks necessary for internship. Students will use knowledge of pathophysiology and clinical epidemiology in order to develop a reasoned differential diagnosis. Finally, students will plan a logical and practical diagnostic evaluation, using the principles of evidence-based medicine.

INMD 7925. Critical Care Elective. (2 cr. [max 4 cr.] ; P-N only; Periodic Fall, Spring & Summer)
2 week rotation of Intensive care unit ward exposure. Clinical ICU time was limited with COVID restrictions, thus adding additional two week rotation in adult medical surgical ICU prerequisite: 79XX

Interior Design (IDES)

IDES 5193. Directed Study in Interior Design. (; 1-4 cr. [max 8 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Independent study in interior design under tutorial guidance. prereq: Jr or sr or grad student

IDES 5196. Work experience (lighting internship). (3 cr. [max 10 cr.] ; A-F or Audit; Every Fall, Spring & Summer)

Faculty-directed internship

IDES 5612. Lighting Design. (3 cr. ; A-F only; Every Fall)
Lighting as dynamic design element. Psychological aspects of light color/quality/ sources. Photometrics, codes, daylighting, energy conservation. How lighting impacts health/well-being. Integrating lighting with interior/architectural elements. Lighting/fixture design. Computer visualization. Lecture, assignments, projects.

IDES 5616. Sustainable Commercial Interior Design. (3 cr. ; A-F or Audit; Every Spring)
Intent, requirements, submittals, technologies/ strategies to achieve LEED CI standards in existing, new construction, or tenant improvement projects.

IDES 5617. Lighting Design Innovations and Technological Advances. (; 3 cr. ; A-F only; Every Spring)
This course deepens students' understanding of the relationship between interior and architectural lighting design issues, strategies, and methods in contemporary practice. It investigates an integrated approach to lighting design to consider lighting innovations and emerging trends in health and comfort, smart technologies, energy and performance, metrics and standards, and assessment processes and tools. Assignments incrementally introduce students to related lighting issues to enable students to gain hands-on knowledge and application of related design issues through a small design project. Field studies and guest lectures provide insights into innovations in industry and professional perspectives on emerging technologies and systems integration.

IDES 8170. Topics in Interior Design. (; 1-3 cr. [max 6 cr.] ; A-F or Audit; Every Fall & Spring)
In-depth investigation of topic, announced in advance.

IDES 8180. Professional Seminar. (; 1-2 cr. [max 4 cr.] ; A-F or Audit; Every Fall & Spring)
Professional development issues/trends.

IDES 8192. Readings in Interior Design. (; 1-3 cr. [max 8 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Independent study, review of books/periodicals under tutorial guidance. prereq: instr consent

IDES 8193. Directed Study. (; 1-3 cr. [max 8 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Directed study in interior design. prereq: instr consent

IDES 8222. Plan B Master's Project. (; 3 cr. ; S-N or Audit; Every Fall & Spring)
Plan B master's project. prereq: [DHA or design] master's student, instr consent

International Business (IBUS)

IBUS 5090. Study Abroad Independent Study. (1-4 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
Independent study coordinated by faculty member.

IBUS 5091. Shanghai Summer Program in International Business (Graduate). (0-18 cr. ; S-N only; Every Summer)
Summer study abroad at one of Carlson School's international exchange partner universities, Antai College of Economics and Management. This is a three week summer program integrating intense business education in China context with corporate experience.

IBUS 5110. Business and the Environment in Costa Rica. (4 cr. ; A-F only; Every Fall & Spring)
How businesses maintain/increase profits by taking care of environment. Sustainable development, environmental strategy. Travel to Costa Rica to join students from INCAE (partner school) for series of courses. Case studies, site visits, field trips. Taught in English. prereq: Sr or grad student

IBUS 5120. Global Business Practicum in Central and Eastern Europe. (4 cr. ; A-F only; Every Spring & Summer)
Rapidly changing business environment of Central/Eastern Europe. Students work in teams with students from WU-Vienna University of Economics/Business for two weeks in May/June in Central/Eastern Europe. prereq: Carlson grad student

IBUS 5130. France Seminar: Doing Business in the European Union (Graduate). (4 cr. ; S-N only; Every Fall, Spring & Summer)
Two-week study abroad program at Universite Jean-Moulin Lyon 3 in Lyon, France. Includes courses taught by international faculty, site visits, cultural excursions. prereq: Carlson grad student

IBUS 5140. Vienna Summer Program in International Business (Graduate). (0-18 cr. ; S-N only; Every Summer)
Summer study abroad program at Europe's largest business school (WU-Vienna). Students take three business classes, plus German language. Program participants from Europe, Asia, Latin America, United States. prereq: Carlson grad student

IBUS 5150. IBUS 5150: Building on Frugal Innovations to Complete in a Global Environment. (4 cr. [max 8 cr.] ; A-F only; Every Fall)
On this program, students will be exposed to concepts related to developing a global managerial mindset, with a particular focus on understanding global product/market innovation. A variety of successful examples highlights the potential of frugal innovation - the term used to describe of cost-effective innovations devised to solve local problems in resource constrained markets - as being a very powerful source of ideas for new products and services. Products of frugal innovation, once proven locally, can be subsequently integrated into the broader R&D and product innovation processes within firms and become the base platforms for global products targeted at markets across the world. Students will choose an industry or domain of focus in class sessions and be exposed to global R&D practices in large local firms and then interact with startups and innovators working on frugal innovation projects on the ground in India. This is an education abroad program. Contact the Carlson Global Institute at cgi@umn.edu with questions. Prereq: approved application

IBUS 5160. Cologne Summer Program: European Management (Grad). (8 cr. [max 24 cr.] ; S-N only; Every Summer)
Summer study abroad at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interest. prereq: Carlson grad student

IBUS 5200. International Business: Undergraduate Exchange. (0-16 cr. [max 160 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

IBUS 5201. International Business: Undergraduate Exchange. (1-6 cr. [max 60 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

IBUS 5202. International Business: Undergraduate Exchange. (1-6 cr. [max 60 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests.

IBUS 5203. International Business: Undergraduate Exchange. (0.5-6 cr. [max 60 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

IBUS 5204. International Business: Undergraduate Exchange. (1-6 cr. [max 60 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

IBUS 5205. International Business: Undergraduate Exchange. (1-6 cr. [max 60 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

IBUS 5206. International Business: Undergraduate Exchange. (1-6 cr. [max 60 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr, Carlson School International Programs consent

IBUS 5207. International Business: Undergraduate Exchange. (1-6 cr. [max 60 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Student's select courses based on academic needs/interests. prereq: 60 cr

IBUS 5208. International Business: Undergraduate Exchange. (1-6 cr. [max 60 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Student's select courses based on academic needs/interests. prereq: 60 cr

IBUS 5209. International Business: Undergraduate Exchange. (1-6 cr. [max 60 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: 60 cr

IBUS 5260. Sustainability: The New Management Paradigm. (4 cr. ; A-F only; Every Spring)
View of integrated reporting (sustainability reporting) as it relates to various fields of business. Site visits, meetings with business executives/governmental agencies. Two weeks in the United Kingdom following commencement week, preceded by Spring B Term classes.

IBUS 5300. International Business: Graduate Exchange BLOCK. (0-18 cr. [max 54 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/ interests. For current offerings, contact Carlson International Programs. prereq: Carlson grad student

IBUS 5301. Graduate Exchange in International Business - BLOCK. (0-18 cr. [max 54 cr.] ; S-N only; Every Summer)
Summer study abroad at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5302. International Business: Graduate Exchange. (0-18 cr. [max 180 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5303. International Business: Graduate Exchange. (0-18 cr. [max 180 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5304. International Business: Graduate Exchange. (0-18 cr. [max 180 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5305. International Business: Graduate Exchange. (0-18 cr. [max 180 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5306. International Business: Graduate Exchange. (0-18 cr. [max 180 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5307. International Business: Graduate Exchange. (0-18 cr. [max 180 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5308. International Business: Graduate Exchange. (0-18 cr. [max 180 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5309. International Business: Graduate Exchange. (0-18 cr. [max 180 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5310. International Business: Graduate Exchange. (0-18 cr. [max 72 cr.] ; S-N or Audit; Every Fall & Spring)
Study at one of Carlson School's international exchange partner universities. Students select courses based on academic needs/interests. prereq: Carlson grad student

IBUS 5400. Global Business Practicum. (4 cr. [max 12 cr.] ; A-F only; Every Spring)
This course is an experiential learning model designed to provide student with an opportunity to apply global business knowledge and hone cross-cultural skills through a live international business project. This is an education abroad program. Contact the Carlson Global Institute with questions. Prereq: approved application

IBUS 5600. Graduate Summer Exchange. (0-4 cr. ; S-N only; Every Summer)
Summer study abroad exchange to one of Carlson Global Institute's partner universities.

IBUS 5601. Graduate Summer Exchange. (0-4 cr. ; S-N only; Every Summer)
Summer study abroad exchange to one of Carlson Global Institute's partner universities.

IBUS 5602. Graduate Summer Exchange. (0-4 cr. ; S-N only; Every Summer)
Summer study abroad exchange to one of Carlson Global Institute's partner universities.

IBUS 5603. Graduate Summer Exchange. (0-4 cr. ; S-N only; Every Summer)
Summer study abroad exchange to one of Carlson Global Institute's partner universities.

IBUS 5604. Graduate Summer Exchange. (0-4 cr. ; S-N only; Every Summer)
Summer study abroad exchange to one of Carlson Global Institute's partner universities.

IBUS 5605. Shanghai Summer Program in International Business (Graduate). (0-18 cr. ; S-N only; Every Summer)
Summer study abroad at one of Carlson School's international exchange partner universities, Antai College of Economics and Management. This is a three week summer program integrating intense business education in China context with corporate experience.

IBUS 6401. Marketing in the Mayhem: Why Chile Thrives and How Argentina Tries. (4 cr. [max 8 cr.] ; A-F only; Every Fall, Spring & Summer)
This course will explore the use of the Marketing Management Process by firms and governments as they seek to grow and will use the comparative perspectives of Argentina and Chile as case studies. This is an education abroad program. Contact the Carlson Global Institute at cgi@umn.edu with questions. Prereq: approved application

IBUS 6402. Morocco Diversifies: Sustainability & Entrepreneurship. (4 cr. [max 8 cr.] ; A-F only; Every Fall, Spring & Summer)
Through the case of Morocco this education abroad program will explore how countries reliant on external energy sources (generally hydrocarbon-based) face more economic instability and national security issues than those countries with sufficient energy resources to support and sustain economic growth. Emphasis on the ways Morocco is diversifying through sustainable energy initiatives and promoting entrepreneurship will be explored. Contact the Carlson Global Institute at cgi@umn.edu with questions. Prereq: approved application

IBUS 6403. How Ghana Grows: Cocoa and More. (4 cr. [max 8 cr.] ; A-F only; Every Fall)
This education abroad program is designed to explore how the commodities are transformed through value addition and sold into markets at price multiples well above their base price. This is an education abroad program. Contact the Carlson Global Institute at cgi@umn.edu with questions. Prereq: approved application

IBUS 6881. Marketing. (3 cr. ; A-F only; Every Spring)
Management of the marketing function; understanding the basic foundational marketing concepts and skills in strategy development and planning of operational and strategic levels pertaining to product offering decisions, distribution channels, pricing and communication.

IBUS 6882. Ethics and Leadership. (2 cr. ; A-F only; Every Fall)
This course has twin objectives: challenge participants to think about the ethical implications of the day-to-day conduct of business organizations; and explore how the relationship between corporate leaders and their followers can become mutually stimulating?raising them both to higher levels. It will focus on: ethics of corporate decisions; corporate social responsibility; corporate governance; sources of leadership power & influence; and leadership styles.

IBUS 6891. Medical Industry Valuation Labratory. (4 cr. ; A-F only; Every Fall & Spring)
Hands on experience in succinctly evaluating the value of a new technology by considering market size and potential, intellectual property, and return on investment. Intercollegiate teams create rapid production market analysis of promising medical technologies and services to determine potential for success in market. Exposure to University innovations, venture firms, inventors. The Medical Industry Valuation Laboratory will produce medical innovation valuations for clients for high value economic development and professional training purposes using an interdisciplinary team of faculty, students and industry leaders.

IBUS 6997. MILI Global Valuation Lab. (4 cr. [max 8 cr.] ; A-F only; Periodic Fall, Spring & Summer)
International version of medical industry leadership institute valuation lab. Assess value of proprietary inventions in context of international markets.

IBUS 7001. China Executive Program - Cohort 1 & 2. (1-56 cr. ; Student Option; Every Fall)
Program for students from Tsinghua School of Economics and Management.

IBUS 7003. China Executive Program - Cohort 3. (1-56 cr. ; Student Option; Every Fall)
Program for students from Tsinghua School of Economics and Management

IBUS 7004. China Executive Program - Cohort 4. (1-56 cr. ; Student Option; Every Fall)
Program for students from Tsinghua School of Economics and Management

Interprsnl Relations Research (IREL)

IREL 8001. Proseminar in Interpersonal Relationships Research. (; 2 cr. ; S-N or Audit; Every Fall)
Survey of major topics, including theoretical assumptions, methods, and samples of current research. prereq: Grad IRel minor

IREL 8021. Seminar: Statistical and Methodological Issues in Research on Dyadic Relationships. (; 3 cr. ; S-N only; Spring Even Year)
Survey of topics in design/analysis of research on behavior in two-person interactions. prereq: Grad IRel minor, [one prior course in multiple regression or structural equation modeling], instr consent

IREL 8360. Seminar: Topics in Interpersonal Relationships Research. (; 1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Intensive study of topics. prereq: Grad IRel minor or instr consent

Introduced Species, Genotypes (ISG)

ISG 5010. Risk Analysis for Introduced Species and Genotypes. (; 3 cr. ; A-F only; Every Fall)
Analytic-deliberative model of Ecological Risk Assessment (ERA). Components of ERA. Risk characterization. Evaluation of risk management decision processes. Use-risk communication, multi-stakeholder deliberation techniques. Cases. prereq: Grad student or [sr, instr consent]

ISG 8021. Problem Solving Practicum in Risk Analysis. (; 3 cr. [max 6 cr.] ; A-F only; Every Summer)
Students address real-world problems in environmental risk analysis of introduced species and genotypes, with faculty guidance and in consultation with public/private partner, and apply societal deliberation and scientific/ policy analysis. prereq: 5010, 5020

ISG 8031. Cooperative Learning Practicum. (; 1 cr. ; A-F only; Every Spring)
Cooperative learning techniques. Scenario planning, decision cases. Students develop/ test cooperative learning exercises for environmental risk assessment based on their research experience in 8021. Linking research to teaching. prereq: 8021

Italian (ITAL)

ITAL 5289. The Narrow Door: Women Writers and Feminist Practices in Italian Literature and Culture. (4 cr. [max 16 cr.] ; Student Option; Periodic Fall & Spring)
Focuses on issues of gender, sexual difference, equality, and emancipation raised by Italian women writers and thinkers from the 19th century to the present.

ITAL 5502. Making of Modern Italy: From the Enlightenment to the Present. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Spring)
Italian literary, cultural, and symbolic practices, from Enlightenment to present. prereq: grad student or instr consent

ITAL 5640. Topics in Italian Studies. (; 3 cr. [max 12 cr.] ; Student Option; Every Fall)
Topics of interest in studies of Italian and/or Italian American culture of the 20th century. Topics and readings may include literary, critical, cultural, historical, and/or social issues, a specific author, a genre, or other topics . Content varies by instructor. Specific content posted in the department and in the Course Guide. prereq: Ital 3015

ITAL 5970. Directed Readings. (; 1-4 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
Meets unique requirements decided on by faculty member and student. Individual contracts list contact hours, number of credits, written and other work required. prereq: instr consent

ITAL 8333. FTE: Masters. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

ITAL 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required (Plan A only)

ITAL 8992. Directed Readings. (; 1-4 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
Requirements decided on by faculty member and student: contact hours, number of credits, written/other work. prereq: instr consent

Japanese (JPN)

JPN 5040. Readings in Japanese Texts. (; 3 cr. [max 9 cr.] ; A-F or Audit; Every Fall)
Students read authentic materials of various types to increase reading and speaking ability. Topics specified in Class Schedule. prereq: 4042 or equiv or instr consent

JPN 5041. Reading Japanese Texts: Literature and Culture. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
This course is conducted 100% in modern Japanese, including course materials, lectures, and discussions. Close reading of texts written in modern Japanese, including a recent novel, essays on social phenomena, critical essays on Japanese society, and/or academic papers. Read and translate these texts accurately and critically; discuss them in Japanese, and/or compose an essay entirely in modern Japanese. Pre-requisite: JPN 4042 or equivalent or instructor consent.

JPN 5211. Introductory Classical Chinese I. (3 cr. ; Student Option; Periodic Fall)
Reading excerpts from canonical Chinese texts. Transnational nature of Classical Chinese/its importance in study of East Asian cultures. Taught in English. prereq: Two years of an East Asian language (Chinese, Japanese, Korean) or equivalent or instr consent

JPN 5993. Directed Studies in Japanese. (1-15 cr. ; Student Option; Every Fall & Spring)
Individual study with guidance of a faculty member. Prereq instr consent, dept consent, college consent.

JPN 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

JPN 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

JPN 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

JPN 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required (Plan A only)

JPN 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Jewish Studies (JWST)

JWST 5013W. Biblical Law and Jewish Ethics. (WI; 3 cr. ; Student Option; Periodic Fall & Spring)
This course introduces students to the original meaning and significance of religious law and ethics within Judaism. Law is the single most important part of Jewish history and identity. At the same time, law is also the least understood part of Judaism and has often been the source of criticism and hatred. We shall therefore confront one of the most important parts of Jewish civilization and seek to understand it on its own terms. In demonstrating how law becomes a fundamental religious and ethical ideal, the course will focus on the biblical and Rabbinic periods but spans the entire history of Judaism. Consistent with the First Amendment, the approach taken is secular. There are no prerequisites: the course is open to all qualified students. The course begins with ideas of law in ancient Babylon and then studies the ongoing history of those ideas. The biblical idea that a covenant binds Israel to God, along with its implications for human worth - including the view of woman as person - will be examined. Comparative cultural issues include the reinterpretations of covenant within Christianity and Islam. The course investigates the rabbinic concept of oral law, the use of law to maintain the civil and religious stability of the Jewish people, and the kabbalistic transformation of law. The course concludes with contemporary Jewish thinkers who return to the Bible while seeking to establish a modern system of universal ethics. The premise of the course is the discipline of academic religious studies. The assumptions of the course are therefore academic and secular, as required by the First Amendment. All texts and all religious traditions will be examined analytically and critically. Students are expected to understand and master this approach, which includes questioning conventional cultural assumptions about the composition and authorship of the Bible. Willingness to ask such questions and openness to new ways of thinking are essential to success in the course.

JWST 5115. Midrash: Reading and Retelling the Hebrew Bible. (; 3 cr. ; Student Option; Periodic Fall & Spring)
How did the Jews of the first seven centuries of the common era read and understand the Hebrew Bible? What were the problems they faced -- interpretive, historical, theological -- in trying to apply their holy scriptures? This course explores key issues that led to the development of a new form of Judaism in late antiquity, rabbinic Judaism, and its methods of scriptural interpretation. The course?s study will focus on the forms and practices of rabbinic scriptural interpretation (midrash) as it developed in Roman Palestine and Sasanian Babylonia, focusing on key narrative and legal passages in the Five Books of Moses (Torah). A main focus of the course will be on the ways the rabbis adapted the Hebrew Bible to express their own core concerns.

JWST 5204. The Dead Sea Scrolls. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Introduction to Dead Sea Scrolls and Qumran. Contents of Dead Sea Scrolls, significance for understanding development of the Bible. Background of Judaism and Christianity. Archaeological site of Qumran. Open to graduate students across the college; knowledge of classical Hebrew will not be required. The course is open to upper level undergraduate students with permission of the instructor.

JWST 5992. Directed Readings. (; 1-12 cr. ; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. prereq: instr consent

Journalism & Mass Communicat (JOUR)

JOUR 5131. In-Depth Reporting. (3 cr. ; A-F only; Every Fall)
The approach to the class is dual: First, there is an academic component ? studying the best examples in-depth reporting from muckrakers to yesterday?s New York Times. This part of the course will be presented in a seminar style with a high-expectation for student involvement. Second, there is a hands-on component ? giving students the opportunity to exercise what they learn in this class and elsewhere in their journalism program. This part of the course will require students to identify appropriate stories for in-depth reporting, outline the proposed stories to the instructor, thoroughly report the stories and go through the editing process. Students will also produce graphics and photographs, and might consider various multi-media possibilities. The class topics will be organized around essential social issues, such as health care, politics, poverty, business or other topics. During some semesters, students will produce news stories for publication at a professional news organization, such as MinnPost.com. Such opportunities in past classes have allowed students to work with professional reporters and editors and get bylines stories read by thousands. prereq: [Jour 3004 or 3004H], Jour 3101, Jour 3121, [Jour major, Mass Comm major or approved BIS/IDIM/ICP program]

JOUR 5174. Magazine Editing and Production. (3 cr. ; A-F only; Every Spring)
This course focuses on magazine and web writing, editing, photography, graphic design, and production. Students will study concepts of magazine and web communication with a special concern for how words, pictures, multimedia and design can be combined effectively. Over the semester, the class will create and produce a professional quality single-theme magazine and website. During this process, students will experience firsthand the organization and working of an editorial and production staff, and the implications of specific divisions of labor and working relationships. All students will write an article and/or produce web content as well as hold a staff job. prereq: [Jour 3004 or 3004H], [Jour 3101 and [Jour 3155 or Jour 3173 or Jour 3321 or Jour 4171 or Jour 4302]] or Jour 3279 , [Jour major, Strat Comm major, Mass Comm major or approved BIS/IDIM/ICP program]

JOUR 5196. Field Based Practicum. (; 3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
This class will teach advanced reporting skills through hands-on experience, professional oversight and thoughtful discussions with working journalists. Classes will be held at news organizations, where students will also work directly with editors to produce news, features or other content. That work experience will be complemented in weekly sessions by readings, projects and discussions and with journalists. Students apply to this course and completion of Jour 3121 is encouraged. Applications are available in the HSJMC student services office about a month before registration begins. prereq: Jour major and instructor permission

JOUR 5251. Strategic Communication Theory. (; 3 cr. ; Student Option; Every Spring)
This course is an introduction to psychologically-grounded concepts, theories and research and their applications for strategic communication. The course objectives involve comprehension and application of a range of psychological concepts and theories related to attitude development, susceptibility to message influence, and opinion formation and change. The course will provide opportunities to apply theoretical concepts to critically evaluate strategic communications (advertising, public relations, brand marketing, etc.) and to use psychological theory and research to inform the development of communication strategies. The course will examine how these theories help us understand communication processes in digital media environments, as well as how they inform relationship-building areas of strategic communication such as reputation and crisis management. The course will provide opportunities for students to apply concepts and theories to potential research for graduate degree capstone projects.

JOUR 5252. Issue Management Communication and Brand Advocacy. (; 3 cr. ; Student Option; Every Spring)
Advocacy and issue management communication provides organizations with a tool for promoting change, forming attitudes, and furthering dialogue about substantive issues. This course examines how advocacy and issue management communication creates dialogue that represents the goals of the organization and society, and the persuasive and media tactics used in advocacy and issue management communication. Typical class sessions will include a lecture and case discussion. Prerequisite: Strategic Communication MA student or instructor permission.

JOUR 5253. Content Strategy and Development. (; 3 cr. ; Student Option; Every Fall)

In today?s disruptive world of digital and social communications, brands/organizations have found it necessary to become content publishers. This course will expose students to evolving, highly dynamic best practices in content strategy and brand journalism. The course will consider how editorial strategies, emerging technologies and digital delivery platforms can lead to more effective content creation, distribution, audience engagement and measurement. Students will learn the various stages of content development, from organizing the brand?s storyline and mapping it to the customer?s brand journey, to the processes of planning, implementing and auditing an organization?s content strategy. The course includes weekly readings and case studies for each topic; guest lecturers who are experts in their area of content strategy; as well as a semester-long class project that aligns with each stage of the content development process. prereq: Strategic Communication MA student or instructor permission

JOUR 5501. Communication, Public Opinion, and Social Media. (; 3 cr. ; Student Option; Every Fall)
Sharpen your understanding of public opinion and its role in political and civic life: What does it mean? Where does it come from? How is it measured? What impact does it have? How are the public's preferences shaped by the larger communications environment and the strategic messages of politicians, interest groups, and other actors in society? What are polls really measuring, and why do they seem so unreliable sometimes? How are social media technologies giving voice to new segments and dimensions of public opinion? But how are they vulnerable to manipulation from bots and other efforts designed to alter perceptions of collective opinions? Examine the theories of communication, psychology, political science, and sociology that underlie these dynamic questions. We'll consider cutting edge approaches used by market researchers, political analysts, and data scientists to harness new forms of data about what the public thinks. We investigate theories that explain how people form their opinions, deliberate with others, change their minds, and reveal their preferences, and we apply these frameworks to understand contemporary public opinion issues and campaigns.

JOUR 5541. Mass Communication and Public Health. (3 cr. ; Student Option; Every Fall)
This course provides an overview of theory and research that lies at the intersection of mass communication and public health. We examine the potential for media exposure to influence public health outcomes, both as a product of people's everyday interactions with media and the strategic use of media messages to accomplish public health goals. To this end, we will explore large-scale public health campaigns in the context of tobacco, obesity, and cancer screening. We also will explore news media coverage of controversial health issues, such as the human papillomavirus (HPV) vaccine, and health information in entertainment media, such as smoking in movies. This course seeks to understand whether media messages have had intended and/or unintended effects on public attitudes and behavior. Although our focus is on mass media, interpersonal, medical, and digital media sources will be considered as well.

JOUR 5542. Theory-based Health Message Design. (3 cr. ; Student Option; Every Spring)
This course is designed to provide an overview of theory and research relevant for the design of health messages, and specifically focuses on how such theory and research informs message design. It builds on social and behavioral science approaches to public health communication and media effects with the primary objective to better understand issues and strategies related to the design of media health messages. Prerequisites: Jour 3005 or Jour 3757 or Jour 5541

JOUR 5543. Programs for Social Good: Design and Evaluation. (; 3 cr. ; A-F or Audit; Every Spring)
Despite the amount of money spent on (and the faith placed in) campaigns and other programs for social good, we often cannot answer basic questions about how these programs worked and the impact they had. There are methodological, programmatic, practical, and political reasons for this?all of which we will address in this course. In so doing, we will identify the key components of program design and evaluation, drawing on examples from domains including the environment, public health, and social justice. The overarching goal of this course is to give students the skills they need to understand and assess the effectiveness of campaigns and other programs for social good, whether as consumers or producers of such content. prereq: [Jour 3004W or 3004V], Jour 3201, any 32xx skills course, [Strat Comm major, Mass Comm major or approved BIS/IDIM/ICP program]

JOUR 5552. Law of Internet Communication. (3 cr. ; A-F or Audit; Every Spring)
Digital communication technologies continue to raise a variety of legal issues, including whether and how (and which) traditional media and regulatory laws will apply, and how policy should be applied through regulatory law to enhance and regulate that communication. This course is conducted as a seminar, with an open discussion of legal precedent and the influence of policy on internet and digital communications. This course covers the First Amendment as it applies in a digital era as well as regulatory topics like net neutrality, broadband access, privacy, and copyright.

JOUR 5601W. History of Journalism. (WI; 3 cr. ; Student Option; Every Spring)
What is (real/fake) news? Who's a journalist? What is journalism? How did we get to where we are today regarding journalism both as a profession and as an essential tool of democracy? Learn the fundamental chronology of the development of journalism in the United States from the Revolution to today, and then delve into the big quandaries: How free has journalism been? What have been its professional standards? How has journalism affected a diverse audience? What are the challenges of international journalism? And how have new communication technologies interacted with journalism?

JOUR 5606W. Literary Aspects of Journalism. (WI; 3 cr. ; Student Option; Every Spring)
Journalism isn't fiction. Yet the relationship between what is true and what is artfully constructed toward a "larger truth" -- beyond the facts -- has a complex and intriguing history. This writing-intensive course explores that relationship through close readings of some the best writers of long-form nonfiction, starting with the birth of the novel from journalistic roots in the 18th century and ending with postmodern forms that challenge the notion of what we can ever know. Discover the literary devices used by Stephen Crane's reported street scenes or Nellie Bly's first-hand investigations into conditions for the mentally ill in the 19th century, and, later, Truman Capote's nonfiction novel about a Kansas farm family's murder. Readings include works by pivotal 20th-century writers such as John Hersey, Joseph Mitchell, Lillian Ross, Michael Herr, Norman Mailer, Gay Talese, Joan Didion, Tom Wolfe, and Hunter S. Thompson, and will trace how their pioneering methods influenced contemporary journalism as well as the documentary films of Errol Morris and contemporary nonfiction writers expanding into new forms.

JOUR 5725. Management of Media Organizations. (3 cr. ; Student Option; Every Fall)
The modern media industry is marked by complexity as new entrants compete for consumers, industry mainstays struggle to survive, and disruptions continue. Consumers are increasingly more educated and proactive about their media consumption, and organizations face a complex array of marketing and advertising decisions. This course introduces students to the organizational structure of media organizations, and of organizations at large. The course focuses on the business aspects of media and prepares students to navigate the complexities of working in modern organizations. The course is designed to expose journalism and strategic communication majors and other interested students to core concepts and principles of managerial and organizational theory as they apply to these organizations. Students will learn about the key management challenges facing media organizations today in the modern technological landscape. A variety of theories or perspectives relevant or related to management, communication, and technology will be considered to help make sense of the modern media organization's structure and competitive landscape.

JOUR 5777. Contemporary Problems in Freedom of Speech and Press. (3 cr. ; A-F only; Every Fall)
Most of us use devices like Smartphones, GPS, streaming services, or hands-free speakers like Amazon's Echo that connect to online voice services like Alexa without thinking

about them very much. But, what kind of information are they collecting? Are merchants allowed to gather your shopping history and use it to send you targeted advertising, or to sell it to other companies for profit? Should other people be able to post your personal information or photos online without your consent? Can the government read your emails, track your online browsing, or intercept your text messages? This course considers how growing concerns about privacy and national security affect the First Amendment and the rights of journalists to gather and report the news. We will read significant court decisions and take a look at current statutory and regulatory initiatives both in the United States and abroad. You can expect lively debates and discussion, and the opportunity to explore a privacy or national security issue in depth in a substantial research paper. prereq: Jour major, Strat Comm major, Mass Comm major or Mass Comm minor or approved BIS/IDIM/ICP program or graduate or law student status. Course is open to students have previously taken a relevant law course - contact instructor for permission.

JOUR 5993. Directed Study. (1-3 cr. [max 6 cr.] ; Student Option No Audit; Every Fall, Spring & Summer)
Directed study/projects. Prereq [Jour major or jour minor or approved IDIM major or ICP major or BIS major], GPA of at least 3.00, college consent, dept consent, instr consent. Students enrolling in this directed study/ research course will complete the University's common Directed Study/Research contract with the faculty mentor/evaluator. The Faculty member will ensure academic standards are upheld, including: the work proposed is at the appropriate level for the course, academic in nature, and the student will be involved intellectually in the project. the project scope is reasonable for one semester and the number of credits specified (42 hours of work per credit) the faculty mentor is qualified to serve in this role assessment of student learning and grading criteria are clear and appropriate the student will be working in a respectful, inclusive environment

JOUR 8001. Studies and Theories of Mass Communication. (3 cr. ; A-F or Audit; Every Fall)
Introduction to key concepts, theories, methods in study of mass communication from social sciences perspective. Survey of research literature using individualistic/structural approaches.

JOUR 8002. Studies in Mass Communication II. (; 3 cr. ; A-F or Audit; Every Spring)
Literature on history of the field, cultural and humanistic approaches to its study, and legal and ethical issues. prereq: 8001

JOUR 8003. Digital Media Issues and Theories. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Nonprofessional skills course. Prepares entering graduate students to work in changing media environment. Political, social, economic, legal, ethical, technological implications nationally/globally. Produce scholarly research about changing media. prereq: Journalism grad student

JOUR 8009. Pro-seminar in Mass Communication. (1 cr. ; S-N only; Every Fall)
Introduction/socialization to scholarly discipline of mass communication, mass communication pedagogy, pathways to successful career. Develop action plan for completing graduate school/starting career in academy or relevant communication industries. prereq: Grad students enrolled in Mass Communication MA or PhD program

JOUR 8191. Health Journalism: Introduction to Health and Medical Journalism. (; 3 cr. ; A-F or Audit; Every Fall)
Best practices in health/medical reporting in different formats/media. Story ideas that challenge conventional wisdom about health care. Elements of health beat. Narrative/ investigative styles of journalism. Students do semester-long project. prereq: Enrolled in MA in health journalism or instr consent

JOUR 8192. Advanced Health Journalism: Computer-Assisted Reporting on Health. (; 3 cr. ; A-F or Audit; Every Spring)
How to use data/databases to tell health news stories or help with health campaigns. Databases, how to access them. How to mine data for effective communication to consumer audience. prereq: Enrolled in MA in health journalism or instr consent

JOUR 8193. Health Communication Capstone. (; 3 cr. ; A-F or Audit; Every Spring)
Focus on different aspects of a health issue, audience, context, and message mix that is central to the Health Communication M.A. program. Develop a final project focusing on a health communication topic of interest. Projects would be a publishable article, research paper, multimedia production, or any other format relevant for the chosen topic. Project is accompanied by a reflection paper.

JOUR 8194. Health Commuinication Practicum. (; 3 cr. ; A-F only; Every Summer)
Field-based practicum for students enrolled in the Health Communication M.A. program. Work with a local non-profit or for profit organization in the health care domain. Participatory observation study: work with organization staff on a strategic communication project and use experiences to analyze how message, audience, and context design processes take place in professional health communication settings.

JOUR 8200. Strategic Communication Research Methods. (; 3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Concepts, analytical techniques, and methods to analyze audiences, target markets, and social trends affecting communication strategy in context of complex and rapidly changing media environments. prereq: Strat Comm MA grad major

JOUR 8201. Factors Affecting Communication Strategy. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Literature/research concerning identification/ analysis of the media and environmental, regulatory, competitive, and economic factors that affect the development of communication strategy. prereq: Strat Comm MA grad major

JOUR 8202. Generation and Selection of Communication Strategies. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Concepts/methods to support analytic/ creative processes that lead to development of breakthrough communication strategies. Criteria for selecting among strategic alternatives. prereq: Strat Comm MA grad major

JOUR 8203. Integration of Communication Strategies Across Media. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Concepts, analytical techniques, and methodologies used to plan communication strategies and implement communication campaigns utilizing a diverse range of media. prereq: 8200, 8201, 8202, strat comm MA grad major

JOUR 8204. Measuring the Effectiveness of Strategic Communication Campaigns. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Examination, evaluation, and application of concepts/methods to evaluate effectiveness of strategic communication campaigns and their components. prereq: 8203, Strat Comm MA grad major

JOUR 8205. Strategic Communication Cases & Campaigns. (; 3 cr. ; A-F only; Every Spring)
Case study analysis concerning development, implementation, and evaluation of communication strategies. Cases cover broad range of organizations, focus on such issues as brand introduction, brand reinforcement, revitalizations, crisis communication, issues management, and legal/ethical considerations. prereq: 8203, strat comm MA grad major

JOUR 8206. Directed Study: Development of an Integrated Strategic Communication Campaign. (3 cr. [max 6 cr.] ; A-F only; Every Fall, Spring & Summer)
Project to develop a case study analysis concerning development, implementation, and evaluation of a strategic communication campaign. prereq: 8205, strat comm MA grad major

JOUR 8208. Digital Strategy, Planning and Analytics. (; 3 cr. ; Student Option; Every Summer)
This is a class that will feel more like a workshop; purpose-built to provide a hands-on learning experience while developing a digital presence for a real-world brand. Starting with the why (business problem or opportunity), students will collaborate on a strategy that informs the what throughout the remainder of the class, including the creation of a website, content and ads - as well as becoming Google Analytics certified. At the end of the semester, each student will play a key role in presenting the digital strategy and work that came from it directly to the client, along with an articulation of the impact it made on the client?s business.

JOUR 8290. Special Topics in Strategic Communication. (; 3 cr. [max 6 cr.] ; A-F only; Every Summer)

Topics specified in Class Schedule. prereq: Strat Comm MA grad major

JOUR 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

JOUR 8442. Seminar: Broadcast News. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Major issues. Confrontations between federal government and network news departments. Historical studies. prereq: 4442 or instr consent

JOUR 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

JOUR 8500. Seminar: Advanced Methods Special Topics. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Advanced topics in mass communication research methods; addresses the theoretical, conceptual, and analytical perspectives associated with advanced methodological approaches to mass communication scholarship, which may include qualitative, quantitative, ethnographic, humanistic, historical, legal, and/or social network approaches; emphasis on application of course materials to developing, analyzing, and describing data as appropriate for mass communication scholarship.

JOUR 8501. Research Methods in Mass Communication. (; 3 cr. ; A-F or Audit; Every Fall)
Epistemological issues and overview of qualitative and quantitative methodological approaches in mass communication research, basic principles and logic of scientific research, relationship between theory and research, concept explication, measurement, instrumentation, and design issues.

JOUR 8502. Advanced Quantitative Research Methods. (; 3 cr. ; A-F or Audit; Every Spring)
Advanced quantitative research principles/ techniques applied to mass communication research, including experimental methods, survey methods, among others. prereq: 8501, [EPsy 5260 or equiv or concurrent registration is required (or allowed) in EPsy 5260]

JOUR 8503. Advanced Qualitative Methods in Mass Communication Research. (3 cr. ; A-F or Audit; Every Spring)
Advanced qualitative research principles/ techniques applied to mass communication research, including ethnography, interviews, focus groups, case study, qualitative content analysis, historical research.?? prereq: Grad students enrolled in Mass Communication MA or PhD program or instr consent

JOUR 8504. Seminar: Analyzing Media Content. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Methods of analyzing media content/application of methods to theoretically-driven studies of media content. Conceptual/methodological issues surrounding analyzing media content in today's contemporary digital media environment, including collecting social media data, computer-aided analyses. prereq: Grad students enrolled in Mass Communication MA or PhD program or instr consent

JOUR 8513. Seminar: Ethnographic Methods in Mass Communication Research. (; 3 cr. ; A-F or Audit; Every Spring)
Theoretical foundations in anthropology/ sociology. Field projects. prereq: [8001, 8002] or instr consent; same as Anth 8810

JOUR 8514. Seminar: Advanced Mass Communication Theories. (3 cr. [max 9 cr.] ; A-F or Audit; Periodic Fall & Spring)
Research paradigms, concepts, findings for developing general theory of mass communication. prereq: 8001

JOUR 8601. Seminar: Methods in Mass Communication History Research. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Critical analysis of research in journalism/ communication history. Research designs/ methods. Development of a research project. prereq: 8001, 8002

JOUR 8602. Seminar: History of Mass Communication. (; 3 cr. ; A-F or Audit; Periodic Spring)
Research in history/development of U.S. mass media.

JOUR 8603. Seminar: Theories and Models in Mass Communication History Research. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Literature on theory in historical research. Uses of theoretical models in historical explanations. Role of theory in historical research, debate about uses. Specific works in journalism/communication history in context of theoretical models. Development of major paper examining models/theories relevant to student's project. prereq: 5601, instr consent

JOUR 8611. Journalism Studies Theory and Research. (3 cr. ; Student Option; Periodic Fall & Spring)
This graduate seminar provides an overview of journalism studies scholarship. As a survey of journalism research, students will be introduced to both classic and cutting-edge journalism research. The course explores multiple epistemic, methodological, and geographic perspectives that approach journalism as a practice, a cultural form, and an institution embedded in political and civic life. Readings will cover core debates surrounding professionalism and organizational structures, normative commitments involving objectivity and its alternatives, news audiences, race, colonialism, inclusivity, and questions arising from recent technological and economic developments. The course will also interrogate how journalism studies scholars consider their conceptual assumptions, research practices, and power. The learning objectives for this course include: introducing the fundamentals of journalism research field, and how the field has changed over the years; understanding how varying approaches to studying journalism shape and constrain how journalism is thought about; examining recent research on the impact of emerging media technologies on long-standing theoretical and conceptual underpinnings; and providing students an opportunity to conduct their own research on a journalism-related topic. The overview of journalism research that this course provides is central for students with a journalism studies focus, but it also provides a helpful background for students with journalism-adjacent focuses in strategic communication, health communication, and mass communication, political communication, and other social science foci.

JOUR 8620. Seminar: Advertising Theory and Research. (; 3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Advertising as persuasive communication. Current research/theory related to advertising decision-making process. prereq: Grad students enrolled in Mass Communication MA or PhD program or instr consent

JOUR 8621. Seminar: Public Relations Theory and Research. (3 cr. ; A-F only; Periodic Fall & Spring)
Study of theoretical body of knowledge in public relations field. Diverse roles played by public relations in organization. Current state of public relations research in regard to theory building. How theory informs professional practice of public relations. prereq: Grad students enrolled in Mass Communication MA or PhD program or instr consent

JOUR 8650. Seminar: Psychology of Media Effects. (3 cr. ; A-F only; Periodic Fall & Spring)
In-depth study of psychological concepts/ theories concerning individual cognitive processing of content of both traditional/new electronic media. Critically evaluate latest empirical research concerning how individuals respond to the content of both traditional mass media/newest electronic digital media. prereq: Grad students enrolled in Mass Communication MA or PhD program or instr consent

JOUR 8651. Seminar: Mass Communication, Audiences, and Society. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Interplay between social theories/media studies. Pragmatism, structural-functionalism, Marxism, political economy, cultural studies, globalization. prereq: 8001 or 8002 or equiv

JOUR 8661. Seminar: Mediated Political Communication in the Digital Age. (3 cr. ; A-F or Audit; Every Fall)
Mediated political communication in the digital age. How news, advertising, and entertainment media shape political perceptions, motivate voters, and influence policy decisions. Agenda-setting, priming, and framing, networked communications, micro-targeting, and mobile technology.

JOUR 8662. Seminar: Literary Aspects of Journalism. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Research in literary aspects of journalism exemplified in careers/works of American/ British writers. prereq: 5606

JOUR 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

JOUR 8671. Seminar: Communication Ethics--Public/Civic Journalism. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Historical underpinnings, philosophical debate, theoretical dynamics, legal concerns, ethical implications.

JOUR 8673. Seminar: Media Management. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Management issues in media organizations. Relation to dynamics of organization structure, employees, markets, economics/finances. prereq: 5725 recommended

JOUR 8675. Seminar: Issues in Information Access and Communication. (3 cr. ; A-F or Audit; Periodic Fall)
Societal, industry, technological, and policy aspects/developments that affect information access, particularly through mass media. prereq: Grad students enrolled in Mass Communication MA or PhD program or instr consent

JOUR 8678. Seminar: Constitutional Law--Theories of Freedom of Expression. (; 3 cr. ; A-F or Audit; Every Spring)
Problems of constitutional/tort law affecting the press. Underlying theories. prereq: 5777 or instr consent or law student

JOUR 8679. Seminar: Research Methods in Media Ethics and Law. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Research at intersection of first amendment and media ethics.

JOUR 8681. Seminar: International Media Perspectives. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Main problems/currents. Concepts, research, policy relevant to global development. Issues of freedom/constraint, media technology, role of journalism in world affairs.

JOUR 8720. Health Communication Theory and Research. (3 cr. ; A-F only; Periodic Fall & Spring)
Theories, methods, research that characterize field of health communication. Mass media influence on health, including use of mass media to promote health behaviors. Theoretical frameworks that inform health communication scholarship, as well as methodological approaches to studying health communication issues. prereq: Grad students enrolled in Mass Communication MA or PhD program or instr consent

JOUR 8721. Media Organizations as Institutions. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
This seminar introduces students to key theories and concepts in the study of media organizations as institutions. It explores the influences and effects of media, the internal dynamics of media organizations, and criticism/modes of reform. It introduces students to foundational questions and perspectives in research about the communicative processes of established and more diffused media organizations, including in journalism, health communication, and strategic communication. And it assesses theoretical frameworks for analysis from a multiplicity of viewpoints including sociology of work, organizational communication, management studies, etc.

JOUR 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required (Plan A only)

JOUR 8801. Seminar: Comparative Research in Mass Communication, a Cross-National Approach. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Comparative research designs/strategies. Analysis of production, presentation, transmission, and consumption of mass media products/services (particularly news, entertainment, and information) across national borders. Theoretical concerns, empirical problems, policy. Ethical issues involving research on form/content of mass communication within/between countries. prereq: 4801 or 5825

JOUR 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

JOUR 8990. Special Problems in Mass Communications. (; 3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Topics specified in Class Schedule. prereq: Mass comm grad student or instr consent

JOUR 8993. Directed Study. (; 1-6 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Directed study. prereq: Grad mass comm major or minor, instr consent, dept consent

Kinesiology (KIN)

KIN 5001. Foundations of Human Factors/ Ergonomics. (; 3 cr. ; A-F or Audit; Every Fall)
Variability in human performance as influenced by interaction with designs of machines and tools, computers and software, complex technological systems, jobs and working conditions, organizations, and sociotechnical institutions. Emphasizes conceptual, empirical, practical aspects of human factors/ergonomic science.

KIN 5104. Physical Activities for Persons with Disabilities. (3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Different approaches to providing physical education service and related movement interventions for persons with disabilities. Topics: movement behavior foundations, movement skill progressions, unique considerations for specific impairments, and sport for persons with disabilities

KIN 5111. Sports Facilities. (; 3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Steps in planning/building facilities for athletics, physical education, and sport for college, professional, and public use. prereq: Kin or Rec grad student or MEd student

KIN 5115. Event Management in Sport. (; 3 cr. ; A-F or Audit; Every Spring & Summer)
Techniques/principles of planning, funding, and managing sport events. Collegiate championships, non-profit events, benefits, professional events. prereq: Grad student, instr consent

KIN 5122. Applied Exercise Physiology. (; 3 cr. ; A-F or Audit; Periodic Fall)
Mechanisms of cardiorespiratory and muscular responses to exercise; application of exercise physiology to assessment of work capacity, athletic conditioning, and requirements of human powered vehicles; low to moderate exercise as an intervention in lowering risk for common health problems. prereq: 4385 or equiv or instr consent

KIN 5123. Motivational Interventions in Physical Activity. (; 3 cr. ; A-F only; Every Spring & Summer)
This course prepares students to critically evaluate theory, motivational interventions, and psychological principles related to physical activity. Environmental and policy influences on physical activity behavior and intervention components, design, and evaluation will be discussed. The influence of physical activity on mental health, self-perceptions, stress, anxiety, depression, emotional well-being, cognitive function, and health-related quality of life will be reviewed. This course will help students to better understand and modify exercise behavior and review the most commonly studied psychosocial influences and consequences of physical activity. This class integrates theoretical principles and the latest research with intervention strategies that students can apply in real-world settings.

KIN 5125. Advances in Physical Activity and Health. (; 3 cr. ; A-F only; Every Spring & Summer)
This course exposes students with accurate and up-to-date information regarding physical activity as it relates to health in the United States. It is intended to enhance students? ability to identify important issues pertinent to physical activity and health, as well as develop and maintain a physically active lifestyle.

KIN 5126. Social Psychology of Sport & Physical Activity. (3 cr. ; A-F only; Every Fall & Spring)
Theory/research on social influences, individual differences, motivational processes. How sport/ physical activity contribute to psycho-social development. Social psychological factors influencing physical activity beliefs/behaviors. prereq: 3126W or equiv or grad student or instr consent

KIN 5136. Psychology of Coaching. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Psychological dimensions of coaching across age levels, including coaching philosophy, leadership, communication skills, motivation,

and mental skills training for performance enhancement.

KIN 5141. Nutrition and Exercise for Health Promotion and Disease Prevention. (3 cr. ; A-F only; Every Fall)
Requirements/physiologic roles of nutrients/ physical activity in promotion of health. Assessment of energy requirements. RDAs, food composition/safety, weight management. Prevention of chronic diseases. Coronary heart disease. prereq: FScN 1112 or equiv

KIN 5142. Applied Nutrition for Sport Performance and Optimal Health. (3 cr. ; A-F only; Every Spring)
This course is designed for students interested in nutrition as it relates to health, exercise and athletic training. Evidenced based information is used to apply current nutrition concepts to improve health, physical and athletic performance. Case studies as well as personal data are employed throughout course to support concepts of lecture.

KIN 5181. Understanding Kinesiology Research. (; 3 cr. ; A-F only; Every Fall)
Prepares students to critically analyze research specific to kinesiology. Ethics, measurement, experimental and qualitative design, and physical activity epidemiology research will be reviewed. The application of research to practice will be emphasized. This course is designed for School of Kinesiology M.Ed Students. Undergraduates, M.S. M.A., and Ph.D. students should consult with their academic advisor before registering for this course. Recommended prerequisite: introductory statistics

KIN 5202. Current Issues in Health. (; 2 cr. ; A-F only; Every Summer)
Critical thinking for health issues in research/ media. Issues specific to conflict, stress, public policy, and communication. Projects, debates.

KIN 5203. Health Media, Consumerism, and Communication. (; 2 cr. ; A-F only; Every Spring)
Effects of media, consumerism, technology, and health related issues. Students form/ defend opinions on positive/negative aspects of how health information is disseminated and how individual health decisions are made.

KIN 5235. Advanced Biomechanics II: Kinetics. (; 3 cr. ; A-F or Audit; Spring Odd Year)
Kinetic aspects of human movement (single/ multi-joint torques, simple inverted pendulum models, mass-spring systems). Analysis of experimental data and of computer simulations. Lectures, seminars, lab. prereq: [3112 or equiv], PMed 5135, undergrad college physics, intro calculus

KIN 5328. International Sport: The Impact of the Olympic Games. (GP,HIS; 3 cr. ; A-F only; Periodic Fall, Spring & Summer)
In the late nineteenth century, Baron Pierre de Coubertin, a French aristocrat, worked tirelessly to revive the Olympic Games from Greek history. Through Baron de Coubertin's efforts, the first Olympic Games of the modern era took place in 1896 in Athens, Greece. From a small sporting event that hosted a little over 300 athletes from 13 countries the Olympic Games have grown over the last 120 years to one of the most viewed sporting events in the world. Today, the Olympic Games hosts over 10,000 athletes from over 200 countries. The International Olympic Committee (IOC), which runs the Olympic Games, is now one of the most powerful and richest sporting organizations in the world. The Olympic Games have had a profound impact on the world we live in and they provide us with a platform for examining changes in the world's cultural, economic, social and political processes over the last 120 years. This course explores the impact of a specific Olympic Game(s) held on that host city's culture, economy and political landscape. In addition, this course will explore that Olympic Games(s) impact on the world's cultural, social and political processes.

KIN 5371. Sport and Society. (; 3 cr. ; A-F or Audit; Every Spring)
Sport, sporting processes, social influences, systems. Structures that have effected and exist within/among societies, nations, and cultures. Contemporary issues such as social differentiation, violence, and honesty. prereq: [3126W, grad student] or instr consent

KIN 5385. Exercise for Healthy Aging & Disease Prevention and Management. (3 cr. ; A-F only; Every Spring)
Exercise testing/prescription with modifications required because of special considerations associated with aging, gender differences, or presence of medical conditions. prereq: Physiology or biology undergrad

KIN 5421. Sport Finance. (; 3 cr. ; A-F or Audit; Every Fall & Summer)
Introduction to financial analysis in sport. Cash flow statements, budgeting issues, traditional/ innovative revenue producing strategies available to sport organizations. Discussion, practical analysis of current market. prereq: Grad student or instr consent

KIN 5435. Advanced Theory and Techniques of Exercise Science. (3 cr. ; A-F only; Every Spring)
Theoretical constructs, in-depth description of procedures used in exercise science research and clinical settings. Laboratory exercises, lectures. prereq: [3385, 4385, Kin major] or instr consent

KIN 5441. Applied Sport Science Research. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Introduction to varied contributions of sport sciences to athletic performance. Evaluation of historical research's contributions toward modern day research questions.

KIN 5461. Issues in the Sport Industry. (3 cr. ; A-F only; Every Fall)
Critical analysis of management issues within sport industry. Strategic management, corporate social responsibility, human resource management/diversity, governance, sport globalization, sport development. prereq: postbac or grad student or instr consent

KIN 5485. Exercise Testing and Prescription. (; 3 cr. ; A-F only; Every Fall)
This course will provide an introduction to exercise testing and prescription including basic placement of EKG placement and interpretation of an electrocardiogram. Students will also learn the basics of gas exchange and fitness test and the use of this information in the prescription of exercise in a variety of populations as well as use of electrocardiogram in clinical exercise testing and exercise prescription. prereq: [3385, 4385] or instr consent

KIN 5505. Human-Centered Design - Principles and Applications. (; 3 cr. ; A-F only; Every Fall)
Application of design to meet human needs. Design of fabricated products, tools/machines, software/hardware interfaces, art/culture, living environments, and complex sociotechnical systems.

KIN 5511. Sport and Gender. (; 3 cr. ; A-F only; Every Fall)
Critically examines women's involvement in/ contributions to sport, physical activity, and leisure.

KIN 5585. Pediatric Physiology and Health: Concepts and Applications. (; 2 cr. ; A-F only; Periodic Fall)
Current understanding of pediatric medicine and exercise physiology. Use of physical activity and weight management in the treatment of various diseases (i.e, obesity) that affect children and adolescents. prereq: 3385 or 4385

KIN 5601. Sport Management Ethics and Policy. (; 3 cr. ; A-F or Audit; Every Spring)
How to critically analyze ethical concepts that underpin or inform sport policies and evaluate sport policies from a normative point of view. Selected sport policy issues are used to illustrate relevance of ethical considerations in policy development and to explore the ethical implications of sport policy. prereq: MEd or grad student or instr consent

KIN 5631. Programming and Promotion in Sport. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Introduction to marketing concepts as they apply to sport industry. Consumer behavior, market research, marketing mix, corporate sponsorship, licensing. Discussion, practical application. prereq: Kin or Rec grad student or instr consent

KIN 5641. Scientific Theory and Application of Training and Conditioning in Sport. (; 3 cr. ; A-F only; Every Spring & Summer)
Current scientific literature on physiological adaptation through training/conditioning for sport. Applying methods in research journals to improve physiological adaptation through training/conditioning with sport specificity. prereq: 4385 or SPST 3641 or SPST 4641 or exercise physiology course or instr consent

KIN 5643. Applied Motion Capture and Movement Analysis Technology. (3 cr. ; A-F only; Every Fall)
Course provides students with the knowledge and tools to effectively analyze human movement patterns in a wide variety of field-

based settings, such as assessing sport skill performance or measuring movement deficits after injury. Students will comprehend the basic, underlying components of movement and movement deficits. It is strongly suggested students have taken Physics, Biomechanics, and Human Anatomy. Credit will not be received if taken KIN 5720: Special Topics in Kinesiology with the topic title, Sport Movement Analysis.

KIN 5696. Practicum in Kinesiology. (; 1-6 cr. ; S-N only; Every Fall, Spring & Summer)
Practical experience in kinesiology under supervision of a University faculty member and an agency supervisor. prereq: [Kin MEd or grad student], instr consent

KIN 5720. Special Topics in Kinesiology. (; 2-4 cr. [max 12 cr.] ; A-F only; Every Fall, Spring & Summer)
Current issues in the broad field and subfields in kinesiology, or related coursework in areas not normally available through regular offerings.

KIN 5723. Psychology of Sport Injury and Rehabilitation. (; 3 cr. ; A-F only; Every Fall)
Psychosocial bases of risk factors preceding sport injury, responses to the occurrence of sport injury, and the rehabilitation process. Lecture, discussion, guest lecture, interviews, and presentation experience. prereq: Intro psych course

KIN 5725. Organization and Management of Physical Education and Sport. (; 3 cr. ; A-F only; Every Spring & Summer)
Comprehensive analysis of organization and management of physical education and sport in educational settings. Focus on management and planning processes, management skills, functions, roles, decision making, leadership, shared systems, and organizational motivation. For physical education teachers, coaches, community sport administrators. prereq: Grad/ initial licensure or instr consent

KIN 5801. Legal Aspects of Sport and Physical Activity. (; 4 cr. ; A-F only; Every Fall & Spring)
Legal issues related to sport and physical activity settings and facilities in public/private sectors

KIN 5804. National Collegiate Athletic Association (NCAA) Compliance. (; 2 cr. ; A-F only; Every Spring)
Governance structure, policies, and procedures in intercollegiate athletics. Careers in college athletics as coach, administrator, athletic trainer, counselor, etc. prereq: [Upper div undergrad or grad student] in KIN, instr consent

KIN 5841. Elite Performance and Environmental Considerations. (3 cr. ; A-F only; Periodic Fall)
An examination of elite athletic performance and the effects of environmental conditions on sport performance. Topics include altitude, heat and humidity, cold, wind, and other high stress environments. Students will investigate strategies such as nutrition/dehydration, training, and acclimatization. prereq: KIN 4385 or 4641 or instr consent suggested

KIN 5941. Clinical Movement Neuroscience. (; 3 cr. ; A-F only; Periodic Spring)
Various neural subsystems involved in controlling human motor function. How injury and disease of the nervous system affects motor behavior. Possibilities for rehabilitation and treatment. Lectures, seminars, class presentations. prereq: [3027 or ANAT 3001 or ANAT 3601 or ANAT 3611 or equiv], [PHSL 3051 or equiv], [4441]

KIN 5981. Research Methodology in Kinesiology and Sport Management. (3 cr. ; A-F only; Every Fall)
Defines/reviews various types of research in exercise/sport science, and physical education. Qualitative research, field studies, and methods of introspection as alternative research strategies to traditional scientific paradigm.

KIN 5987. Professional Skills and Grant Writing for Health Sciences. (; 2 cr. ; Student Option No Audit; Spring Odd Year)
Introduction to structure/function of different organizations (e.g., NIH, AHA). Writing/ reviewing grants/manuscripts. Preparing for a job in academia. prereq: Grad student

KIN 5992. Readings in Kinesiology. (; 1-9 cr. ; A-F only; Every Fall, Spring & Summer)
Independent study under tutorial guidance. prereq: [KIN upper div undergrad or MEd or grad student], instr consent

KIN 5995. Research Problems in Applied Kinesiology. (; 1-6 cr. ; A-F only; Every Fall, Spring & Summer)
Selected topics in physical activity and human performance. prereq: [Kin upper div undergrad or MEd or grad student], 15 cr of major coursework [including 4981 or 5981], instr consent

KIN 8002. Proseminar in Human Factors/ Ergonomics. (; 1 cr. [max 2 cr.] ; A-F or Audit; Every Fall & Spring)
Issues/concerns tailored to interests of faculty/ students regarding human factors/ergonomics. Interaction of performance/behavior with design factors in performance environment. prereq: Enrollment in good standing, grad HumF minor

KIN 8010. Special Topics in Kinesiology. (; 1-6 cr. ; A-F only; Periodic Fall, Spring & Summer)
Current issues in the broad field and subfields in kinesiology, or related coursework in areas not normally available through regular offerings.

KIN 8122. Seminar: Exercise Physiology. (2 cr. [max 8 cr.] ; A-F only; Every Fall & Spring)
Classic/contemporary literature in exercise physiology/allied disciplines. Contributions of major leaders in field. Opportunities for interdisciplinary research. Spring semester students/faculty in exercise science present original research. prereq: 5122 or equiv or instr consent

KIN 8126. Sports Medicine Psychology. (; 3 cr. ; A-F only; Periodic Spring)
Advanced seminar course. Multidisciplinary contributors to sports medicine psychology. Theory, research, and practice in the behavioral/social aspects of injury prevention/ experiences among physically active populations across the life span. prereq: Grad student or instr consent

KIN 8128. Doctoral Sport Management Seminar. (; 3 cr. ; A-F only; Periodic Fall & Spring)
Analysis of current literature, theoretical constructs, research methodology and design relative to sport management. Focuses on student-selected topics, research problems. prereq: PhD student, instr consent

KIN 8132. Seminar: Motor Development. (; 3 cr. ; A-F or Audit; Periodic Spring)
Contemporary research literature on motor skill development from before birth to senescence. Emphasizes interaction between physical/environmental/performer constraints. Coordination/control of movement. prereq: grad student or instr consent

KIN 8135. Seminar: Motor Control and Learning. (; 3 cr. ; A-F or Audit; Periodic Spring)
Advanced reading/discussion of research on motor control, motor learning, human performance. prereq: grad student or instr consent

KIN 8136. Developmental Sport and Exercise Psychology. (; 3 cr. ; A-F only; Every Fall & Spring)
Sport and exercise psychology from a life span developmental perspective. Theoretical perspectives, self-perceptions, social influences, emotional development, motivational processes, self-regulation, development of expertise, moral development, sport injury, and gender and cultural diversity. prereq: Grad student or instr consent

KIN 8211. Seminar: Perception and Action. (; 3 cr. ; A-F or Audit; Periodic Spring)
Survey of theory/research on use of perceptual information for control of action. Behavioral research on perceptual guidance of daily activities (e.g., standing, walking, driving). Perceptual control in context of expertise (e.g., sports). Perceptual-motor development. prereq: grad student or instr consent

KIN 8285. Cellular and Molecular Exercise Physiology. (3 cr. ; A-F only; Periodic Fall & Spring)
This course emphasizes the cellular and molecular mechanisms in response to acute and chronic physical exercise. Biochemical pathways of regulating energy metabolism during exercise, change of gene expression as adaptation to altered diet, environmental factors and aging, and cellular oxidative-antioxidant homeostatsis will be the main foci. The course will expose graduate students and advanced undergraduate students to current topics of biomedical issues affecting human health and wellbeing, modern techniques of exercise science research, and important research articles in literature. prereq: KIN 3385: Human Physiology and KIN 4385: Exercise Physiology; KIN 5122: Applied Exercise Physiology; college level chemistry. Suggested: organic chemistry, or instr consent Credits will not be given if taken as KIN 5720 with the same title.

KIN 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

KIN 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

KIN 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 24 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; Dept consent required; No grade associated; 4 completions allowed; up to 24 combined cr.

KIN 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required (Plan A only)

KIN 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

KIN 8980. Graduate Research Seminar in Kinesiology. (3 cr. [max 9 cr.] ; A-F only; Every Fall)
Reporting/discussion of student/faculty research activity. prereq: KIN M.S. or Ph.D. or SMGT M.A. or instr consent

KIN 8995. Research Problems in Kinesiology. (1-12 cr. ; S-N only; Every Fall, Spring & Summer)
Individual scholarly research. prereq: Kin Ph.D. student or SMGT grad student or instr consent

Korean (KOR)

KOR 5040. Readings in Korean Texts: North Korean Dialect. (; 3 cr. [max 9 cr.] ; Student Option No Audit; Periodic Fall & Spring)
Expose advanced students of Korean to various North Korean contexts. Improve ability to understand North Korean literary work. Various authentic texts from North Korea. Mostly taught in Korean. prereq: 3022 or intermediate level of Korean proficiency

KOR 5140. Readings in Sino-Korean Texts. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Sino-Korean vocabulary/characters necessary for advanced and superior level of knowledge in Korean. Students conduct research projects based on specialized readings in their own fields of study. prereq: 3032 or equiv or instr consent

KOR 5211. Introductory Classical Chinese I. (3 cr. ; Student Option; Periodic Fall)
Reading excerpts from canonical Chinese texts. Transnational nature of Classical Chinese/its importance in study of East Asian cultures. Taught in English. prereq: Two years of an East Asian language (Chinese, Japanese, Korean) or equivalent or instr consent

KOR 5993. Directed Studies. (1-5 cr. [max 15 cr.] ; Student Option No Audit; Every Fall & Spring)
Guided individual study of Korean language or linguistics. prereq: instr consent, dept consent, college consent

Laboratory Medicine and Path (LAMP)

LAMP 7114. Surgical Pathology. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
The student participates in all areas of surgical pathology activities.

LAMP 7119. Forensic Pathology. (; 2 cr. [max 4 cr.] ; H-N only; Every Fall, Spring & Summer)
This course acquaints students with the field of forensic medicine. The student will become familiar with the function of a medical examiner's office in determining the various causes and manners of death that fall under the jurisdiction of such a public official.

LAMP 7120. Perinatal/Pediatric Pathology. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This elective will expose medical students to pediatric pathology, a diagnostic subspecialty that ranges broadly across anatomic and clinical pathology as these relate to children and adolescents, fetuses and infants, and pregnant women. It should prove useful to medical students interested in pediatric medicine, pediatric surgery, obstetrics and gynecology, or pathology.

LAMP 7145. Neuropathology. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
The course is a practical introduction to neuropathology. The students will work with the attending neuropathologist and residents (from LMP, Neurology and/or Neurosurgery) performing diagnostic services in neuropathology.

LAMP 7150. Anatomic Pathology. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
The student will become acquainted with current basic concepts of anatomic pathology, especially in relation to morphological interpretation.

LAMP 7152. Anatomic Pathology-VA. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
The goal of this rotation is to familiarize the medical student with the role of pathology in the diagnosis, prognosis and treatment of patients through the activities of pathologist as members of the clinical team.

LAMP 7158. Cardiac Pathology. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
Students will observe examinations of existing and newly acquired cardiovascular specimens to identify variations of specific congenital and acquired disease entities and their functional significance.

LAMP 7181. Hematopathology. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
Over the course of the rotation, students will be fully integrated into the blood and bone marrow biopsy service, with ?ownership? of their cases and graduated responsibility for their level of training. They will learn to preview/ interpret blood smears and write up preliminary diagnostic reports.

LAMP 7184. Introduction to Transfusion Therapy. (; 2-4 cr. ; H-N only; Every Fall, Spring & Summer)
The student will address transfusion problems in patients with red cell, white cell, and platelet antibodies and coagulopathy.

LAMP 7186. Laboratory Medicine in a Community Hospital. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
The student will specialize in one or two areas of the clinical lab but will participate in all its general teaching activities. SPECIAL INSTRUCTIONS: Students must contact Dr. Apple at least one month prior to beginning elective.

LAMP 7187. Interpretation of Lab Data. (4 cr. ; P-N only; Every Fall)
This course is designed for 3rd and 4th year medical students who are faced with the challenge of bringing the extensive diagnostic capabilities of the clinical laboratory to bear on specific clinical problems. prereq: Med Student Yr 3 or 4/one previous rotation

LAMP 7195. Medical Informatics. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
Medical informatics uses computer and information science to solve problems in medicine, health care delivery, and medical research. The student works on a project under the supervision of faculty and/or fellows in medical informatics. The specific project depends on faculty availability and the student's background, interests, and experience. Projects have included computer assisted instruction for medical students or patients, computer-based medical decision support systems, creation of clinical database management systems, and statistical analysis of data from clinical research. As schedule permits, the student is expected to attend health informatics courses and seminars.

LAMP 7210. Surgical Pathology for Post-M.D.s. (; 1-10 cr. ; H-N or Audit; Every Fall & Summer)
Surgical Pathology for post MD's. prereq: Regis med fellow special

LAMP 7500. Acting Internship-Hematopathology. (4 cr. ; P-N only; Every Fall, Spring & Summer)
Over the course of the 4 week rotation, students (acting as a first year LMP resident) will be fully integrated into the blood and bone marrow biopsy service, with ?ownership? of their cases and graduated responsibility for their level of training. They will learn to preview/ interpret blood smears and write up preliminary diagnostic reports. Once they are competent with blood smears, they will progress to bone marrow aspirate and biopsy interpretation, including drafting a diagnostic report. Special studies are often performed simultaneously and may include immunohistochemistry and flow cytometry; the student will learn how these influence overall diagnosis and how they are integrated into the report. There are

weekly multidisciplinary and unknown teaching conferences, as well as a daily consensus/ teaching conference. The student will become acquainted with the various complimentary modalities used to distinguish between reactive etiologies and malignant neoplasms and learn how to classify the more common types of hematopoietic neoplasms, including leukemias and lymphomas. The student will typically work individually with each of the 7 faculty over the course of the month. The evaluation is done as a group to gather input from each faculty member. The course grade is based on the appraisal of the student's ability to recognize and describe the more common types of hematolymphoid disorders, both reactive and neoplastic as well as all core competencies including professionalism and medical knowledge. The student is required to select a topic in hematopathology, review the medical literature and present a 20-minute talk to the residents, fellows and faculty. The talk is usually case-based, with a brief presentation followed by literature review.

LAMP 7501. Acting Internship Pathology_Transfusion Medicine. (4 cr. ; P-N only; Every Fall, Spring & Summer)
The acting intern will function as an integral part of the Transfusion Medicine service. Responsibilities will go beyond that of the general medical student clerkship (LAMP 7184), and will align with the expectations and goals of pathology residents on this rotation. These enhanced responsibilities will include: - Coverage of the daytime service pager. This will greatly enhance the acting intern's ability to function as an integral part of the health care team. These calls include interactions with laboratory staff as well as clinical teams. - Primary responsibility to collect, evaluate, and present assessments of blood bank evaluation forms and transfusion reactions. - Develop the skills to perform clinical consultations for apheresis patients, beginning with stem cell collections, and moving on to therapeutic apheresis procedures. Write consultation notes to document these interactions and activities. - Write orders for upcoming apheresis procedures. - Take 1 week of overnight call with a University of Minnesota Transfusion Medicine physician. Plan for this during week 3 or 4 of the acting internship. - Seek out independent learning on transfusion medicine topics. Physical textbooks are available onsite; additional suggestions for online materials and resources can also be made available.

LAMP 7502. Acting Internship Pathology_Surgical Pathology. (4 cr. ; P-N only; Every Fall, Spring & Summer)
The acting intern will function as an integral part of the Surgical Pathology service. The surgical pathology service at the University of Minnesota is a sub-specialty based sign-out (primarily based on organ system). Interns will be placed onto service(s) based on their interests, career goals, and service availability. Responsibilities will go beyond that of the general medical student clerkship, and will align with the expectations and goals of pathology residents on this rotation. Acting interns will be expected to take cases to preview, review with the attending, and compose reports in Beaker. They will have graduated responsibilities as the rotation proceeds, but will begin the rotation reviewing the patient's clinical history and start composing the pathology report. They will meet with a surgical pathology attending to sign-out cases on days that they are not in the gross room. The acting intern will be in the gross room intermittently (likely once per week) and will also participate in frozen sections when they are in the gross room.

LAMP 7910. Laboratory Medicine and Pathology Medical Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Laboratory medicine and pathology medical residency.

LAMP 7930. Laboratory Medicine and Pathology Medical Fellowship. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Laboratory medicine and pathology medical fellowship.

Land and Atmospheric Science (LAAS)

LAAS 5050. Integrated Topics in Land & Atmospheric Science. (; 3 cr. ; A-F or Audit; Every Fall)
Earth system science. Interactions between the land and atmosphere. Biogeochemistry, human-environment interactions, environmental biophysics, and global environmental change.

LAAS 5051. Thesis Proposal Writing for Land & Atmospheric Science. (; 2 cr. ; A-F or Audit; Every Spring)
Grant proposals, including proposal formats of various funding sources, how to develop a significance statement, hypotheses and objectives, background, methods, project summary, time line, and budget. Critique proposal samples/discuss other aspects of seeking funding for research. Discuss LAAS graduate program prelim exam process.

LAAS 5311. Soil Chemistry and Mineralogy. (; 3 cr. ; Student Option; Every Fall & Spring)
Structural chemistry, origin/identification of crystalline soil clay minerals. Structure of soil organic matter. Chemical processes in soil: solubility, adsorption/desorption, ion exchange, oxidation/reduction, acidity, alkalinity. Solution of problems related to environmental degradation, plant nutrition, and soil genesis. prereq: [[Chem 1022 or equiv], Phys 1102, grad] or instr consent

LAAS 5416. Precision Agriculture and Nutrient Management. (3 cr. ; Student Option; Every Fall)
Precision Agriculture is an integrated information- and technology-based modern agricultural management system, with the intent to manage the spatial and temporal variability associated with all important aspects of agricultural production to achieve optimum yield, quality, efficiency and profitability, protection of the environment and sustainable development. It is an important direction of future agriculture. The focus of this course is on the concept, principles and technologies of precision agriculture and their applications in nutrient resource management. The specific topics include concept and development of precision agriculture and nutrient management, key supporting technologies, soil spatial variability and analysis, yield data analysis, remote sensing-based precision nutrient management, management zone delineation and application, crop growth modeling, combining crop growth modeling and remote sensing for precision nutrient management, and the challenges and future directions of precision agriculture and nutrient management. Precision agriculture and nutrient management is data intensive and the students will also learn basic agro-informatics through hands-on experiences and computer exercises. This course will involve background knowledge and technologies from multi-disciplines, which will facilitate multi-disciplinary integration and innovation. The class will include both lectures and activities such as case studies, group discussion and presentation, problem-solving, and hands-on exercises. This course is intended for graduate students and upper-level undergraduate students whose major is related to agriculture, environmental science and sustainability. This course is equivalent to LAAS 5480 (001) in Fall of 2018 only. This course was taught one semester as a topic course and is only equivalent to that particular topic and semester.

LAAS 5425. Atmospheric Processes I: Thermodynamics and Dynamics of the Atmosphere. (; 3 cr. ; A-F or Audit; Fall Odd Year)
Basic laws governing atmospheric motion through analysis of atmospheric dynamics and thermodynamics at the micro, synoptic, and global scales. Fundamental thermodynamic and dynamical processes/equations governing the behavior of the atmosphere/apply to larger-scale geophysical situations. prereq: One yr college-level [calculus, physics]

LAAS 5426. Atmospheric Processes II: Radiation, Composition, and Climate. (; 3 cr. ; A-F or Audit; Spring Odd Year)
Atmospheric radiation, composition/chemistry, climate change. Radiative transfer in Earth's atmosphere. Changing chemical makeup of troposphere/stratosphere. Interplay between natural processes and human activities in air pollution, stratospheric ozone depletion, and chemical forcing of climate. Anthropogenic contribution to climate change/role of land-atmosphere feedbacks affecting atmosphere's energy budget and cycling of greenhouse gases. Application to numerical modeling. prereq: [one yr college-level [calculus, physics, chemistry]]; LAAS 5425 recommended

LAAS 5480. Special Topics in Land and Atmospheric Science. (; 1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
Lectures by visiting scholar or regular staff member. Topics specified in Class Schedule. prereq: grad student or instr consent

LAAS 5515. Soil Formation: Earth Surface Processes and Biogeochemistry. (; 3 cr. ; A-F or Audit; Every Fall)
Basic soil morphology, soil profile descriptions. Pedogenic processes, models of soil development. Soil geomorphology, hydrology, hillslope processes. Digital spatial analysis. Soil classification. Soil surveys, land use. Soil geography. prereq: 2125 or instr consent

LAAS 5621. Environmental Genomics and Microbiomes. (3 cr. ; Student Option; Every Fall)
This course deals with molecular and genomic approaches to answer ecological questions related to environmental sciences. The course focuses on microbial community analysis and (meta)genomics, but also covers transcriptomics and other omics approaches. It includes hands-on computer exercises to learn basic bioinformatics with python and R. prereq: college-level courses in microbiology

LAAS 8005. Supervised Classroom or Extension Teaching Experience. (; 2 cr. ; S-N or Audit; Every Fall & Spring)
Teaching experience in biosystems and agricultural engineering or agronomy and plant genetics or horticultural science or soil, water, and climate or plant pathology. Discussions about effective teaching to strengthen skills and develop a personal teaching philosophy. prereq: instr consent

LAAS 8128. Land and Atmospheric Science Seminar. (; 1.5 cr. [max 3 cr.] ; S-N or Audit; Every Fall & Spring)
Students present an open seminar on an advanced topic and attend seminars presented by other graduate students.

LAAS 8195. Research Problems in Soils. (; 1-5 cr. [max 10 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed research on special topics of interest in soil science or climatology supervised by individual or small groups of faculty. prereq: [Grad major in soil sci or related field], instr consent

LAAS 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

LAAS 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

LAAS 8550. Teaching Experience. (; 1 cr. [max 6 cr.] ; S-N or Audit; Every Fall & Spring)
Provides students with practical experiences in instructional techniques in a university setting. prereq: Grad major in soil sci or related field, instr consent

LAAS 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Doctoral pre-thesis credits. prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

LAAS 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

LAAS 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Landscape Architecture (LA)

LA 5001. Sustainable Landscape Design and Planning Practices. (; 3 cr. ; Student Option; Every Fall)
Systemic, formal and spatial relationships. Quantitative and qualitative changes in global biodiversity, quality of the earth's air, soil, and water resources, development and consumption of energy resources and climate change. Development of design processes for selection, deployment, and management of sustainable practices. prereq: 5201, 5203

LA 5003. Climate Change Adaptation. (; 3 cr. ; Student Option; Every Fall)
This course will study nations, regions, cities, and communities that have adapted or are undergoing adaptation to climate change. The course will examine different approaches in planning, policy, economics, infrastructure, and building design that increase the adaptive capacity of human settlements. These approaches will vary in scale from the construction of new neighborhoods to the implementation of storm water gardens. The course will emphasize multi-functional strategies which couple climate change adaptation with other urban improvements. Learning Objectives: ? To understand role of climate adaptation in the reconfiguration of human settlements. ? To apply design thinking to the issue of climate adaptation in the context of an urban society. ? To apply knowledge to challenge-based coursework on managing climate risk, decreasing climate vulnerability, and building resilience to climate change.

LA 5004. Regional Environmental Landscape Planning. (4 cr. ; Student Option; Every Spring)
An exploration of critical regional landscape parameters affecting the growth and development of metropolitan areas. Students assess these parameters and prepare a multifunctional land use plan for a defined locale. prereq: PA 5271 or LA 5131 or FR 3131 or GEOG 3561 or GEOG 5561 or equivalent

LA 5096. Internship for Master of Landscape Architecture Students. (1-3 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
Students will receive supervised professional experience in a landscape architectural design firm in order to gain employment experience related to the field as well as receiving graduate credit. As a requirement of the course, students will submit a reflection paper relating the professional experiences to their education. Must have director of graduate studies (DGS) approval of the internship to register.

LA 5100. Topics: Landscape Architecture. (; 1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Current and emerging topics in the field of landscape architecture. Taught by regular or visiting faculty in their areas of specialization.

LA 5131. Geospatial Data Analysis and Design. (3 cr. ; A-F only; Every Fall)
Introduction to geospatial data analysis/ application in landscape architectural, environmental design research/practice. prereq: Master of Landscape Architecture Student or instr consent

LA 5201. Making Landscape Spaces and Types. (; 6 cr. ; A-F or Audit; Every Fall)
Design exploration using 3-D models and historical precedent studies to create outdoor spaces for human habitation and use. Application of the basic landscape palette of landform, plants, and structures to give physical, emotional, cognitive, and social definition to created places. prereq: B.E.D accelerated status or LA grad or instr consent

LA 5202. Landscape Analysis Workshop. (; 1 cr. ; S-N only; Every Fall)
Introduction to field techniques for site analysis, including vegetation, soil, and landform description. One-week session, before fall term, at lake Itasca Forestry and Biological Station.

LA 5203. Ecological Dimensions of Space Making. (; 6 cr. ; A-F or Audit; Every Spring)
Design studio experience drawing on ecological, cultural, aesthetic influences to explore development of design ideas responsive to ecological issues and human experience. prereq: LA major or instr consent; recommended for both BED and Grad students

LA 5204. Metropolitan Landscape Ecology. (; 3 cr. ; A-F only; Every Fall & Spring)
Theories/principles of holistic landscape ecology. People, nature, and environmental stewardship in metropolitan landscapes. Urban areas, rural areas that provide food, water, energy, and recreation. prereq: BED accelerated status or LA grad student or instr consent

LA 5376. Representation I. (4 cr. [max 8 cr.] ; A-F only; Every Fall)
Strengthen freehand sketching ability. Develop observation skills. Develop ability to communicate ideas clearly through visual expression. Learn/explore conventions of landscape architectural drawing. Basic tools/ techniques associated with Adobe Photoshop CS6. Promote fluidity between analog/ digital media. Create drawing personality/ graphic style. prereq: Master of Landscape Architecture (MLA) or Accelerated Bachelor of Environmental Design.

LA 5377. Representation II. (4 cr. [max 8 cr.] ; A-F only; Every Spring)

Explore multi-media rendering techniques. Increase knowledge of art materials/graphic programs. Increase hand-drawing ability. Color theory, contemporary graphic styles. Layout, grid systems/type. Increase speed of drawing/ producing renderings. Create or strengthen graphic style. prereq: Master of Landscape Architecture (MLA) or Accelerated Bachelor of Environmental Design

LA 5381. The City in Visual Culture. (3 cr. ; A-F only; Every Spring)
Visual culture is not just that we see the way we do because we are social animals, but also that our social arrangements take the forms they do because we are seeing animals. The social arrangements of the city, the buildings and public spaces, are concretized expressions of power and culture. The course will, through multiple drawings, attempt to critically examine these social arrangements as they have evolved over time (history) by re-presenting the city (as human experience and aesthetic form). The course will be structured around on-site work sessions, critical readings, on- and off-site lectures, and weekly drawing assignments.

LA 5400. Topics in Landscape Architecture. (; 1-3 cr. [max 12 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Current topics in landscape architecture. Taught by regular or visiting faculty in their areas of specialization.

LA 5401. Directed Studies in Emerging Areas of Landscape Architecture. (; 1-3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
tbd prereq: instr consent

LA 5402. Directed Studies in Landscape Architecture History and Theory. (; 1-6 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Independent studies under the direction of landscape architecture faculty. prereq: instr consent

LA 5403. Directed Studies in Landscape Architecture Technology. (; 1-6 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Independent studies under the direction of landscape architecture faculty. prereq: instr consent

LA 5404. Directed Studies in Landscape Architecture Design. (; 1-6 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Independent studies under the direction of landscape architecture faculty. prereq: instr consent

LA 5405. Interdisciplinary Studies in Landscape Architecture. (; 1-6 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
Research, planning, or design projects. Topics vary. prereq: instr consent

LA 5408. Landscape Architecture, Architecture, and Planning. (; 3-4 cr. ; A-F or Audit; Every Fall & Spring)
Methods and theories in urban design and human behavior. Students develop urban design journal as tool for experiencing, analyzing, and recording the urban landscape, its fabric, spatial elements, and individual components, and for analyzing design solutions. prereq: Admitted to Denmark International Study Program co-sponsored by the University; given in Denmark

LA 5413. Introduction to Landscape Architectural History. (3 cr. ; A-F or Audit; Every Fall)
Introductory course examines the multiple roots of landscape architecture by examining the making of types of landscapes over time. Emphasis on ecological and environmental issues, and issues related to political, economic, and social contexts of landscape architectural works. prereq: One course in history at 1xxx or higher

LA 5414. Study Abroad: History and Culture. (0-3 cr. ; A-F only; Every Spring)
This is a history course aimed at investigating the rich urban, landscape and architectural legacy of Spain, tracing the multiple histories of the Spain through the ceremonial and quotidian spaces of Madrid as it developed as the capital city of the Catholic monarchy and the monuments of Al-Andalus, the Islamic caliphate in Southern Spain. The course is structures so that each week there will be an in-class lecture and a walking tour of Madrid. There will also be several field trips to historic sites.

LA 5514. Making the Mississippi. (; 3 cr. ; A-F or Audit; Every Spring)
Critical environmental parameters affecting growth/development of metropolitan areas. Students assess these parameters and prepare a multi-functional land use plan for a defined locale.

LA 5576. Ecological Restoration Project Planning and Management. (3 cr. ; A-F only; Every Fall)
Applied practice of ecological restoration of landscapes. Grasslands, wetlands, forests, disturbed agricultural sites, former industrial parcels. Restoration management, skills needed to lead successful projects. prereq: [MLA student, senior B.E.D.] or senior or grad with one college course in ecology/one college course in plant science or botany or instr consent

LA 5755. Infrastructure, Natural Systems and the Space of Inhabited Landscapes. (; 3 cr. ; A-F or Audit; Every Fall)
Cross-disciplinary exploration of urban infrastructural solutions to mitigate/reverse anthropogenic impacts on Earth. Design of sustainable urban infrastructure systems, policy options, available technologies, criteria, design methods. prereq: Grad student

LA 5761. Infrastructure + Culture. (3 cr. ; A-F only; Every Spring)
As attitudes about ecology and nature are shifting and as the threats from climate change are becoming more pronounced, new infrastructure works in the Netherlands are caught a a double bind of responding to ecological concerns and protection of the land. This course will explore both historic and modern water management infrastructures as cultural and engineering constructs through visual representation as a form of critique. The course will be structured around study trips, preparatory readings, on-site lectures, and will be supplemented by the participation of several guest speakers.

LA 5771. Landscape Infrastructure and Systems I. (3 cr. [max 6 cr.] ; A-F only; Every Fall)
Basic principles, techniques, skills of creating infrastructures of built landscapes. Basic concepts of simple plant taxonomy, plant community structure, earthwork, water management, landscape structures. Small site scale design development. prereq: Master of Landscape Architecture Student, [Accelerated Track B.E.D or instr consent]

LA 5772. Landscape Infrastructure Systems II. (3 cr. [max 6 cr.] ; A-F only; Every Spring)
Principles, techniques, skills of creating ecological infrastructures of built landscapes systems. Builds on basic concepts taught in LA 5771. Focuses on ecological connections among plants, landscape structure, earthwork techniques, water management, landscape structural systems. prereq: Master of Landscape Architecture Student, [Accelerated BED Student or instr consent]

LA 8205. Urban Form Options: Landscape Architecture Studio. (; 6 cr. [max 8 cr.] ; Student Option; Every Fall & Spring)
Urban landscape design issues, theories, and problems explored via formal/spatial inquiry in studio, reading, and the exposition of ideas in paired seminar. Urban systems, gathering spaces, ecology, infrastructure, recreation, and public space. prereq: 2 yrs of studio, grad LA major or instr consent

LA 8206. Making Urban Landscape Space. (; 6 cr. [max 12 cr.] ; A-F only; Every Fall)
Advanced design studio course focusing on current or emerging topics in urban or urbanizing landscapes. The specific course topics vary slightly from year to year and between sections. Each studio is focused on the same set of learning objectives, but with different studio sites and focus. Each studio explores a site and local culture of a metropolitan area and involves brief travel to the studio site. In general, these studios will examine changing conditions due to industrial decline, technological advancement, climate change, etc. as experimental ground for studio investigations into new paradigms of landscape-based solutions to urban design/ development, and infrastructure. prereq: MLA grad student

LA 8207. Cities on Water International Workshop. (6 cr. [max 16 cr.] ; A-F only; Every Spring)
Intensive studio course on international applications of sustainable urban design. prereq: Grad LA or ARCH major or instr consent

LA 8301. Landscape Architecture: Research Issues and Methods. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Alternative methodological approaches to landscape architectural research and consideration of their appropriateness for contemporary research topics. prereq: 8201 or

concurrent registration is required (or allowed) in 8201, grad LA major or instr consent

LA 8302. Professional Practice. (; 3 cr. ; A-F or Audit; Every Spring)
Office and project management case studies. Organizational behavior, marketing, sales, strategic planning, financial and cost accounting, insurance, legal issues and contracts. prereq: 8205, grad LA major or instr consent

LA 8333. FTE: Masters. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

LA 8400. Topics in Landscape Architecture. (; 1-8 cr. [max 96 cr.] ; Student Option; Every Fall, Spring & Summer)
Seminar offered by regular or visiting faculty in their area of specialization. Content varies with interest of instructor.

LA 8401. Directed Studies in Emerging Areas of Landscape Architecture. (; 1-6 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Current topics in landscape architecture. Seminar offered by regular or visiting faculty in their area of specialization. Subject matter varies with instructor. prereq: instr consent

LA 8402. Directed Studies in Landscape Architecture History and Theory. (; 1-6 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Advanced independent studies under direction of landscape architecture faculty. prereq: Grad LA major or instr consent

LA 8403. Directed Studies in Landscape Architecture Technology. (; 1-6 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Advanced independent studies under direction of landscape architecture faculty. prereq: Grad LA major or instr consent

LA 8404. Directed Studies in Landscape Architecture Design. (; 1-6 cr. ; Student Option; Every Fall & Spring)
Advanced independent studies under direction of landscape architecture faculty. prereq: Grad LA major or instr consent

LA 8405. Interdisciplinary Studies in Landscape Architecture. (; 1-6 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
Research, planning, and/or design project. Sample topics: energy efficient design, historic preservation, urban revitalization, agricultural land use, computerized land-use planning, housing. prereq: Grad LA major or instr consent

LA 8554. Project Programming. (2 cr. [max 4 cr.] ; A-F only; Every Fall)
Individual research in preparation for final studio. prereq: 8203, [grad land arch major or instr consent]

LA 8555. Advanced Landscape Planning and Design. (; 6 cr. ; A-F or Audit; Every Spring)
Advanced studies in area of student's choice. prereq: 8205, grad land arch major or instr consent

LA 8773. Landscape Infrastructure and Systems III. (3 cr. [max 6 cr.] ; A-F only; Every Fall)
Third course in landscape infrastructure/ systems sequence that introduces technical skills required to work/obtain professional licensure as landscape architect. Programming, qualitative/quantitative performance of constructed hydrologic systems, planting design, representation of constructed systems, paving systems for hydrologic control. prereq: Master of Landscape Architecture Student or instr consent

LA 8774. Landscape Infrastructure and Systems IV. (3 cr. [max 6 cr.] ; A-F only; Every Fall)
Fourth course in landscape infrastructure/ systems sequence that introduces students to technical skills required to work/obtain professional licensure as landscape architect. Use/implementation of complex constructed assemblies in urban context. prereq: Master of Landscape Architecture Student or instr consent

LA 8775. Landscape Infrastructure and Site Technology V. (3 cr. [max 6 cr.] ; Student Option; Every Spring)
Seminar, cross-disciplinary. Advanced inquiry into complex site-scale problems requiApplied theory. Professional practice applications with emphasis on urban/post-industrial sites. Programmatic, regulatory/ construction contexts. Directed research of emerging/speculative infrastructure. prereq: 8773, 8774 preferred, students outside of Master of Landscape Architecture program are encouraged to enroll upon demonstration of similar pre-requisite coursework and instr consent

LA 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required (Plan A only)

Lang, Teaching, and Technology (LGTT)

LGTT 5110. Technology in the Second Language Classroom. (; 2 cr. ; Student Option; Every Spring & Summer)
Examine, evaluate, and use technology in language teaching. Theoretical background, demonstration, hands-on exploration.

LGTT 5111. Using the Web for Communicative Language Learning. (; 2 cr. ; Student Option; Every Summer)
This is a fully online course that is intended for K?16 second language instructors who are looking for ways to increase their knowledge of web applications and ways to incorporate them into their second language curriculum to encourage student communication and collaboration. Participants can expect to learn effective ways to incorporate current web technology into their curriculum to promote written and spoken language comprehension and production, and interpersonal communication. The course will address lesson planning, implementation, and assessment issues related to using these tools in second language learning.

LGTT 5710. Special Topics in Language Teaching and Technology. (; 2 cr. [max 6 cr.] ; Student Option; Periodic Fall & Summer)
Examine, evaluate, apply specific area of technology to K-higher education, second/ foreign language teaching/learning in classroom, independent study, distance education environments.

LGTT 8999. Advanced Teaching Methods: Integrating Language and Disciplinary Content. (3 cr. ; Student Option; Periodic Fall)
This course explores theoretical and practical approaches to cultivating students' advanced literacies in a second language through the integration of language proficiency development and the study of disciplinary content in upper-level literature, linguistics, and culture courses. Students must have passed FRIT 5999 or GSD 5103 or SPPT 5999 or have permission from the instructor in order to take this course.

Language Centr CLA Courseshare (LANG)

LANG 5010. Graduate Language Study. (; 3 cr. [max 6 cr.] ; Student Option No Audit; Every Fall & Spring)
Graduate language study enrollment option for a CourseShare language course received from a Big Ten university. Enrollment is restricted to graduate students, and by permission only. Please contact the Language Center at elsie@umn.edu, 612-626-6017, with questions.

LANG 5011. Topics in Catalan Study: Representations of Violence. (3 cr. ; Student Option; Every Spring)
Topics in Catalan Study: Representations of Violence is a Big Ten Academic Alliance CourseShare course. The instructor is at Indiana University but you enroll and receive credit for it at the University of Minnesota. This course will be received via video conferencing at a scheduled time. This class is intended for advanced Catalan students and permission is required. Please contact the Language Center at elsie@umn.edu or 612-626-6017 for enrollment assistance.

LANG 5111. Advanced Turkish and Azeri III. (3 cr. ; Student Option; Every Fall)
CourseShare course hosted by the University of Wisconsin-Madison. Received via video conferencing. Email the CLA Language Center at elsie@umn.edu for more information.

LANG 5121. Advanced Vietnamese III. (3 cr. ; Student Option No Audit; Every Fall)
CourseShare course hosted by the University of Wisconsin-Madison. Received via video conferencing. Please email the Language Center at elsie@umn.edu for more information.

LANG 5122. Advanced Vietnamese IV. (3 cr. ; Student Option; Every Spring)
Advanced Vietnamese IV is a Big Ten Academic Alliance CourseShare course. The

instructor is at the University of Wisconsin-Madison, but you enroll and receive credit for it at the University of Minnesota. This course connects via video conferencing technology, and there is a fixed time and location. It is intended for students who completed Advanced III. Heritage speakers and those with prior knowledge of Vietnamese should contact the Language Center at elsie@umn.edu or 612-626-6017 for placement assistance.

LANG 5123. Advanced Vietnamese V. (; 3 cr. ; Student Option; Every Fall)
Advanced Vietnamese Directed Study is a Big Ten Academic Alliance CourseShare course. The instructor is at the University of Wisconsin-Madison, but you enroll and receive credit for it at the University of Minnesota. This course is received online. It is intended for advanced-level students by permission only. Heritage learners or students with prior experience with Vietnamese should contact the Language Center at elsie@umn.edu or 612-626-6017 for placement assistance.

LANG 5124. Advanced Vietnamese VI. (; 3 cr. ; Student Option; Every Spring)
LANG 5124 Advanced Vietnamese VI is a Big Ten Academic Alliance CourseShare course. The instructor is at the University of Wisconsin-Madison, but you enroll and receive credit for it at the University of Minnesota. This course is received online. It is intended for advanced-level students by permission only. Heritage learners or students with prior experience with Vietnamese should contact the Language Center at elsie@umn.edu or 612-626-6017 for placement assistance.

LANG 5125. Advanced Vietnamese Special Translation I. (; 3 cr. ; Student Option; Every Fall)
LANG 5125 - Advanced Vietnamese Special Translation Iis a Big Ten Academic Alliance CourseShare course. The instructor is at the University of Wisconsin-Madison, but you enroll and receive credit for it at the University of Minnesota. This course is received online. It is intended for advanced-level students by permission only. Heritage learners or students with prior experience with Vietnamese should contact the Language Center at elsie@umn.edu or 612-626-6017 for placement assistance.

LANG 5221. Introduction to Middle Egyptian & Hieroglyphics I. (3 cr. ; Student Option No Audit; Every Spring)
CourseShare course hosted by Penn State University. Received via video conferencing. Although there are no prerequisites, previous education in Ancient Egyptian history and civilization is recommended. This course is offered as a basic introduction to that stage in the evolution of the Egyptian language known as "Middle Egyptian" (used as a vernacular c. 2300 - 1700 B.C., and as a "literary" dialect c. 2200 - 1350 B.C.) as revealed and written in the hieroglyphic script. Please email the Language Center at elsie@umn.edu for more information.

LANG 5231. Special Topics in Hebrew Studies: Israeli Innovation and Entrepreneurship. (; 3 cr. ; Student Option; Every Fall)
LANG 5231 Hebrew: Israeli Innovation is a Big Ten Academic Alliance CourseShare course. The instructor is at the University of Michigan, but you enroll and receive credit for it at the University of Minnesota. It is an advanced online Hebrew language course dealing with Israeli technology and entrepreneurship. It is intended for students who have completed the intermediate Hebrew sequence. Please contact the Language Center at elsie@umn.edu or 612-626-6017 for placement assistance.

LANG 5232. Special Topics in Hebrew Studies: Gender and Identity in Israeli Culture. (; 3 cr. ; Student Option; Every Spring)
Special Topics in Hebrew Studies: Gender and Identity in Israeli Culture is a Big Ten Academic Alliance CourseShare course. The instructor is at the University of Maryland but you enroll and receive credit for it at the University of Minnesota. It is a fully online course. A grade of at least [C- or S] in HEBR 3012 or instructor consent is required. Please contact the Language Center at elsie@umn.edu or 612-626-6017 for enrollment assistance.

LANG 5341. Advanced Thai III. (; 3 cr. ; Student Option; Every Fall)
LANG 5341 - Advanced Thai III is a Big Ten Academic Alliance CourseShare course. The instructor is at the University of Wisconsin-Madison, but you enroll and receive credit for it at the University of Minnesota. This course is received via online. It is intended for students who have completed the previous course. Heritage speakers and those with prior knowledge of Thai should contact the Language Center at elsie@umn.edu or 612-626-6017 for placement assistance.

LANG 5361. Intermediate Biblical Hebrew Grad I. (; 3 cr. ; Student Option; Every Fall)
LANG 5361 Intermediate Biblical Hebrew Grad I is a Big Ten Academic Alliance CourseShare course. The instructor is at the University of Michigan but you enroll and receive credit for it at the University of Minnesota. This course is received online. It is intended for students who completed a Beginning Biblical Hebrew sequence, and is being offered in place of HEBR 4104. Heritage learners or students with prior experience with Biblical Hebrew should contact the Language Center at elsie@umn.edu or 612-626-6017 for placement assistance.

LANG 5401. Regional Cultures of Brazil Graduate. (; 3 cr. ; Student Option; Every Spring)
LANG 5401 - Regional Cultures of Brazil is a Big Ten Academic Alliance CourseShare course. The instructor is at the University of Illinois but you enroll and receive credit for it at the University of Minnesota This integrated skills language course will have students navigate Brazil from end to end, with the goal of exploring historical and cultural aspects of Brazil that aren?t always covered in the media. From myths and legends, to culinary adventures, traditional music, and more, this course will cover the five geographic regions of Brazil and touch on the Brazilian diaspora around the world. This class is intended for graduate students who are advanced students of Portuguese.

LANG 5411. Introduction to Akkadian. (; 3 cr. ; Student Option; Every Spring)
Introduction to Akkadian is a Big Ten Academic Alliance CourseShare course. The instructor is at Penn State University but you enroll and receive credit for it at the University of Minnesota. This course is received online. This course aims at familiarizing students with the basics of Akkadian grammar and enabling them to read a variety of genres. Students will be introduced to the grammar of Old Babylonian as well as to the basics of cuneiform writing. Please contact the Language Center at elsie@umn.edu with questions.

LANG 5651. Islamic Studies Seminar: Rumi, Sufi Poet. (3 cr. ; Student Option; Every Spring)
CourseShare course hosted by Rutgers University through the Digital Islamic Studies Curriculum (DISC). Received via video conferencing. Please email the CLA Language Center at elsie@umn.edu for more information.

LANG 5702. Development of African Studies. (3 cr. ; Student Option No Audit; Periodic Spring)
CourseShare course hosted by the University of Iliinois. Received via video conferencing. Please email the CLA Language Center at elsie@umn.edu for more information.

Latin (LAT)

LAT 5001. Intensive Latin. (3 cr. ; Student Option; Every Fall)
Covers material usually taught over two semesters. prereq: Prev experience in another foreign language is desirable

LAT 5003. Intermediate Latin Prose for Graduate Student Research. (; 4 cr. ; Student Option; Every Fall)
Introduction to Latin prose authors of 1st centuries BCE/CE. Readings of continuous passages of unadapted Latin texts (history, speeches, letters). Review of grammar/ vocabulary as needed. Some discussion of major themes/issues in Roman culture as illustrated by texts. prereq: [Grade of at least [C- or S] in [1002 or 5001] or instr consent]

LAT 5004. Intermediate Latin Poetry for Graduate Research. (; 4 cr. ; Student Option; Every Spring)
Introduction to Roman epic poetry. Readings of selections from Vergil's Aeneid. Quantitative meter and poetic devices. Discussion of major themes and issues as developed in Vergil's poetry. Meets with 3004.

LAT 5100. Advanced Readings in Latin Poetry. (; 3 cr. [max 18 cr.] ; Student Option; Every Fall & Spring)
The primary material for this course will be a selection of readings from three or more different Latin poets connected by genre (e.g. epic, dramatic, lyric), theme (e.g. heroism and the hero, the body, the good life), period (e.g. Augustan, late Antique), or the like. Primary

readings and critical approach will vary from year to year, making the course repeatable. Some modern secondary reading will be assigned to provide a basis for discussion and a model for student written work. prereq: [3004 or equiv], at least two yrs of college level Latin. Contact the Classical & Near Eastern Religions & Cultures Department with any questions.

LAT 5200. Advanced Readings in Latin Prose. (; 3 cr. [max 18 cr.] ; Student Option; Periodic Fall & Spring)
The primary material for this course will be a selection of readings from three or more different Latin prose authors connected by genre (e.g. historical writing, philosophy, religious texts), theme (e.g. Epicureanism and Stoicism, Christian apologetics, grammarians), period (e.g. Republican, Late Imperial), or the like. Primary readings and critical approach will vary from year to year, making the course repeatable. Some modern secondary reading will be assigned to provide a basis for discussion and a model for student written work. prereq: [LAT 3004 or equiv], at least two yrs of college level Latin. Contact the Classical & Near Eastern Religions & Cultures department (CNRC) with any questions.

LAT 5701. Latin Prose Composition. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Latin grammar, syntax, diction, and prose style. Graduated exercises in prose composition. prereq: Grad student or instr consent

LAT 5703. Epigraphy. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Practical/theoretical introduction to Latin epigraphy (study/interpretation of inscriptions). Readings/discussion of epigraphic texts. Their value as historical documents, as evidence for development of Latin language, and as literary texts. prereq: Grad student or instr consent

LAT 5993. Directed Studies. (; 1-4 cr. [max 18 cr.] ; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. prereq: instr consent, dept consent

LAT 5994. Directed Research. (; 1-12 cr. [max 20 cr.] ; Student Option; Every Fall & Spring)
Guided research on original topic chosen by student. prereq: Grad student or instr consent

LAT 5996. Directed Instruction. (; 1-12 cr. [max 20 cr.] ; Student Option; Every Fall & Spring)
Supervised teaching internship. prereq: Grad student or instr consent

LAT 8100. Readings in Latin Prose. (; 3 cr. [max 18 cr.] ; Student Option; Every Fall & Spring)
Reading/discussion of Latin prose texts.

LAT 8120. Latin Text Course. (; 3 cr. [max 15 cr.] ; Student Option; Every Fall & Spring)
Students attend 3xxx Latin courses. Supplementary work at discretion of instructor. prereq: 3111 or dept consent; not for students in dept of Classical and Nr East Studies

LAT 8200. Readings in Latin Verse. (; 3 cr. [max 18 cr.] ; Student Option; Every Fall & Spring)
Reading/discussion of Latin poetic texts. prereq: Advanced grad student

LAT 8262. Survey of Latin Literature I. (; 3 cr. ; Student Option;)
Extensive readings in variety of works from republican and early Augustan period.

LAT 8263. Survey of Latin Literature II. (; 3 cr. ; Student Option;)
Variety of works from Augustan and imperial periods.

LAT 8267. Graduate Survey of Latin Literature of Late Antiquity. (; 3 cr. ; Student Option; Periodic Spring)
Latin literature of 3rd to 6th centuries A.D., including Ammianus and Augustine. prereq: instr consent, dept consent

LAT 8300. Readings in Latin Texts. (; 3 cr. [max 18 cr.] ; Student Option; Every Fall & Spring)
Reading/discussion of literary or documentary texts from Roman antiquity. Topics may include subjects that draw on various sources, genres, or methods. prereq: Advanced grad student

LAT 8910. Seminar. (; 3 cr. [max 30 cr.] ; Student Option; Periodic Fall & Spring)
Topics in Latin literature examined in depth. Emphasizes current scholarship, original student research.

Law School (LAW)

LAW 5000. Introduction to American Law and Legal Reasoning. (3 cr. ; A-F only; Every Fall)
Law pervades all areas of modern life. Yet it remains mysterious to those without legal training. This course will equip you to better answer such questions by exploring the tools that lawyers use to interpret and apply the law. Students will learn to think like lawyers through a series of contemporary case studies that require reading, writing, thinking, and problem solving like a lawyer. Cases will be drawn from topics such as contracts, torts, civil procedure, property, business law, criminal law, sports law, privacy, and law and science.

LAW 5001. Introduction to the American Legal System. (2 cr. ; A-F only; Every Fall)
This is an introductory course in American law, providing an overview of a wide variety of constitutional, statutory and common law legal issues. A primary focus will be on American constitutional law: legislative, judicial, and executive powers; the legal structure of ? checks and balances? among the three national governmental powers; the distribution of powers between the national government and state governments (federalism); and the constitutional rights of individuals (including rights of free speech, freedom of religion, due process, and equal protection). We will also examine the American system of litigation: the structure of the court system, the jurisdiction of federal (national) and state courts, and the litigation process. We will also address some common law substantive topics in American law including torts and contracts. Students will have the opportunity to learn how to read and interpret American legal materials, to do legal research within the legal system, and to write an analytical legal memorandum.

LAW 5002. MSPL Legal Research and Writing. (1 cr. ; S-N only; Every Fall)
This course covers the process of communicating about the law. Our goal is to teach students the building blocks of legal communication through multiple practice exercises so that students can repeat the process on their own after successful completion of the course. In the fall (one credit), we begin at orientation with a short exercise, then move on to email, letter, and office memorandum exercises written in an objective/predictive mode.

LAW 5025. Patent Law In Practice. (; 1 cr. ; S-N only; Every Spring)
The field of patents extends across the boundaries of business, technology, innovation, and law. In this course, students will be introduced to a broad range of patent related topics presented by leading practitioners working at the intersection of law and technology. The course is designed to provide an overview of patent law topics, for example: Patents Now and the Future; Strategic Patents; Patent Analytics; Patent Firm Business Model; Patent Agent/Attorney Roles; Global Patent Procurement; Inventors and Inventions; Claiming Inventions; Patentable Subject Matter; Patent Litigation; Patents Appeals and Trials. Leading practitioners lead a discussion for each of these topics. Subject matter experts may include corporate and law firm lawyers, patent agents, intellectual asset managers, consultants, tech transfer officers, and business owners. Open to graduate students, open to undergraduate juniors or seniors in CSE or CBS, open to other undergraduates with instructor permission

LAW 5026. Intellectual Property In Practice. (1 cr. ; S-N only; Every Fall)
The field of intellectual property extends across the boundaries of business, technology, innovation, and law. In this course, students will be introduced to a broad range of IP related topics presented by leading practitioners working at the intersection of law and technology. Topics may include trade secrets, copyrights, trademarks, patents, IP transactions, IP litigation, emerging technologies, intellectual asset management, IP valuation, and commercialization. Lecturers may include corporate general counsels, firm lawyers, transactional lawyers, litigators, consultants, tech transfer officers, R&D Leaders, and CTO. Open to graduate students, open to undergraduate juniors or seniors in CSE or CBS, open to other undergraduates with instructor permission.

LAW 5050. Law of Business Organizations. (3 cr. ; A-F only; Every Spring)
This course surveys the leading forms of legal business association governing the formation of business entities, including the laws of agency, partnerships, limited liability companies, and corporations. Emphasis is put on the methods lawyers use to interpret statutes and cases.

LAW 5051. Business Associations/ Corporations. (4 cr. ; Student Option; Every Fall & Spring)
The initial part of this course is an introduction to the general law of multi-person unincorporated business organizations, principally partnerships, limited partnerships and limited liability companies. Matters covered include the procedures for forming such organizations and the rights and obligations of the participants as among themselves and with respect to third persons. The remaining class hours constitute the first portion of the basic Corporations course, and will cover such matters as corporate organization; the distribution of powers among the corporate board of directors, its officers and its stockholders; the proxy system; control devices in the close corporation; and the fiduciary duties of directors, officers and controlling shareholders. Matters dealing with ?corporate finance? (issuance of shares, payment of dividends, and corporate reorganizations) are covered in Advanced Corporate Law.

LAW 5062. Energy Law. (3 cr. ; Student Option; Every Fall)
This course provides an introduction to U.S. energy law. The first portion of the course introduces the nation's sources of energy: coal, oil, biofuels, natural gas, hydropower, nuclear, wind, solar, geothermal energy, and energy efficiency. In doing so, it explores the physical, market, and legal structures within which these energy sources are extracted, transported, and converted into energy. The second portion of the course turns to the two major sectors of our energy economy--electricity and transportation--and the full range of federal and state regulation of each sector. The third portion of the course explores case studies of hot topics in energy law and policy that highlight the complex transitions taking place in the energy system. These topics include electric grid modernization, electric vehicles, risks and benefits associated with hydraulic fracturing and deepwater drilling for oil and gas, the development of offshore wind energy, and the continued role of nuclear energy. In addition to traditional textbook reading and class discussion, the course will include industry, government, and nonprofit guest speaker presentations. Grading will be based on a final exam given at the end of the semester as well as class discussion and weekly written postings on Canvas for the course.

LAW 5075. Ethics for Patent Agents. (1 cr. ; A-F only; Every Spring)
This course is designed to provide students with an introduction and understanding of the ethics and rules of professional responsibility and the unauthorized practice of law. Scope: This course covers ethics and professional responsibility for lawyers, ethics and professional responsibility for patent agents and patent attorney?s and the unauthorized practice of law. Goals: This course will provide students with the framework that will guide their actions and conduct as future patent professionals by introducing them to various scenarios that they are likely to encounter in their professional career. By the end of the course, students will understand the principles behind the ethics and rules of professional responsibility and the unauthorized practice of law as it applies to nonlawyers. prereq: Master of Science Patent Law Students.

LAW 5076. Essentials of Business for Lawyers. (3 cr. ; Student Option; Every Fall & Spring)
This course will teach you how to: (1) Understand basic accounting principles; (2) Read an annual report and analyze financial statements; (3) Look beyond numbers to gauge the financial performance and strength of an entity; (4) Employ cash flow analysis to value a business or determine the potential financial rewards of an investment opportunity; and (5) Understand the strategic questions that business managers must confront in governing their companies. The course surveys foundational concepts, analytical techniques and practices related to finance, accounting and strategic management issues lawyers confront when working with business executives either as an outside consulting attorney or as an inside corporate counsel. It may also consider other concepts used by business executives, including organizational behavior, marketing and quantitative analysis. The aim of the course is to help law students better appreciate the broader business context of legal decision-making so that they can contribute more effectively as a member of a firm?s top management team or as outside counsel.

LAW 5078. Legislation and Regulation. (3 cr. ; Student Option; Every Fall)
This course explores lawmaking in the administrative state. Topics include: the legislative process, delegation of legislative authority to administrative agencies, the rulemaking process, statutory interpretation by courts and agencies, and judicial review of agency decisions. The course will focus on how statutes structure and constrain judicial and administrative decisionmaking.

LAW 5100. Taxation I. (3 cr. ; A-F only; Periodic Fall & Spring)
This basic course in federal income taxation introduces the student to the Internal Revenue Code and the income taxation of individuals through the following topics: definition of income, relevant accounting concepts, exclusions, deductions, income splitting, sales and dispositions of property, amortization, capital losses, and current issues of tax policy.

LAW 5102. Mergers and Acquistions. (3 cr. ; Student Option; Periodic Fall & Spring)
This class will cover the theory behind, the Federal and state law governing, and the practice of, mergers and acquisitions. Our main focus will be what a transactional lawyer would want and need to know as to why mergers and acquisitions might occur and how and why companies or shareholders would embrace or disfavor them, how the transactions are documented and how disclosure requirements are met, and what the present cases say.

LAW 5103. Data Privacy Law. (3 cr. ; A-F only; Periodic Fall & Spring)
Every single day, the newspaper contains stories?plural intended?about data privacy and security. Whether they concern the National Security Agency, Facebook, or a data breach at a small business, the handling of personal information has become a central concern of our time. In response, a complex law of data privacy has emerged, and now it is a fast growing area of legal practice. This course will equip students to counsel clients about an array of federal, state, and international legal requirements?while also analyzing them critically and thinking about the societal challenges posed by new information technology. Assessment will include group projects and a take-home final.

LAW 5109. Creditors Remedies/Secured Transactions. (3 cr. ; Student Option; Periodic Fall & Spring)
The course covers primarily Article 9 of the Uniform Commercial Code--among the most significant commercial statutes in the world. Article 9 governs transactions in which a borrower borrows money from a lender and gives that lender an interest in some of the borrower?s property as collateral to make the lender more secure with respect to repayment. Transactions large and small are covered by Article 9: whether a person borrows money to buy a car, a manufacturer borrows money to buy its raw materials, a department store chain borrows money to purchase its inventory, or a credit card issuer sells its receivables to investors, Article 9 applies. Secured transactions are of central importance to consumer and commercial loans, mergers and acquisitions, securitizations and to bankruptcy. In addition to secured transactions, during this course we will address the remedies of unsecured creditors, statutes and procedures on levies of execution, attachment, garnishment, replevin, and receiverships. We will also address the exemptions and procedural rights available to debtors.

LAW 5127. Patent Drafting and Oral Advocacy Competition Team. (1 cr. [max 2 cr.] ; A-F only; Every Fall)
This Competition team furthers students' patent research, patent drafting, and oral advocacy. In the Competition's Regional stage, the team prepares a written patent application and defends it before a judges panel. In the Competition's contingent National stage, the team amends the application and defends it before another judges panel. The course is open to 8 students (i.e., two teams of up to 4 JD and MS students). JD students should add themselves to the waitlist, share their resumes with the instructor, and request enrollment in the course. prereq or co-req one of the following: Law 5224 Patents, Law 5231 Patent Prosecution I, Law 5243 Patent Research & Writing, or Director of Patent Law Programs permission

LAW 5207. Antitrust. (3 cr. ; Student Option; Periodic Spring)
The course provides an overview of U.S. antitrust (competition) law. It covers the historical development of antitrust, the role of economic analysis in contemporary antitrust

law, and the principal areas of substantive antitrust including horizontal restraints (between competitors), vertical restraints (franchise or distributional restrictions), monopolization, and mergers.

LAW 5211. Federal Securities Regulation. (3 cr. ; Student Option; Every Spring)
This course covers concepts and problems in the regulation of securities transactions under the Securities Act of 1933, the basic federal statute governing rights, duties, and remedies in connection with the financing of business operations through the distribution of securities to the public. Topics covered will include the definition of a security and the exemptions from federal registration (crucial knowledge for the small business advisor), the registration process, the contents of the prospectus, civil liabilities, and the applicability of the 1933 Act to secondary transactions (sales of securities by persons other than the issuing entity). Because of the expansive scope of federal securities law and the draconian nature of the penalties imposed even for 'innocent' violations, knowledge of this material is vital not only for business lawyers who advise large corporations but also those whose business clients are closely held. The course will not focus, however, on litigation strategy or technique. Classes are problem-oriented. Recommended prereq: Law 5050 or 3050

LAW 5214. Insurance Law. (3 cr. ; Student Option; Every Fall)
Insurance is omnipresent in the practice of law because insurance is the primary means by which companies and individuals deal with risks. Lawyers, of course, often make a living either by counseling clients about how to plan for risks or by serving clients whose risks have developed into losses. This course will introduce students to fundamental principles of insurance law and regulation. It will survey the nature and function of insurance, insurance contract formation and meanings, and insurance regulation. We will also look at specific legal issues relating to different lines of insurance, such as property, life, health, and liability insurance.

LAW 5224. Patents. (; 3 cr. ; A-F only; Every Fall)
This course offers an overview of patent law, both for students intending to specialize in patent prosecution and those whose general practice may include patent litigation and licensing. Topics to be covered include patentable subject matter; novelty, utility, and nonobviousness; statutory bars; enablement and written description; direct and vicarious patent infringement; claim interpretation; and administrative review of patent validity.

LAW 5231. Patent Prosecution Practice I. (2 cr. ; A-F only; Every Fall)
Patent Prosecution Practice I is recommended for all students interested in intellectual property and patent law, including students considering practicing in the areas of patent prosecution, litigation, licensing, technology commercialization, and patent portfolio management. The course focuses on US patent practice and is designed to extensively develop the student's skills. Throughout the semester each student will complete two projects: (1) formulate and draft patent claims for a number of different inventions in view of prior art, (2) develop strategies for responding to a patent examiner according to rules of the U.S. Patent Office, arguing patentability and allowance of a patent application over cited prior art. Each student will be paired with a senior practicing attorney who will act as a mentor, including reviewing drafts and providing candid feedback to the student. Lectures and discussion topics include: -Organization and structure of the U.S. Patent Office, -The US patent process including the entire life cycle of a patent from application preparation and filing through examination and grant, -Formulating patent claims in view of prior art and potential infringers, -Architecting patent portfolios including all types of US patent applications, such as provisionals, utilities, continuations and divisionals, -Examination of patent applications including responding to Office Actions issued by the US Patent Office; -Inventorship and ownership determination and legal ramifications flowing therefrom, and -US law and regulations governing patent prosecution practice. A technical background is not required to take this course.

LAW 5232. Patent Prosecution Practice II. (3 cr. ; A-F only; Every Spring)
Patent Prosecution Practice II is recommended for all students interested in intellectual property and, in particular, students interested in advancing their skills and understanding of patent law and practice. Throughout the semester each student will complete three practical and diverse assignments designed to develop the student's skills. Each student will be paired with a senior practicing attorney who will act as a mentor, including reviewing drafts and providing candid feedback to the student. Specifically, in this class, each student will: (1) prepare a complete US Patent Application based on a real invention, (2) write an appeal brief according to rules of the US Patent Trial and Appeal Board, arguing patentability and reversal of the patent examiner in view of an examination history by the US Patent Office, and (3) provide clearance counseling to a client about to launch a new product, including reviewing issued US patents and developing a full non-infringement / invalidity opinion for the client. The course grade is primarily based on these three projects in lieu of a final exam. Lectures and discussion topics throughout the semester include: -skills and strategies for writing patent applications, -appeal practice including brief writing before the Patent Trial and Appeals Board (PTAB) at the US Patent Office, -clearance analysis including invalidity and non-infringement counseling and opinions, -foreign practice including national filings in foreign countries and international filings using the Patent Cooperation Treaty (PCT), including leveraging patent prosecution highways for accelerated examination, -eligible subject matter issues including recent case law and claim drafting tips, -accelerated examination procedures within the US Patent and Trademark Office, -legal and practical considerations of infringement counseling including formulating invalidity and non-infringement opinions, -post grant review and other mechanisms for challenging issued patents before the US Patent and Trademark Office, -patent prosecution related considerations that arise in relation to participation in industry standards organizations, -patent prosecution related considerations that arise in the context of universities and technology licensing organizations, and -design patents. prereq: Master of Science Patent Law Students only.

LAW 5243. Patent Research and Writing. (2 cr. ; A-F only; Every Fall)
Patent lawyers and agents spend their entire professional careers communicating (with clients, patent examiners, judges, colleagues) no matter what their individual career paths may be. This course is about the process of research and communicating about patents. In other words, the goal of the course is to teach the building blocks of patent research and communication through multiple practice exercises so the student may repeat the process independently after successful completion of this course. This course leverages free, patent office, and commercial research tools. Deliverables and works include: patent landscape search and report, patentability search and opinion, patent risk search and assessment, patent invalidity search and opinion. Recommended prereq: Patents (5224), Patent Prosecution Practice I (5231) or Patent Portfolio Management (5250)

LAW 5250. Patent Portfolio Management. (2 cr. ; A-F only; Every Fall)
Patent portfolio management is the art of aligning patent strategy with business objectives. In general, the successful portfolio manager must have the ability to transform complex patent information into actionable insights that provide decision-making value to a wide variety of stakeholders. This course introduces students to the various practices and skills that go into building, implementing, and managing a patent portfolio whether from the point of view of a small, innovative, start-up company or a Fortune 500 company in a highly competitive market space.

LAW 5290. Patent Law Capstone: Innovation. (3 cr. ; A-F only; Every Spring)
This capstone course introduces students to the principles of successful innovation and the integral role of patents in this process. This is a course in innovation. There are no right or wrong answers. Large companies with very smart people often launch products that fail. Venture capitalists seeking to invest in winners more-often-than-not end up investing in losers. Innovation is an art not a science. There is no ?secret formula? that guarantees success. There are simply different tools, skills, methods of analysis and approaches that may or may not work better than others. We will explore the art of innovation and the integral role that patents play in turning an idea into an innovation. Goals: Students will learn how to research complex subject matter across the intersecting domains of business, finance,

marketing, science, technology and intellectual property. Students will then develop the ability to present their findings in a clear and concise manner that is understandable to and can be acted upon by a cross-functional audience of high-level decision makers.

LAW 5601. International Business Transactions. (3 cr. ; Student Option; Periodic Fall & Spring)
International Business Transactions is a three-credit course whose main focus of discussion and study is the private law aspects pertaining to international business transactions, rather than issues of national and international trade regulation. Thus, the course is primarily concerned with private international business law. We examine three basic methods of doing business abroad, namely, the sales of goods (export) transaction, licensing and franchising, and foreign direct investment. The course materials touch upon substantive law in areas as diverse as commercial transactions and the uniform commercial code, antitrust, intellectual property, conflict of laws, civil procedure, contracts, bankruptcy, taxation, and international law. While knowledge or background in these areas is certainly helpful it is not necessary for success in the course and for dealing with the issues raised in the readings or in class.

LAW 5608. Trademarks. (3 cr. ; Student Option; Periodic Fall & Spring)
This course will consider how marketers secure and enforce trademark rights. Trademarks are the indicators that consumers rely upon to determine the origin of goods and services. The course will focus on U.S. federal trademark law, but will also look at state and international trademark law as well as related areas such as false advertising, publicity rights, and cybersquatting. This course will provide a solid foundation for students interested in practicing trademark law (application, enforcement, licensing, or litigation) or more general intellectual property law. It will also be useful to attorneys who do any work with trademark-dependent industries such as retail sales, advertising, or media and entertainment. Finally and more generally, trademark law offers excellent case studies of the interaction between law, culture, and technology, and of the evolution of traditional doctrine under pressure from rapid changes in surrounding circumstances.

LAW 5613. Copyright. (3 cr. ; Student Option; Periodic Fall & Spring)
Copyright subsists in original works of authorship, including literary works, music, and works of visual art. This course provides an overview of U.S. copyright law, including the requirements for copyright protection; authorship and ownership; copyright owner rights; exceptions to copyright liability, including the fair use doctrine; and duration and terminations of transfer.

LAW 5629. Patent Field Placement. (1-3 cr. ; S-N only; Every Fall, Spring & Summer)
This course provides an opportunity for students to work with and learn from lawyers and patent professionals in industry and law firms. The instructor and student will work together to find an appropriate placement that matches the student's interests and host's needs. Enrollment occurs through an application outside of the lottery process. If you are interested in participating, please contact the instructor by email as early as possible with a short explanation of: (1) why you are interested in pursuing a patent field placement; (2) the kind of work that interests you; and (3) whether you have an interest in and/or relationships with a specific potential host organization. Prereq or co-req one of the following: Law 5224 Patents, Law 5231 Patent Prosecution I, Law 5243 Patent Research & Writing, or Director of Patent Law Programs permission.

LAW 5707. Intellectual Property Transactions. (2 cr. ; A-F only; Every Spring)
Intellectual property rights have been described as a ?sword and shield.? Rights holders are thought to act offensively by suing or threatening to sue infringers and seeking money damages, irrespective of the holders? marketing and product sales programs. Or they act defensively to protect their current or future market positions by having federal courts enjoin competitors. This course considers a third way: intellectual property rights are also valuable intangible assets that may be bought and sold. In this course, we will explore the principal theories and practices of intellectual property transactions. We will be considering closely the doctrines regulating the assigning and licensing of patent, copyright, trademark and other intellectual property rights, and we will be questioning critically whether these laws and practices encourage or inhibit commercial activity and innovation. While studying specific transactions in the course, we will be examining the practical uses of intellectual property law to meet commercial objectives.

LAW 5836. Trade Secret Law. (2 cr. ; Student Option; Every Spring)
This course is an exploration of perhaps the least studied of the legal regimes protecting commercially valuable information, trade secret law. Patents and copyrights receive considerably more attention, at least as studied disciplines. But the importance of trade secrets and laws protecting them are no less important, and increasingly businesses are recognizing this reality. The focus of this course will be the ways trade secrets come to exist, how they are used, and how they can be protected, and the enforcement mechanisms used to achieve that protection. We will explore the sources of state-based trade secret law, the common law and statutes, and seek an understanding of relevant federal law and the interplay of state and federal law. Because a true understanding of trade secrets only can be obtained by understanding their relation to and differences from inventions covered by patents, we also will make sure to contrast these regimes throughout the course.

LAW 5908. Independent Research and Writing. (1-2 cr. [max 8 cr.] ; Student Option; Every Fall, Spring & Summer)
Students may earn 1 or 2 credits (and in exceptional circumstances, 3 credits) for researching and writing a note, article, memo, or other paper on a legal topic. At least 3,750 words are required for one credit, at least 7,500 for two credits, and at least 11,250 for three credits. To register, the student should confer with a supervising faculty member, draft a description of the proposed project, and complete the online Independent Research form. LAW 5908 is for students who are not enrolled in the Law School, as well as MSPL candidates. Other law school degree candidates should enroll in LAW 7606 or LAW 7608 instead of LAW 5908.

LAW 5909. Independent Field Placement. (1-3 cr. ; S-N only; Every Fall, Spring & Summer)
Students may earn up to three credits in a semester for work in a patent practice setting under the supervision of a qualified field supervisor and a faculty advisor. At least 50 hours of patent-related activities are required per credit. The student is responsible for identifying a field placement setting and supervisor, finding a faculty advisor, and submitting the Independent Field Placement Enrollment Form for approval by the Associate Dean of Academic Affairs prior to enrollment.

LAW 6000. First Year Law Coursework. (12-17 cr. [max 32 cr.] ; A-F only; Every Fall & Spring)
First year Law Students have 17-credits of required coursework in fall and 12-credits of required coursework plus a 3-credit required elective in spring.

LAW 6001. Contracts. (; 4 cr. ; A-F only; Every Fall)
Basic course in law of contract and promissory obligation; formation of contracts; legal validity and construction; breach; legal and equitable remedies for breach; conditions; third-party rights.

LAW 6002. Legal Research & Writing. (2 cr. [max 4 cr.] ; P-F only; Every Fall & Spring)
This year-long course (2 credits Fall; 2 credits Spring) covers the process of communicating about the law. Our goal is to teach students the building blocks of legal communication through multiple practice exercises so that students can repeat the process on their own after successful completion of the course. In the fall, we begin at orientation with a short exercise, then move on to email, letter, and office memorandum exercises written in an objective/predictive mode. In the spring, we proceed gradually to a persuasive trial court brief and delivery of formal oral arguments.

LAW 6004. Property. (; 4 cr. ; A-F only; Every Spring)
The law's protection of possession and ownership of real and personal property.

LAW 6005. Torts. (; 4 cr. ; A-F only; Every Fall)
Civil liability for infliction of harm, including assault, battery, false imprisonment, infliction of mental distress, negligence, and their respective defenses; function of torts process.

LAW 6006. Civil Procedure. (; 4 cr. ; A-F only; Every Fall & Spring)
This course addresses rules governing civil litigation, with emphasis on rules applicable in federal district courts. Topics may include due process, pleading, joinder, discovery, case management, the relationship between judges and juries, settlement, alternative dispute resolution, summary judgment, post-trial motions, finality, and preclusion. The course will also provide a brief survey of the topics covered in Civil Procedure II.

LAW 6007. Constitutional Law: Federalism and Separation of Powers. (; 3 cr. ; A-F only; Every Fall)
Judicial review authority, structure of government (federalism, inter-governmental relations, separation of powers).

LAW 6009. Criminal Law. (; 3 cr. ; A-F only; Every Fall & Spring)
Purposes/functions of criminal processes and of several deprivations they impose. Requisites for official designation of acts and persons as "crimes" and "criminals." Justifications for acts otherwise designated "criminal." Emphasizes concepts of criminal responsibility. Nature/limits of criminal sentencing process. prereq: dept consent

LAW 6011. International Law: 1L. (3 cr. ; A-F only; Every Spring)
The course is an introduction to public international law. It will examine the sources and history of the law of nations, and how international law is formed, interpreted and (sometimes) enforced. It will also provide a brief introduction to the law of international organizations (specifically the United Nations), concepts of jurisdiction and conflicts of jurisdiction among nation states, international protection of human rights, the law of war, international criminal law, and the control of the use of force (including peacekeeping and related topics).

LAW 6013. Law in Practice: 1L. (; 3 cr. ; P-F only; Every Spring)
This course introduces first year students to the skills needed to apply emerging knowledge of legal doctrine and reasoning in the actual practice of law. The course involves a series of simulation experiences related to two case files?one litigation case and one transactional matter. Students attend ?Law Firm? classes taught by Law School faculty that explore the doctrinal and strategic issues in the simulated cases. Students also perform simulations in ?Practice Groups? of eight students led by local practicing attorneys. Each student individually takes and defends a deposition. Groups of two students engage in client or witness interviews, client counseling and negotiation simulations. Students also complete either a simulated conference in the chambers of a local judge or engage in a simulated mediation conducted by a qualified neutral.

LAW 6015. Civil Procedure II: 1L. (; 3 cr. ; A-F only; Every Spring)
This course builds on Civil Procedure I by examining additional facets of civil litigation. Topics may include personal jurisdiction, subject matter jurisdiction, venue, preliminary injunctions and temporary restraining orders, the Erie doctrine, appeals, and class actions.

LAW 6016. Essentials of Business for Lawyers: 1L. (3 cr. ; A-F only; Every Spring)
This course will teach you how to: (1) Understand basic accounting principles; (2) Read an annual report and analyze financial statements; (3) Look beyond numbers to gauge the financial performance and strength of an entity; (4) Employ cash flow analysis to value a business or determine the potential financial rewards of an investment opportunity; and (5) Understand the strategic questions that business managers must confront in governing their companies. The course surveys foundational concepts, analytical techniques, and practices related to finance, accounting, and strategic management issues lawyers confront when working with business executives either as an outside consulting attorney or as an inside corporate counsel. It may also consider other concepts used by business executives, including organizational behavior, marketing, and quantitative analysis. The aim of the course is to help law students better appreciate the broader business context of legal decision-making so that they can contribute more effectively as a member of a firm's top management team or as outside counsel.

LAW 6018. Legislation and Regulation: 1L. (; 3 cr. ; A-F only; Every Spring)
This course explores lawmaking in the administrative state. Topics include: the legislative process, delegation of legislative authority to administrative agencies, the rulemaking process, statutory interpretation by courts and agencies, and judicial review of agency decisions. The course will focus on how statutes structure and constrain judicial and administrative decisionmaking.

LAW 6020. LL.M. Introduction to American Law. (; 2 cr. ; A-F only; Every Fall)
This course introduces law students and lawyers from other legal systems to the basics of the U.S. legal system and its legal institutions. The course will include legal research exercises designed to develop legal research skills.

LAW 6021. LL.M. Legal Writing and Legal Skills I. (; 3 cr. ; A-F only; Every Fall & Spring)
The fall course introduces legal writing and focuses on legal analysis. Students will draft and edit letters and office memoranda and engage in exercises such as mock client meetings and professional presentations. The focus of the fall semester is predictive legal writing. Some time will also be spent discussing how to prepare for and take law school exams.

LAW 6022. LL.M. Legal Writing and Legal Skills II. (; 3 cr. ; A-F only; Every Spring)
The spring semester course continues to build upon the foundation presented in the fall semester and to examine the fundamentals of U.S. legal analysis and legal writing. The focus of the second semester is persuasive legal writing and students will draft and edit a legal memorandum for motion practice in litigation as well as professional correspondence. To accomplish these goals, students act as attorneys in fictitious law firms, representing either the plaintiff or the defendant in a litigation matter. Students will also engage in simulated oral exercises such as mock client meetings and mock oral arguments. We will also spend time examining how to improve legal writing by doing editing and revising exercises and by analyzing samples of good (and bad) legal writing.

LAW 6023. LL.M. Contract Drafting. (; 2 cr. [max 3 cr.] ; A-F only; Every Fall)
This seminar will cover general contract principles and build upon them in a practical way. Students will review and revise contracts, draft sample provisions, draft contracts from "scratch" and discuss options for managing risk through effective drafting.

LAW 6024. LL.M. Trial Practice. (; 3 cr. ; A-F only; Periodic Spring)
Selected problems in litigation. Exercises in jury selection, introduction of evidence, expert testimony, direct and cross examination and impeachment of witnesses, opening statements and closing arguments. prerequisite: LL.M. student

LAW 6025. Wrongful Convictions. (; 2 cr. ; A-F only; Every Fall)
Wrongful Convictions is run in conjunction with the Innocence Project of Minnesota. Its purpose is to educate students about the causes of wrongful convictions as well as provide students with an opportunity to work on hypothetical courtroom situations in a classroom setting. The reading materials and classroom discussion will cover such topics as unreliable eyewitness identifications, false confessions, jailhouse informant testimony, ineffective assistance of counsel, government misconduct, problematic forensic science, and racial bias in the court system. We will also discuss how DNA testing works and its application in the courtroom. Students are expected to perform in-class exercises such as examination of witnesses making eyewitness identification, challenging confessions, cross-examine a cooperating witness and conduct voir dire on racial bias. Finally, students will be required to evaluate inmate applications for assistance submitted to the Innocence Project of Minnesota as part of their midterm sample assignment and final assignment.

LAW 6027. Law of the Sea. (2 cr. ; A-F only; Periodic Fall)
This course will examine the United Nations Convention on the Law of the Sea (UNCLOS). UNCLOS has been established as arguably the most comprehensive expression of multilateral treaty negotiation and practical application since it entered into force in 1994. The Convention is the definitive word on articulating the use by nation states of the world?s seas and oceans and the concomitant rights and responsibilities arising there from. The course will examine the historical perspective of the use of seas and oceans and the evolution of this body of international law. The course also address older regimes of the sea as well as the innovations that UNCLOS has ushered in, which include: the

territorial sea, contiguous zone, and rights of innocent passage; archipelagic states; the exclusive economic zone; the continental shelf; access by landlocked sates to the resources of the sea; geographically disadvantaged states; protection of the environment; the high seas and the resources thereof for the common heritage of mankind; the international seabed authority; maritime delimitation and the dispute settlement arrangements through the International Tribunal of the Law of the Sea, among others. The course will also study the wealth of case law mapping the development of international law of the sea. The course will adopt a practical approach to enhance skills in the drafting of treaties pursuant to UNCLOS, such as arrangements between coastal states and landlocked states for the sharing of EEZ resources. Students will be exposed to ?mock? maritime boundary delimitations and guest lecturers/visiting professors will facilitate this simulation.

LAW 6028. LL.M. Judicial Observation. (1-2 cr. ; S-N only; Every Spring)
Students work with a judge and observe how our court systems work in the United States.
prereq: LL.M. student

LAW 6030. Contemporary Problems in Freedom of Speech and Press. (; 3 cr. ; A-F only; Every Fall)
Most of us use devices like Smartphones, GPS, streaming services, or hands-free speakers like Amazon's Echo that connect to online voice services like Alexa without thinking about them very much. But, what kind of information are they collecting? Are merchants allowed to gather your shopping history and use it to send you targeted advertising, or to sell it to other companies for profit? Should other people be able to post your personal information or photos online without your consent? Can the government read your emails, track your online browsing, or intercept your text messages? This course considers how growing concerns about privacy and national security affect the First Amendment and the rights of journalists to gather and report the news. We will read significant court decisions and take a look at current statutory and regulatory initiatives both in the United States and abroad. You can expect lively debates and discussion, and the opportunity to explore a privacy or national security issue in depth in a substantial research paper.

LAW 6031. Smart Growth. (; 2 cr. [max 3 cr.] ; A-F only; Periodic Spring)
This class examines emerging legal strategies to address the fiscal, environmental, and social impacts of unrestrained metropolitan regional growth (?urban sprawl?). Topics include: inequalities in access to housing, jobs, and educational opportunities; local fiscal competition; local, state & regional regulatory responses to metropolitan development; environmental impacts of metropolitan development; and evolving legal structure of regional governance in America?s large metropolitan areas.

LAW 6034. Women's Legal History. (; 2 cr. [max 3 cr.] ; A-F only; Periodic Fall & Summer)
This course focuses on women and the law in the United States from the Revolutionary Era to the Present. We will focus especially on ways and instances in which the law - on the books or in application - treated men and women differently and the reasons or rationalizations for doing so; ways in which it distinguished among women based on status (free or slave, single or married, citizen or non, adult or child, able or disabled), race, class, and sexuality; how women's legal status changed over time and the limits of that change; and, finally, on women's individual and collective efforts to claim a right to themselves, equality in the workplace, and in civil and political rights. Law courses are generally case (or at least casebook) centered. This seminar offers a break from that format. Our lens will be historical. Most of our readings will be by historians whose principal fields of study include women's history, legal history, the history of citizenship, labor history, and the history of sexuality. The readings will be a combination of historical monographs and journal articles based on original archival research.

LAW 6036. Reproductive Rights. (; 3 cr. ; A-F only; Every Fall)
The age-old debate on the rights of individuals to sexual determination and reproductive autonomy rages on. It grows more contentious as new technology and heated political confrontations alter the playing field. This course, using cases, statutes, and ancient and contemporary critical writings, examines the legal foundations and social implications of regulating contraception, abortion, pregnancy, childbirth, and assisted reproduction. It addresses access, funding, the rights of men, women, minors, fetuses, and government. It also explores ethical considerations and international perspectives.

LAW 6038. LL.M. Small Business Practicum. (; 3 cr. ; A-F only; Periodic Spring)
The Small Business Practicum will replicate the practice of law and the representation of a small business client. The semester will revolve around one client, a food truck business, that wants to open and operate in the Twin Cities. Unlike other experiential classes at the law school such as legal writing, moot court and trial practice, the SBP students will not be told what issues they will research and write about, but rather will independently identify, research and analyze the issues that the small business client faces.

LAW 6039. U.S. Supreme Court and Great Cases that have Shaped the Nation. (; 3 cr. ; A-F only; Periodic Fall)
Discussion of twenty-four U S Supreme Court cases that have shaped the nation, and three sensationalized trial court cases that shocked the nation.

LAW 6041. Investment Management Law. (2 cr. ; A-F only; Periodic Spring)
This course will cover policy and regulation governing pooled investment vehicles and their managers. We will engage in a close study of the Investment Company Act of 1940 and its companion statute, the Investment Advisers Act of 1940. The primary focus will be the regulation of mutual funds, but attention will also be given to alternative investment vehicles, such as hedge funds, private equity funds and exchange-traded funds.

LAW 6043. Nonprofit and Public Sector Externship. (; 2 cr. ; P-F only; Periodic Summer)
Externships for nonprofit/public sectors.

LAW 6044. Immigration Law Externship - Center for New Americans. (; 2-3 cr. [max 6 cr.] ; P-F only; Every Fall & Spring)
Externship in immigration law with Center for New Americans.

LAW 6046. Human Trafficking. (; 2 cr. ; A-F only; Periodic Spring)
Seminar will examine the breadth and depth of efforts to combat and raise awareness about human trafficking, a form of modern-day slavery in which people are compelled through force, fraud, coercion, or other means to engage in commercial sexual exploitation or forced labor.

LAW 6049. Advanced LLCs and Partnerships. (; 3 cr. ; A-F only; Periodic Fall & Spring)
This course exposes students to a deeper focus and more advanced topics involved in the leading forms of unincorporated business associations, including limited liability companies (LLCs), partnerships, limited partnerships, and limited liability partnerships. Topics covered include authority and management structure, fiduciary duty, financial rights, partnership taxation, transfer rights, and dissociation and dissolution.
The course is structured around a series of exercises in which students negotiate, draft, and analyze the governing agreement for a simulated LLC.

LAW 6050. Commercial Paper. (; 2-3 cr. ; A-F or Audit; Every Fall & Spring)
Commercial payment and credit devices, such as checks, drafts, and promissory notes, and applicable commercial and banking practices. Articles 3 and 4 of the Uniform Commercial Code.

LAW 6051. Business Associations/ Corporations. (; 4 cr. ; A-F only; Every Fall)
The initial part of this course is an introduction to the general law of multi-person unincorporated business organizations, principally partnerships, limited partnerships and limited liability companies. Matters covered include the procedures for forming such organizations and the rights and obligations of the participants as among themselves and with respect to third persons. The remaining class hours constitute the first portion of the basic Corporations course, and will cover such matters as corporate organization; the distribution of powers among the corporate board of directors, its officers and its stockholders; the proxy system; control devices in the close corporation; and the fiduciary duties of directors, officers and controlling shareholders. Matters dealing with ?corporate finance? (issuance of shares, payment of

dividends, and corporate reorganizations) are covered in Advanced Corporate Law.

LAW 6053. Analytical Methods for Lawyers: An Introduction. (; 3 cr. ; A-F only; Periodic Spring)
The course provides the analytical foundations for legal practice in the modern world?a world in which sound legal advice requires the mastery of the techniques and language of disciplines such as economics, decision theory and game theory. After a brief review of the methodology of law and economics, this course exposes students to a broad survey of micro-economics, decision-theory, and game-theory concepts. These analytical methods play a crucial role in the design and understanding of legal rules. The second part of the course builds on these premises to study the economic structure of several areas of law. Through this course students will develop a framework for the analysis of legal rules that will aid them in the remainder of their legal studies and professional life.

LAW 6054. Corporate Finance. (; 3 cr. ; A-F only; Periodic Spring)
Corporate finance and reorganization. Methods of financing corporate enterprise, including capital stock structures, bonds, and debentures. Payments to stockholders by way of dividends, redemption, or purchase of shares. Corporate reorganizations, including mergers, sale of assets, and recapitalization. prereq: Business Associations/Corporations I

LAW 6055. Advanced Corporate Law. (; 3 cr. ; A-F only; Every Spring)
This course will focus on corporate finance and reorganization. Specifically, the course will explore: methods of financing the corporate enterprise including capital stock structures with preferred and common stock, as well as debt types and obligations; payments to stockholders by way of dividends, redemptions, purchase of shares or spin offs; and reorganizations including mergers, sales of assets, and recapitalizations. The evaluation is by way of final essay exam.

LAW 6058. Human Rights Advocacy. (; 3 cr. ; A-F only; Every Fall)
This course will study the histories, philosophies and activities of human rights activists and organizations. The course examines the theoretical basis of the human rights movement, the principles underlying key organizations in the human rights field, as well as their strategies, tactics, and programs. The class will use case studies and other active methods to understand and to evaluate the work of human rights activists. Topics to be considered include fact-finding and documentation, campaigns on human rights issues, cultural relativism, economic rights, and corporate responsibility for human rights. Students will consider the basic organizational structure and fundraising needs of NGOs. Students will design and present a research project based on their selection of in-class topics. Readings include material on the history of NGOs; roots and development of the human rights movement; analysis of key NGOs; advocacy within international institutions; and reports and publications from NGOs working in the field.

LAW 6059. Constitutional Law - Theories of Freedom of Expression. (; 3 cr. ; A-F only; Periodic Spring)
This course will survey the evolution of First Amendment law as it affects the legal rights and privileges of the print and electronic media. Topics will include prior restraints, libel, privacy, reporters? privilege, access to courts (including free press/fair trial), commercial speech, and obscenity/indecency. The course will examine the statutory and common law rights of access to information and will consider the constitutional implications of government regulation of media content, including the new media. We will read court opinions as well as seminal scholarly articles on the historical origins and philosophical foundations of freedom of press and speech and review doctrinal themes.

LAW 6061. Financial Regulation. (3 cr. ; A-F only; Periodic Spring)
This course will be a high-level overview of several different areas of financial regulation: banking regulation, insurance regulation, and elements of securities regulation (particularly broker-dealer and investment company regulation).

LAW 6062. Energy Law. (3 cr. ; A-F only; Every Fall)
This course provides an introduction to U.S. energy law. The first portion of the course introduces the nation's sources of energy: coal, oil, biofuels, natural gas, hydropower, nuclear, wind, solar, geothermal energy, and energy efficiency. In doing so, it explores the physical, market, and legal structures within which these energy sources are extracted, transported, and converted into energy. The second portion of the course turns to the two major sectors of our energy economy--electricity and transportation--and the full range of federal and state regulation of each sector. The third portion of the course explores case studies of hot topics in energy law and policy that highlight the complex transitions taking place in the energy system. These topics include electric grid modernization, electric vehicles, risks and benefits associated with hydraulic fracturing and deepwater drilling for oil and gas, the development of offshore wind energy, and the continued role of nuclear energy. In addition to traditional textbook reading and class discussion, the course will include industry, government, and nonprofit guest speaker presentations. Grading will be based on a final exam given at the end of the semester as well as class discussion and weekly written postings on Canvas for the course.

LAW 6063. Law and Neuroscience. (2 cr. ; A-F only; Every Fall)
What are adolescents, psychopaths, and white-collar fraud artists thinking? Why does emotional trauma for victims of abuse last so long? Why is eye-witness memory so poor? Do violent video games lead to violent children? How can you get into the heads of the judge and jury? Lawyers and courts, including the US Supreme Court, are already integrating neuroscience research into their arguments and opinions on questions such as these. This Law and Neuroscience course will introduce the exciting new field of ?neurolaw? by covering issues such as the neuroscience of criminal culpability, brain-based lie detection, cognitive enhancement, emotions, decision making, and much more. Along the way we?ll discuss how the legal system can and should respond to new insights on topics such as adolescent brain development, addiction, psychopathy, Alzheimer?s, the effects of combat on soldiers? brains, and concussions from sports injuries. New in the 2017 version of the course is a ?Bridge to Practice? track, which emphasizes the real-world brief writing related to the use of neuroscientific evidence in practice. (Note that all scientific material in the class will be presented in an accessible manner, so no previous science background is required.)

LAW 6066. Saeks Public Interest Residency. (2 cr. [max 4 cr.] ; A-F only; Every Fall)
The Saeks Public Interest Residency Program is a new program established by Allen ('56) and Linda Saeks that connects leading public interest and government organizations with high-achieving 3L students. Students work full-time during their third year of law school for a nonprofit or government agency and have a guaranteed, full-time, paid legal position with the same organization the year following graduation. This innovative model provides students with valuable legal training while providing the organizations with much-needed legal work. This classroom component will complement the externship. Residents will meet as a group, weekly to discuss lawyering skills, learn from public interest speakers, and gain insight into their work. prereq: JD Students only; concurrent enrollment in 6067 required

LAW 6067. Saeks Public Interest Residency Externship. (8 cr. [max 16 cr.] ; P-F only; Every Fall)
The Saeks Public Interest Residency Program is a new program established by Allen (56) and Linda Saeks that connects leading public interest and government organizations with high-achieving 3L students. Students work full-time during their third year of law school for a nonprofit or government agency and have a guaranteed, full-time, paid legal position with the same organization the year following graduation. This innovative model provides students with valuable legal training while providing the organizations with much-needed legal work. prereq: JD Students only; concurrent enrollment in 6066 required

LAW 6071. International Law. (; 3 cr. ; A-F only; Every Spring)
The course is an introduction to public international law. It will examine the sources and history of the law of nations and how international law is formed, interpreted, and (sometimes) enforced. It will also provide a brief introduction to the law of international organizations (specifically the United Nations), concepts of jurisdiction and conflicts of jurisdiction among nation states, international

protection of human rights, the law of war, international criminal law, and the control of the use of force (including peacekeeping and related topics). prereq: Upper division students only

LAW 6075. Civil Procedure II. (; 3 cr. ; A-F only; Every Spring)
This course builds on Civil Procedure I by examining additional facets of civil litigation. Topics may include personal jurisdiction, subject matter jurisdiction, venue, preliminary injunctions and temporary restraining orders, the Erie doctrine, appeals, and class actions. prereq: Upper division students only

LAW 6076. Essentials of Business for Lawyers. (; 3 cr. ; A-F only; Every Fall & Spring)
This course will teach you how to: (1) Understand basic accounting principles; (2) Read an annual report and analyze financial statements; (3) Look beyond numbers to gauge the financial performance and strength of an entity; (4) Employ cash flow analysis to value a business or determine the potential financial rewards of an investment opportunity; and (5) Understand the strategic questions that business managers must confront in governing their companies. The course surveys foundational concepts, analytical techniques and practices related to finance, accounting and strategic management issues lawyers confront when working with business executives either as an outside consulting attorney or as an inside corporate counsel. It may also consider other concepts used by business executives, including organizational behavior, marketing and quantitative analysis. The aim of the course is to help law students better appreciate the broader business context of legal decision-making so that they can contribute more effectively as a member of a firm?s top management team or as outside counsel.

LAW 6078. Legislation and Regulation. (; 3 cr. ; A-F only; Every Fall & Spring)
This course explores lawmaking in the administrative state. Topics include: the legislative process, delegation of legislative authority to administrative agencies, the rulemaking process, statutory interpretation by courts and agencies, and judicial review of agency decisions. The course will focus on how statutes structure and constrain judicial and administrative decisionmaking.

LAW 6081. Constitutional Law: 14th Amendment. (; 3 cr. ; A-F only; Periodic Fall & Spring)
This course offers an overview of civil liberties and civil rights under the United States Constitution. It will cover First Amendment freedoms, including freedom of speech and of the press, freedom of assembly and association, and religious freedoms (prohibition on establishment of religion and protection of free exercise of religion). It will also cover rights protected by the Fourteenth Amendment, including due process of law and equal protection of the laws. A few other individual rights and liberties guaranteed by the Constitution will be briefly discussed (takings, contract clause, Second Amendment gun rights, Ninth Amendment "privacy" rights). It does not cover constitutional rights in criminal law matters, which are covered in the Criminal Procedure course.

LAW 6084. Equal Protection: Race and the Civil Rights Acts. (; 3 cr. ; A-F only; Periodic Fall & Spring)
The course will cover the equal protection clause of the 14th Amendment and the three major civil rights acts passed in the 1960s to give content to that clause. The Choper casebook will be used for the equal protection clause and provide materials about the legislative histories and regulatory and statutory constructions of the major provisions of the 1964, 65, and 68 Civil Rights Acts.

LAW 6085. Criminal Procedure: Investigation. (; 3 cr. ; A-F only; Every Fall & Spring)
This course explores the constitutional constraints on the conduct of police investigations, focusing primarily on the Fourth and Fifth Amendments. The course will cover the Supreme Court's key cases on searches and seizures, police interrogations, and the remedies that follow from constitutional violations. Time permitting, the course will also address topical issues, such as stop and frisk, the use of force, and electronic surveillance.

LAW 6100. Taxation I. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
This basic course in federal income taxation introduces the student to the Internal Revenue Code and the income taxation of individuals through the following topics: definition of income, relevant accounting concepts, exclusions, deductions, income splitting, sales and dispositions of property, amortization, capital losses, and current issues of tax policy.

LAW 6102. Mergers and Acquisitions. (; 3 cr. ; A-F only; Periodic Spring)
This class will cover the theory behind, the Federal and state law governing, and the practice of, mergers and acquisitions. Our main focus will be what a transactional lawyer would want and need to know as to why mergers and acquisitions might occur and how and why companies or shareholders would embrace or disfavor them, how the transactions are documented and how disclosure requirements are met, and what the present cases say. prereq: or corequisite Law 6051; or prereq Law 5051 or Law 5050 or Law 3050

LAW 6103. Data Privacy Law. (; 3 cr. ; A-F only; Periodic Spring)
Every single day, the newspaper contains stories?plural intended?about data privacy and security. Whether they concern the National Security Agency, Facebook, or a data breach at a small business, the handling of personal information has become a central concern of our time. In response, a complex law of data privacy has emerged and now it is a fast growing area of legal practice. This course will equip students to counsel clients about an array of federal, state, and international legal requirements?while also analyzing them critically and thinking about the societal challenges posed by new information technology. Assessment will include group projects and a take-home final.

LAW 6104. Legal Writing II. (; 1 cr. ; A-F only; Every Fall)
This course provides additional instruction in the legal analysis and legal writing concepts covered in the first-year legal research and writing course. Students will meet individually and in groups with the instructor and will have multiple short assignments.

LAW 6106. Federal Tax Procedure. (; 2 cr. ; A-F only; Every Fall & Spring)
Overview of all major IRS functions including returns selection, examinations, administrative appeals, tax litigation, collection activities (liens and levies), bankruptcy, and criminal tax enforcement. Effective representation of clients in all phases of IRS encounters.

LAW 6107. Bankruptcy: Power, Process and Procedure. (; 2 cr. [max 3 cr.] ; A-F only; Periodic Fall & Spring)
This course focuses on the US bankruptcy code. Bankruptcy is ingrained in the US Constitution and it is one of the most common civil legal proceedings in the country. This course will cover bankruptcy jurisdiction and procedure, the sources and scope of the federal bankruptcy power, and how bankruptcy interacts with other areas of law such as insurance, tort law, labor law, and IP. The course will also cover consumer, corporate, and municipal bankruptcy. The class will be helpful for anyone interested in federal law or general commercial litigation.

LAW 6109. Creditors Remedies/Secured Transactions. (; 3 cr. ; A-F only; Periodic Fall & Spring)
The course covers primarily Article 9 of the Uniform Commercial Code?among the most significant commercial statutes in the world. Article 9 governs transactions in which a borrower borrows money from a lender and gives that lender an interest in some of the borrower?s property as collateral to make the lender more secure with respect to repayment. Transactions large and small are covered by Article 9: whether a person borrows money to buy a car, a manufacturer borrows money to buy its raw materials, a department store chain borrows money to purchase its inventory, or a credit card issuer sells its receivables to investors, Article 9 applies. Secured transactions are of central importance to consumer and commercial loans, mergers and acquisitions, securitizations and to bankruptcy. In addition to secured transactions, during this course we will address the remedies of unsecured creditors, statutes and procedures on levies of execution, attachment, garnishment, replevin, and receiverships. We will also address the exemptions and procedural rights available to debtors.

LAW 6111. Lawyers in Film. (; 2 cr. ; A-F only; Periodic Spring)
Influence Hollywood has had on how society perceives lawyers, legal profession, ethical standards of legal profession. Critically evaluate films/television programs, identify ethical issues, gain increased understanding of role in society played by lawyers/legal system.

LAW 6113. Construction Law. (; 2 cr. ; A-F only; Periodic Fall)
The construction industry, comprised of owners, lenders, architects and engineers, contractors and subcontractors, material suppliers, sureties and insurers, by many measures is the largest production industry in the U.S. This industry-oriented course will address (1) the complex world of construction, (2) the climate that leads to controversies, (3) the application of legal principles to the complex factual contexts of the construction process, (4) contract formation and administration issues involved in the process, including project delivery methods, contract types, allocation of risk, implied warranties, competitive bidding and contractor selection procedures, changes and extras, differing site conditions, schedule delay and disruption, bonds and suretyship, insurance, and claims of many types, and (5) how disputes are resolved through mediation, litigation, and arbitration.

LAW 6114. Partnership Taxation. (; 3 cr. ; A-F only; Every Spring)
Federal income taxation of partnerships and limited liability companies including formation, operation and management, distributions, allocations, sales and liquidations of entity interests, and terminations.

LAW 6115. Civil Litigation: Case Development and Discovery Practice. (; 3 cr. ; A-F only; Every Fall & Spring)
Much of what civil litigators do involves case development. Case development is a form of storytelling. The story, of course, should be persuasive, but it must also satisfy the requirements of applicable law, and it must be based upon admissible evidence. An integral part of case development is discovery. The Rules of Civil Procedure, specifically Rules 26 through 37 and 45, set forth the scope and types of discovery that may be conducted. Yet, depending upon the nature of the case, questions relating to what forms of discovery are appropriate, in what order, and for what purposes cannot be found in the rules. The goal of this course is to teach the student how to think both strategically and tactically with regard to case development and discovery. You will be introduced to basic (and some advanced) concepts and skills relating to ?designing? and ?building? the case, including through discovery practice. In addition, you will participate in a number of skills-related exercises. Students will work in teams.

LAW 6120. Federal and State Courts. (; 3 cr. ; A-F only; Periodic Spring)
Eleventh Amendment, state immunity from suit in federal court, federal sovereign immunity. Statutory/common law constraints on federal jurisdictions arising from federalism concerns. Choice of law and Erie. Federal common law.

LAW 6126. Water Law. (; 2 cr. [max 3 cr.] ; A-F only; Periodic Fall)
This course examines the legal mechanisms by which society allocates and protects its most vital natural resource: water. The primary emphasis is on current legal and policy issues, but the course also addresses the historical development of water policy and water law in the United States. Topics include: the riparian and prior appropriation doctrines and modern administrative permitting schemes governing private uses of surface water and groundwater; public rights in water resources; federal and state water resource development, allocation, and control; alternative means of responding to the growing scarcity of fresh water and adapting to changes in the hydrological cycle due to climate change; the appropriate role for market-based approaches; allocation and protection of groundwater resources; environmental limits on water development, including the Endangered Species Act, Clean Water Act, and public trust doctrine; tribal water rights; the doctrine of federal reserved water rights; mechanisms for resolving or avoiding conflicts over transboundary water resources.

LAW 6133. Data Compliance Practicum. (; 1 cr. ; S-N only; Periodic Spring)
The enormous growth in the importance of data privacy law over the past ten years has created opportunities for attorneys with expertise in this fascinating and fast-moving field. The Data Privacy Practicum aims to prepare students who may wish to specialize in the area with real-world exposure to practice and credentials that demonstrate readiness for its challenges. Students will 1) study for and take an exam overseen by the International Association of Privacy Professionals that will entitle them to become Certified Information Privacy Professionals?many attorneys working in this area display the ?CIPP? credential proudly on their business cards and bios, demonstrating its reputational value; 2) shadow a privacy professional in the Twin Cities working in organizations such as Target, 3M, US Bank, Cargill, Optum Health, and major law firms; 3) attend six proseminar sessions with guest speakers practicing in the field; and 4) research and write a short paper tackling an important problem in current data privacy law.

LAW 6151. Estate Planning. (; 3 cr. ; A-F only; Periodic Fall & Spring)
This course will cover both tax and non-tax considerations in estate planning. In light of the doubling of the federal estate tax exemption to $11,180,000 in the 2017 tax reform act, the course will cover the changes that may need to be made in many existing estate plans to adapt to the new provisions. Other topics covered include use of revocable trusts, retirement benefit planning, life insurance planning, charitable gift planning, and ethical considerations in estate planning.

LAW 6152. Federal Jurisdiction. (; 3 cr. ; A-F only; Periodic Fall & Spring)
This three-credit course will cover approximately half of a traditional five- or six-credit ?Federal Courts? curriculum; the other half is covered in LAW 6120 Federal and State Courts. Students may take either course or both courses, in any order. This course will explore issues that were raised in Constitutional Law and Civil Procedure regarding federal courts and the interactions between the federal and state judicial systems. Topics discussed may include Congressional power over jurisdiction, legislative courts, justiciability, appellate jurisdiction, Supreme Court review over state court decisions, and general principles of federal subject matter jurisdiction. This course is important for anyone planning a judicial clerkship or a legal career that includes litigation in federal courts.

LAW 6153. Wills and Trusts. (; 3 cr. ; A-F only; Every Fall)
This course is about people, living and dead, their relationships, and their property. More specifically, it is about the rights of property owners to pass their property on to others when they die. This is the law of succession. American law on this subject is based on the principle that though you can't take your property with you when you die, you are free to direct what happens to it thereafter. The course is a survey of the law and policy supporting that principle and the limits on it. It aims to acquaint you with the pleasures and pitfalls of practicing in this area and therefore we will be interested in drafting and professional responsibility as those issues arise throughout the course.

LAW 6159. Education Law and Policy. (; 3 cr. ; A-F only; Periodic Fall)
The Supreme Court has famously said that ?education is perhaps the most important function of state and local governments,? and Americans consistently rank K-12 education as one of the most important issues they want policymakers to address. Yet K-12 education is also one of the nation?s most contentious policy arenas. Education law stands at the center of these policy debates, and in this seminar students will be exposed to the many ways in which K-12 education is shaped by law and policy. Topics to be covered include: the structure of education law and governance; school finance; the interplay of federal, state, and local laws; religion and public schooling; charter schools and school choice vouchers; school boards; segregation; students? rights; and teachers? rights and teacher unions. In addition to case law, students will consider policy perspectives on school reform. Several guest speakers are planned. Students will be required to complete a paper (minimum 25 pages), as well as be active participants in course discussions.

LAW 6200. Remedies. (; 3 cr. ; A-F only; Periodic Fall)
This is an extremely practical course. It is about what will make you, as a lawyer, valuable to your clients. Plaintiff litigates to get a remedy; defendant litigates to avoid having to provide one. Clients will consult you and pay for your services because of your ability to achieve results for them. This course tells you what a court can do for a client who wins and what the court can do to a client who loses. In it, we will explore the fundamental remedies -- damages, injunctions, restitution, and declaratory relief. The questions we will ask throughout are what can the plaintiff (or the defendant) get? Why that and not something else? Which of the available remedies or defenses is best? What are the strategic and practical ways to achieve the desired result? Remedies integrates threads from different parts of the law school

curriculum and is a good vehicle for testing theories of what law is all about.

LAW 6201. Land Use Planning. (; 3 cr. ; A-F only; Every Fall)
Public control of land use and development and its constitutional limitations.

LAW 6203. Labor Law. (; 3 cr. ; A-F only; Every Fall)
The Labor Law course focuses on workers? rights to engage in collective action, including through unionization and collective bargaining. In the private sector, the National Labor Relations Act (NLRA) is the main statute that governs relationships between unions, employers, and employees; it is administered and enforced by the federal National Labor Relations Board (NLRB). Major topics to be covered include the union representation process, including recognition outside of NLRB elections; the regulation of campaign conduct during an organizing effort; workplace activities that are (and are not) protected by the NLRA; retaliation on the basis of union activities or support, or on the basis of other concerted activities for the purpose of mutual aid or protection; the legal framework surrounding the process of collective bargaining between employers and unions; the use of economic action (e.g., strikes and picketing); and the labor relations issues surrounding corporate transactions or other organizational transitions. To the extent time allows, we will also discuss issues related to public sector workers' rights to bargain collectively.

LAW 6207. Antitrust. (; 3 cr. ; A-F only; Every Fall & Spring)
The course provides an overview of U.S. antitrust (competition) law. It covers the historical development of antitrust, the role of economic analysis in contemporary antitrust law, and the principal areas of substantive antitrust including horizontal restraints (between competitors), vertical restraints (franchise or distributional restrictions), monopolization, and mergers.

LAW 6208. Local Government Law. (; 3 cr. ; A-F only; Periodic Fall & Spring)
This course will cover local government law on a national basis. Since much of local government law is on a statutory basis, we will use Minnesota statutes as a primary example. We will, however, also look at alternative approaches from other parts of the country.

LAW 6211. Federal Securities Regulation. (; 3 cr. ; A-F only; Every Spring)
This course covers concepts and problems in the regulation of securities transactions under the Securities Act of 1933, the basic federal statute governing rights, duties, and remedies in connection with the financing of business operations through the distribution of securities to the public. Topics covered will include the definition of a security and the exemptions from federal registration (crucial knowledge for the small business advisor), the registration process, the contents of the prospectus, civil liabilities, and the applicability of the 1933 Act to secondary transactions (sales of securities by persons other than the issuing entity). Because of the expansive scope of federal securities law and the draconian nature of the penalties imposed even for 'innocent' violations, knowledge of this material is vital not only for business lawyers who advise large corporations but also those whose business clients are closely held. The course will not focus, however, on litigation strategy or technique. Classes are problem-oriented.

LAW 6213. Real Estate Transactions. (; 3 cr. ; A-F only; Every Fall & Summer)
The course examines the acquisition and development of real property. Topics include listing agreements, purchase agreements, conveyancing, real estate finance and security instruments, foreclosure, mechanics? liens, and forms of real estate development.

LAW 6214. Insurance Law. (; 3 cr. ; A-F only; Every Fall)
Insurance is omnipresent in the practice of law because insurance is the primary means by which companies and individuals deal with risks. Lawyers, of course, often make a living either by counseling clients about how to plan for risks or by serving clients whose risks have developed into losses. This course will introduce students to fundamental principles of insurance law and regulation. It will survey the nature and function of insurance, insurance contract formation and meanings, and insurance regulation. We will also look at specific legal issues relating to different lines of insurance, such as property, life, health, and liability insurance.

LAW 6215. Environmental Law. (; 3 cr. ; A-F only; Every Fall)
Legal aspects of major environmental problems with emphasis on issues that appear in various regulatory contexts, such as the degree to which environmental quality should be protected; who should bear the cost of enhancing environmental quality; allocation of responsibilities among courts, legislatures, and administrative agencies; the role of citizens. groups; and environmental litigation.

LAW 6216. European Union Law. (; 3 cr. ; A-F only; Periodic Spring)
The European Union establishes the largest market in the world; it is the biggest US trade partner, and the main site of overseas offices of American law firms. This course aims to give students a general introduction to European Union law and politics over the course of the semester. Students should emerge with a thorough understanding of the constitutional and legal structure of the European Union. This course will chart historical and contemporary legal and political developments so that students will be fully cognizant both of the manner in which the European Union has evolved and the challenges that face it now. The course will focus on the following major areas: the institutional and constitutional structure of the Union; the sources of European Union law; the enforcement of Community law; the fundamental economic objectives of the Union with an emphasis on the four fundamental freedoms protected by the Treaty of Rome; and the foreign policy objectives and challenges of the Union.

LAW 6217. Securities Litigation. (; 3 cr. ; A-F only; Periodic Spring)
This course focuses on SEC enforcement of the federal securities laws and on the express and implied private rights of action under the federal securities laws, including the procedural rules for class action securities litigation. Students will read and critique federal cases, draft complaints, answers, motions to dismiss and other pleadings, and participate in a mock oral argument on their written pleadings. Evaluation will be based on class participation, written pleadings, the oral argument, and a final exam.

LAW 6219. Evidence. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
This course provides an introduction to the use of evidence in litigation, with an emphasis on the Federal Rules of Evidence. Topics may include admission and exclusion of evidence, direct and cross examination, judicial notice, hearsay, expert testimony, burdens of proof and presumptions, and privileged communications.

LAW 6220. Poverty Law: Housing and Government Benefits Law. (; 3 cr. ; A-F only; Every Fall)
This course reviews constitutional, federal, state, and municipal law as they specifically affect low income persons. Poverty Law I and II cover complementary aspects of the subject. They may be taken independently or in any order. Poverty Law I focuses on government benefits programs and landlord-tenant law, with additional topics including consumer and elder law. Poverty Law II focuses on civil juvenile and public and subsidized housing law, with additional topics including migrant farmworkers, government benefits for immigrants, third party legal custody, direct care jobs disqualifications, expungement of criminal records, special education law, and rural practice. This is a practice-based class with an emphasis on Minnesota law. Taking either or both courses will prepare the student for providing pro bono work while in private practice, working at a legal aid office, or serving in public law.

LAW 6223. Poverty Law II. (; 3 cr. ; A-F only; Periodic Spring)
This course reviews constitutional, federal, state, and municipal law as they specifically affect low income persons. Poverty Law I and II cover complementary aspects of the subject. They may be taken independently or in any order. Poverty Law I focuses on government benefits programs and landlord-tenant law, with additional topics including consumer and elder law. Poverty Law II focuses on civil juvenile and public and subsidized housing law, with additional topics including migrant farmworkers, government benefits for immigrants, third party legal custody, direct care jobs disqualifications, expungement of criminal records, special education law, and rural practice. The course requires two papers and has no exam. This is a practice-based class with an emphasis on Minnesota law. Taking either or both courses will prepare the student for providing pro bono work while in private practice, working at a legal aid office, or serving in public law.

LAW 6224. Patents. (; 3 cr. ; A-F only; Every Fall)
This course offers an overview of patent law, both for students intending to specialize in patent prosecution and those whose general practice may include patent litigation and licensing. Topics to be covered include patentable subject matter; novelty, utility, and nonobviousness; statutory bars; enablement and written description; direct and vicarious patent infringement; claim interpretation; and administrative review of patent validity.

LAW 6225. Winning Patent Litigation. (; 2 cr. ; A-F only; Every Spring)
The course focuses on practical litigation strategy in the context of patent litigation. It uses patent litigation as a vehicle for seeing how parties develop a winning strategy for a variety of complex legal issues, including choice of law, personal jurisdiction, subject matter jurisdiction, venue, and certain patent-specific issues, such as claim construction. A general understanding of patent law is helpful but not mandatory.

LAW 6226. Juvenile Justice. (; 3 cr. ; A-F only; Every Fall)
Legal, sociological, and philosophical bases of the principal agencies responsible for the control of youthful deviance. Emphasis on the juvenile courts, delinquency jurisdiction, and the procedural and substantive limitations on the courts' authority to dispose of juvenile offenders.

LAW 6227. Products Liability. (; 2 cr. ; A-F only; Every Spring)
This seminar will address all main areas of potential liability in the U.S. before and after the product is sold. This includes design defects, manufacturing defects, defects in warnings and instructions and post-sale negligence. There will also be discussions about product safety regulation in the U.S. and the development of product liability and product safety regulation around the world. Lastly, there will be discussions of liability prevention techniques throughout the course.

LAW 6228. American Legal History. (; 2 cr. [max 3 cr.] ; A-F only; Periodic Spring)
This course explores the interaction between law, politics, and culture in American society, concentrating on the period from the Revolution through the New Deal. Topics include: democracy and the rule of law; slavery; the public-private distinction; Civil War and Reconstruction; industrialization; expansion of the federal administrative state; law and the human sciences; crime and punishment; legal education and the role of the lawyer in the American polity. Readings will include primary legal sources, such as treatises, statutes, constitutions, and landmark cases, as well as contemporary religious, scientific, and literary works, which will help to situate the legal materials in broader cultural context. Several secondary sources will also be considered, both for insights into the topics covered, and to illustrate various approaches to legal-historical analysis. The course will encourage critical examination of these sources with the aim of clarifying how law has figured in the history and historiography of the United States. No previous background in American history is assumed.

LAW 6229. Criminal Procedure: Adjudication. (; 3 cr. ; A-F only; Periodic Fall & Spring)
This class examines what happens once the judicial system is mobilized to prosecute an individual. How effective is this system in ensuring that those presumed innocent get their day in court? What role does discretion play? What role does advocacy play? Major topics include: bail, prosecutorial charging discretion, discovery, suppression, plea bargaining, the role of the press, experts, jury selection, jury persuasion, defendant testifying, ineffective assistance of counsel, and sentencing. This is an experiential course, with a high concentration on simulations. This class is sometimes known as "Criminal Procedure II" because it picks up chronologically where Criminal Procedure ends. Criminal Procedure, however, is not a prerequisite.

LAW 6230. Advanced Torts. (; 3 cr. ; A-F only; Every Fall)
Study of injuries to relational interests, including defamation, privacy (a relational interest in some contexts, not in others), misuse of legal procedure, business torts, interference with family relations, wrongful death actions, and if time permits, no-fault auto compensation system in Minnesota. prereq: Torts

LAW 6231. Patent Prosecution Practice I. (; 2 cr. ; A-F only; Every Fall)
Patent Prosecution Practice I is recommended for all students interested in intellectual property and patent law, including students considering practicing in the areas of patent prosecution, litigation, licensing, technology commercialization, and patent portfolio management. The course focuses on U.S. patent practice and is designed to extensively develop the student's skills. Throughout the semester each student will complete two projects: (1) formulate and draft patent claims for a number of different inventions in view of prior art, (2) develop strategies for responding to a patent examiner according to rules of the U.S. Patent Office, arguing patentability and allowance of a patent application over cited prior art. Each student will be paired with a senior practicing attorney who will act as a mentor, including reviewing drafts and providing candid feedback to the student. Lectures and discussion topics include: - Organization and structure of the U.S. Patent Office, - The U.S. patent process including the entire life cycle of a patent from application preparation and filing through examination and grant, - Formulating patent claims in view of prior art and potential infringers, - Architecting patent portfolios including all types of U.S. patent applications, such as provisionals, utilities, continuations and divisionals, - Examination of patent applications including responding to Office Actions issued by the U.S. Patent Office; - Inventorship and ownership determination and legal ramifications flowing therefrom, and - U.S. law and regulations governing patent prosecution practice. A technical background is not required to take this course.

LAW 6232. Patent Prosecution Practice II. (; 3 cr. ; A-F only; Every Spring)
Patent Prosecution Practice II is recommended for all students interested in intellectual property and, in particular, students interested in advancing their skills and understanding of patent law and practice. Throughout the semester each student will complete three practical and diverse assignments designed to develop the student's skills. Each student will be paired with a senior practicing attorney who will act as a mentor, including reviewing drafts and providing candid feedback to the student. Specifically, in this class, each student will: (1) prepare a complete U.S. Patent Application based on a real invention, (2) write an appeal brief according to rules of the U.S. Patent Trial and Appeal Board, arguing patentability and reversal of the patent examiner in view of an examination history by the U.S. Patent Office, and (3) provide clearance counseling to a client about to launch a new product, including reviewing issued U.S. patents and developing a full non-infringement / invalidity opinion for the client. The course grade is primarily based on these three projects in lieu of a final exam. Lectures and discussion topics throughout the semester include: - skills and strategies for writing patent applications, - appeal practice including brief writing before the Patent Trial and Appeals Board (PTAB) at the U.S. Patent Office, - clearance analysis including invalidity and non- infringement counseling and opinions, - foreign practice including national filings in foreign countries and international filings using the Patent Cooperation Treaty (PCT), including leveraging patent prosecution highways for accelerated examination, - eligible subject matter issues including recent case law and claim drafting tips, - accelerated examination procedures within the U.S. Patent and Trademark Office, - legal and practical considerations of infringement counseling including formulating invalidity and non- infringement opinions, - post grant review and other mechanisms for challenging issued patents before the U.S. Patent and Trademark Office, - patent prosecution related considerations that arise in relation to participation in industry standards organizations, - patent prosecution related considerations that arise in the context of universities and technology licensing organizations, and - design patents.

LAW 6234. Public Lands and Natural Resources. (; 3 cr. ; A-F only; Periodic Spring)
Public Lands and Natural Resources studies the expansive body of federal and state constitutional provisions, statutes, rules, customs, and processes that govern the ways individuals, corporations, and federal, state, and local governments interact with federal public lands, state lands, private lands, water, air, wildlife, minerals, and other natural resources. We will study: (1) the history and statutes of U.S. federal public lands, and the past and present conflicts governing those lands; (2) the laws and regulations governing national parks, national monuments, national

forests, grazing lands, energy resources, wildlife, and other natural resources; and (3) ownership interests and rights relating to public and private lands and resources. The course will help students gain an appreciation of our relationship with the natural environmental from cultural, historical, and economic perspectives, in addition to a legal perspective.

LAW 6241. Patent Remedies. (; 1 cr. [max 3 cr.] ; A-F only; Periodic Spring)
This course provides in-depth coverage of issues relating to remedies for patent infringement. Specific topics may include permanent and preliminary injunctions, ITC proceedings, lost profits, reasonable royalties, FRAND royalties, enhanced damages, attorneys? fees, awards of infringer?s profits for design patent infringement, patent marking, declaratory judgments of noninfringement or invalidity, and comparative remedies law.

LAW 6243. Patent Research and Writing. (; 2 cr. ; A-F only; Every Fall)
Patent lawyers and agents spend their entire professional careers communicating (with clients, patent examiners, judges, colleagues) no matter what their individual career paths may be. This course is about the process of research and communicating about patents. In other words, the goal of the course is to teach the building blocks of patent research and communication through multiple practice exercises so the student may repeat the process independently after successful completion of this course. This course leverages free, patent office, and commercial research tools. Deliverables and works include: patent landscape search and report, patentability search and opinion, patent risk search and assessment, patent invalidity search and opinion. Recommended prereq: Patents (5224/6224), Patent Prosecution Practice I (5231/6231) or Patent Portfolio Management (5250/6250)

LAW 6244. Employee Benefits. (; 3 cr. ; A-F only; Periodic Fall & Spring)
Qualified pension and profit-sharing plans. Qualification, nondiscrimination, limitations on contributions/benefits, treatment of participants/beneficiaries. Emphasizes federal income tax aspects of qualified plans.

LAW 6245. Interviewing, Counseling, and Negotiating. (; 3 cr. ; A-F only; Every Fall & Spring)
This course will focus on basic skills necessary for all lawyers. We will discuss and do simulated exercises in each of the skills, focusing on skill development and self-reflection to improve skills. The course will emphasize planning, performance and reflection over a range of civil and criminal cases.

LAW 6247. Depositions. (; 2 cr. ; A-F only; Periodic Fall & Spring)
Skills necessary to prepare for, defend, and take depositions in civil litigation under federal rules of civil procedure. Learn-by-doing, skills simulation course.

LAW 6250. Patent Portfolio Management. (; 2 cr. ; A-F only; Every Fall)
Patent portfolio management is the art of aligning patent strategy with business objectives. In general, the successful portfolio manager must have the ability to transform complex patent information into actionable insights that provide decision-making value to a wide variety of stakeholders. This course introduces students to the various practices and skills that go into building, implementing, and managing a patent portfolio whether from the point of view of a small, innovative, start-up company or a Fortune 500 company in a highly competitive market space.

LAW 6400. International Environmental Law. (; 2 cr. ; A-F only; Every Spring)
This seminar will examine issues of international environmental law. Although there is a limited body of older law, most of the topic has emerged during the past half century.

LAW 6402. Food and Drug Law. (; 3 cr. ; A-F only; Periodic Fall)
The primary focus of the class will be on the Food, Drug and Cosmetic Act and the FDA. In addition, time will be spent on specific food and drug aspects of other areas of the law. For example, the class will review the special rules and cases in the product liability field relating to food and drugs and the interface between food and drug regulation and subjects such as environmental law, the practice of medicine, and free choice in medical care.

LAW 6413. Family Law Capstone. (; 3 cr. ; A-F only; Periodic Spring)
This capstone course is designed to expose students to the ways in which family law concepts are implemented practically and procedurally. The course will touch on traditional family law topics?such as premarital agreements, custody, and property divisions? in the contexts that practicing attorneys are likely to encounter these topics. The course will accordingly focus on interviewing potential clients, retaining and using experts, incorporating financial planners and therapists in family dispute resolution, conducting a mediation, and drafting documents such as cohabitation agreements, divorce petitions, settlement decrees, and parenting plans. Assignments will be designed both to prepare students for practice and to capture the way that family law practice is changing to deal with the realities of modern families. The course will offer rigorous practical experience and advanced theoretical and policy discussion.

LAW 6490. Patent Law Capstone: Innovation. (; 3 cr. ; A-F only; Every Spring)
This capstone course introduces students to the principles of successful innovation and the integral role of patents in this process. This is a course in innovation. There are no right or wrong answers. Large companies with very smart people often launch products that fail. Venture capitalists seeking to invest in winners more-often-than-not end up investing in losers. Innovation is an art not a science. There is no ?secret formula? that guarantees success. There are simply different tools, skills, methods of analysis and approaches that may or may not work better than others. We will explore the art of innovation and the integral role that patents play in turning an idea into an innovation. Goals: Students will learn how to research complex subject matter across the intersecting domains of business, finance, marketing, science, technology and intellectual property. Students will then develop the ability to present their findings in a clear and concise manner that is understandable to and can be acted upon by a cross-functional audience of high-level decision makers.

LAW 6601. International Business Transactions. (; 3 cr. ; A-F only; Periodic Fall & Spring)
International Business Transactions is a three-credit course whose main focus of discussion and study is the private law aspects pertaining to international business transactions, rather than issues of national and international trade regulation. Thus, the course is primarily concerned with private international business law. We examine three basic methods of doing business abroad, namely, the sales of goods (export) transaction, licensing and franchising, and foreign direct investment. The course materials touch upon substantive law in areas as diverse as commercial transactions and the uniform commercial code, antitrust, intellectual property, conflict of laws, civil procedure, contracts, bankruptcy, taxation, and international law. While knowledge or background in these areas is certainly helpful it is not necessary for success in the course and for dealing with the issues raised in the readings or in class.

LAW 6604. Family Law. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
This course examines how the law creates family relationships, regulates their dissolution, and defines the rights and responsibilities of family members. Topics include: limits on who may marry and who may adopt children, divorce and its economic consequences, dissolution of nonmarital relationships, termination of parental rights, child custody and support, surrogate motherhood, domestic violence, and child abuse.

LAW 6605. Health Law. (; 3 cr. ; A-F only; Periodic Fall)
This course is a comprehensive introduction to health law. We will investigate the organization of health care delivery in the United States; the nature of the physician-patient relationship; methods of quality control; responses to harm and error, including through medical malpractice litigation; problems of access to health care; and approaches to cost control. We will also analyze proposals for health care reform.

LAW 6608. Trademarks. (; 3 cr. ; A-F only; Periodic Fall)
The course will focus on U.S. federal trademark law, but will also look at state and international trademark law as well as related areas such as false advertising, publicity rights, and cybersquatting. This course will provide a solid foundation for students interested in practicing trademark law (application, enforcement, licensing, or litigation) or more general intellectual property law. It will also be useful to attorneys who do any work with

trademark-dependent industries such as retail sales, advertising, or media and entertainment. Finally and more generally, trademark law offers excellent case studies of the interaction between law, culture, and technology, and of the evolution of traditional doctrine under pressure from rapid changes in surrounding circumstances.

LAW 6609. International Intellectual Property. (; 3 cr. ; A-F only; Periodic Spring)
This course provides an overview of international intellectual property law. Likely topics include (1) a comparison of US and foreign law relating to patents, copyrights, and trademarks; (2) the principal multinational agreements relating to intellectual property, including the Paris Convention, Berne Convention, and the TRIPs Agreement, as well as the implementation of these agreements within the domestic law of the United States and other countries; and (3) other topics such as the protection of indigenous knowledge and the law of judgments, jurisdiction, and choice of law as it relates to intellectual property disputes. It is highly recommended that students enrolling in this course have taken, or be in the process of taking, at least one other intellectual property course. prereq: One prior or concurrent intellectual property course.

LAW 6610. Unfair Competition. (2 cr. [max 3 cr.] ; A-F only; Every Spring)
This course provides an overview of false advertising and product disparagement under the Lanham Act; the right of publicity; and trade secret law. The course does not provide comprehensive coverage of antitrust, trademarks or trade dress, or consumer protection law.

LAW 6613. Copyright. (; 3 cr. ; A-F only; Periodic Spring)
Copyright subsists in original works of authorship, including literary works, music, and works of visual art. This course provides an overview of U.S. copyright law, including the requirements for copyright protection; authorship and ownership; copyright owner rights; exceptions to copyright liability, including the fair use doctrine; and duration and terminations of transfer.

LAW 6614. History of the American Legal Profession and Legal Education. (2 cr. [max 3 cr.] ; A-F only; Periodic Fall)
The history of the American legal profession and legal education is characterized by intersections, interactions, and transformations. The seminar will cover the underpinnings of the American legal profession and legal educational system with their changing models, methods, and values. The course will examine the origins of this history from its beginnings in medieval Italy to the Inns of Court in London to the earliest settlements in the colonies. The seminar will proceed to analyze the development after 1783 of the uniquely American approach to lawyer training and the practice of law. Students will study the emergence in the 19th century of the American model of institutional legal education, with a focus on Christopher Columbus Langdell's "case method," and the development of the "Cravath system" of organizing and managing a legal practice. The students will be exposed to the change and growth of law practice and law schools following both world wars, influenced by economic booms and busts, the expansion of the federal regulatory system, the acknowledgement that substantive knowledge and practical skills are equally essential to legal training, the increasing pressure to ensure equal access to legal education and legal representation for all segments of society, and the growing focus on social, environmental, and international concerns. The course will trace how the interrelationship of American law, society, economics, and ideologies have dramatically changed the practice of law as well as the priorities, policies, curriculums, and cultures of law schools. The seminar will conclude with an analysis of the current state of the legal profession and legal education. A unique and important aspect of the course will be the integration of material from the Law Library?s Arthur C. Pulling Rare Books Collection. LL.M. students may request instructor permission to enroll.

LAW 6615. Jurisprudence. (; 3 cr. ; A-F only; Every Fall & Spring)
This course will be a general survey course of the most important ideas, concepts, theorists, and schools of law in contemporary legal philosophy. The course will examine foundational legal questions relating to the nature of law, rights, justice, and punishment; questions relating to the connections between law and morality; and the proper understanding of legal reasoning, legal interpretation, and the role of judges. We will examine different schools of legal thought, including Natural Law Theory, Legal Positivism, Legal Realism, Feminist Legal Theory, and Critical Race Theory.

LAW 6618. Trial Practice. (; 3 cr. ; A-F only; Every Fall & Spring)
Selected problems in litigation. Exercises in jury selection, introduction of evidence, expert testimony, direct and cross examination and impeachment of witnesses, opening statements, and closing arguments.

LAW 6619. International Trade. (; 3 cr. ; A-F only; Every Spring)
This course is designed to familiarize the students with the regulatory system of international trade. Through the materials discussed in the course, focusing on the case law and jurisprudence of the WTO/GATT, the course is aimed at understanding the institutional framework of that system and the ways in which it functions. In addition the course deals with a large number of substantive issues to be found on the agenda of international trade scholars and lawyers. While the course is focused on legal theory and doctrine of international trade, we will approach each and every topic from economic and social perspectives. Thus, the course is designed to follow a truly interdisciplinary tour of the relevant subject-matter.

LAW 6621. Rights in Conflict: Citizenship and Human Rights. (; 2 cr. [max 3 cr.] ; A-F only; Every Spring)
This course explores an emerging, interdisciplinary field of inquiry that focuses on the relationships between Civil Rights Law in the United States and International Human Rights Law in the global context. Although the two areas represent distinct bodies of law, they also share many important features, objectives, and impediments. By examining the historical emergence of (1) Civil Rights Law in the United States, and (2) International Human Rights Law in the global context, students will gain a better understanding of the critical relationships and intersections between these two important areas of public law. Through an examination of the seminal cases and controversies in these areas, this course will explore the differences between various categories of rights; America?s ?exceptionalism? why the United States pursues a strong human rights agenda abroad that is rarely applied in the domestic context; the gains (and losses) that the domestic civil rights movement has experienced in recent decades, among other topics.

LAW 6622. International Business Operation and Negotiation. (; 3 cr. ; A-F only; Periodic Spring)
The course surveys foundational concepts, analytical techniques and practices related to organization and strategic management of multinational firms and cross-border transactions they negotiate with host-country governments, firms and non-governmental organizations. The overall aim of the course is to give law students basic proficiency in theories, practices and analytical techniques for understanding why and how multinational firms emerge and organize operations differently, negotiate cross-border transactions differently, and perform differently over time. Students will gain this basic proficiency with special reference to the multinational firm?s general counsel and her contributions to top-management decision-making, so that these future legal professionals can contribute more effectively as a member of a multinational firm?s top management team. The pedagogical approach of this course will be a modified Socratic method utilizing business and legal cases as well as in-class exercises letting law students play different organizational roles in different negotiating contexts.

LAW 6623. Integrative Leadership: Leading Across Sectors to Address Grand Challenges. (; 3 cr. ; A-F only; Periodic Fall)
Are you interested in working across government, business, and the non-profit sector for public good? Are you wondering how you can create sustainable shared leadership on challenges that can best be addressed together? This course explores multi-sector leadership and related governance and management challenges from a variety of perspectives and provides an opportunity for students to work together to apply what they are learning individually and in teams through in-class exercises and a final team project. The course is taught by a team of interdisciplinary faculty and considers different contexts, forms, and specific examples of multisector leadership that can enable transformative action to tackle a significant societal issue and achieve lasting

change. Credit will be not be granted if credit has been received for GCC 5023, OLPD 6402, PUBH 6702, MGMT 6402, PA 5130, PA 5105

LAW 6625. Disability Law. (; 3 cr. ; A-F only; Periodic Fall)
This class explores legal issues relating to physical and mental disabilities in the contexts of employment, governmental services, public accommodations, and education. The principal regulatory focus is on the Americans with Disabilities Act. Legal issues under that statute include determining who is disabled, proving discrimination, and the concepts of reasonable accommodation and undue hardship. Other statutes covered include the Family and Medical Leave Act, the Rehabilitation Act, and Individuals with Disabilities Education Act. This course has no written paper requirement, but will have a final examination. There is no prerequisite for taking this course.

LAW 6626. Complex and Cross-Cultural Negotiations. (; 2 cr. ; A-F only; Periodic Spring)
Principles, role play of multi-party/-issue, team-based negotiations/conflicts. How to structure ambiguous situations, bridge national/organizational cultures (e.g., alliances, mergers), functions (R&D, finance), institutional contexts (regulators, interest groups).

LAW 6627. International Tax. (; 2 cr. ; A-F only; Every Spring)
The course examines U.S. taxation of foreign individuals and corporations earning U.S. source income from activities in this country, taxation of U.S. citizens and residents abroad, taxation of business and investment activities of U.S. persons, companies and subsidiaries operating abroad, foreign tax credits, transfer pricing issues, the use and applicability of tax treaties, and the obligations under U.S. law for U.S. persons to report interests in and transactions with foreign accounts.

LAW 6628. Advanced Trial Practice. (; 3 cr. ; A-F only; Every Spring)
This course will be to help students learn to recognize and anticipate a large number of important evidentiary issues which can arise during a trial and to help them learn how to deal with the issues when they arise. Students will perform direct and cross examinations, opening and closing statements, and voir dire. Students will be expected to write brief motions in limine and short memoranda on evidentiary issues to learn to present concise persuasive memoranda to a court before and during trial.

LAW 6629. Indian Law. (; 2 cr. [max 3 cr.] ; A-F only; Periodic Fall)
This course examines the evolution of Indian law from colonization onward as impacted by treaties, executive orders, congressional enactments, and the development of federal common law. Students will gain an understanding and appreciation of one of the more particularized areas of the law, and acquire the necessary tools to become able practitioners within the field. The course will also focus upon the unique historical experience of the Midwest tribal nations.

LAW 6631. Employment Discrimination. (; 3 cr. ; A-F only; Every Fall)
Employment Discrimination. This course considers the principal statutory and constitutional prohibitions on employment discrimination. It focuses most prominently on Title VII of the 1964 Civil Rights Act, which prohibits employment discrimination based on ?race, color, religion, sex, or national origin.? The course considers the basic frameworks for proving discrimination under Title VII and the jurisprudence defining Title VII?s protected classes. The course also investigates newer Title VII fields, such as the law of sexual harassment and pregnancy discrimination. Using Title VII as a basis for comparison, the course then examines the constitutional law of employment discrimination, Title I of the Americans with Disabilities Act (ADA), the Age Discrimination in Employment Act (ADEA), and various state and local statutes addressing emerging issues in employment discrimination law, such as employment discrimination based on weight or attractiveness.

LAW 6632. Employment Law. (; 3 cr. ; A-F only; Periodic Fall & Spring)
This course explores the rapidly expanding body of law governing the workplace. The Employment Law course goes beyond the fields of Labor Law (which deals with workers? collective action rights) and Employment Discrimination to focus on the individual employment contract and the regulation of the workplace under various statutory schemes. Beginning with the common law regulation of the employment contract and the employment-at-will doctrine, the course explores topics such as wage and hour regulation, privacy in the workplace, freedom of expression and the employment contract, and occupational safety and health.

LAW 6637. Business and Human Rights. (; 2 cr. ; A-F only; Periodic Spring)
This seminar will explore the growing area of law and advocacy around corporate accountability and corporate social responsibility related to international human rights standards. The course has several goals: 1) We will examine the development and content of international human rights standards pertaining to corporations and corporate officers, including state, national and international and regional laws and principles including the UN Guiding Principles on Human Rights and Business. 2) We will next focus on levels of implementation and varying points of intervention on BHR issues: a) internal corporate policies, b) socially responsible investment shareholder advocacy and divestment, c) disclosure and anti-corruption laws and sanctions, d) trade policies, e) civil litigation, criminal prosecution and internal grievance mechanisms, f) reporting and documentation by human rights organizations, g) international standard-setting mechanisms. To examine these questions, we will use case studies across various industries including supply chains and labor conditions, environmental practices, and violations by security forces employed by multinational corporations. 3) The readings and seminars will encourage students to explore the debates about the most effective ways for businesses to protect and advance respect for human rights, prevent violations, and provide redress to victims of violations that occur as a result of their actions/inaction, and defend themselves when they are falsely accused. 4) Three papers throughout the semester will encourage students to integrate different arguments and course materials, conduct related independent research and develop their own arguments.

LAW 6638. Cybersecurity Law and Policy. (; 3 cr. ; A-F only; Periodic Fall)
Cybersecurity?also known as ?information security? or ?Internet security??studies how individuals, companies, governments, and criminals attack and defend from each other on digital devices and computer networks. This course will begin with a technological overview of the Internet, cryptography, and computer hacking. It will then address the technological, legal, and policy dimensions around a wide range of current cybersecurity issues across the following categories: (1) cybersecurity in the private sector, (2) cybercrime and digital investigations, and (3) the international dimensions of cybersecurity.

LAW 6642. Consumer Protection Law. (; 3 cr. ; A-F only; Periodic Spring)
This course examines a wide variety of consumer protection laws. Topics include consumer privacy, credit reporting, credit discrimination, consumer product warranties, abusive debt collection practices, and predatory lending.

LAW 6644. Law & Economics. (; 3 cr. ; A-F only; Periodic Spring)
"Law and Economics" is one of the most important developments in legal scholarship of our times. Economics and game theory have changed the way many scholars and legal practitioners think about law, litigation, and legal process. Legal scholarship using economic analysis is highly influential in legal academia and in courts. The field of law and economics received the highest level of recognition with numerous Nobel Prizes in economics awarded to economists and law professors who contributed to the creation of this field of research, holding joint appointments in various U.S. law schools, including James Buchanan (1986), Ronald Coase (1991), Gary Becker (1992), Vernon Smith (2002), and Oliver Williamson (2009). This course introduces the students to the field of law and economics, with applications spanning across several areas of law, including contracts, torts, property, civil procedure, antitrust, and regulation. No prior knowledge of economics or game theory is required.

LAW 6645. Gender Theory and the Law. (; 2 cr. [max 3 cr.] ; A-F only; Periodic Fall & Spring)
This course will cover the application of gender theory to contemporary legal issues such as sexual harassment and the #MeToo movement, the intersection of race and gender in political and workplace identities, the construction of masculinity in competitive workplace cultures, the tensions between gender equality and protection of caretaking

roles in the family, the rise of gender fluid identities, the unprecedented political gender gap among millennials, and the growing gender pay gap in the most elite parts of the American economy. In examining these legal issues, the course will revisit feminist and masculinities theories, consider the sources of gender identity and traits, and examine developments in Title IX, employment discrimination, criminal, and family law.

LAW 6647. European Union Business Law. (; 3 cr. ; A-F only; Periodic Fall & Spring)
This course will prepare future lawyers to represent clients doing business in the 28 Member States of the European Union. Today, the European Union is, by far, the largest economic partner of the United States: it counts for one-third of the global trade. The European Union's Common Commercial Policy makes the Commission of the E.U. the only Institution negotiating agreements with foreign countries on behalf of its 28 Member States, like the CETA with Canada (in force since September 2017) and the Transatlantic Trade & Investment Partnership with the US, that has been replaced by a similar negotiation in July 2018. Attorneys and Companies' General Counsels are more involved in strategic decisions made by American Enterprises operating abroad and a reasonable knowledge of the European Business Law will be required in the future.

LAW 6648. International Criminal Law. (; 3 cr. ; A-F only; Periodic Spring)
This course will cover developments in the prosecution of mass atrocity by international and hybrid criminal tribunals. It will discuss the history and development of the field of international criminal law from Nuremberg to the ICC; the sources of international criminal law; and jurisdiction over the investigation and prosecution of international crimes. The course will examine the elements of the international crimes of genocide, war crimes, crimes against humanity, and aggression. It will also analyze recent developments in international criminal justice, including victim participation, sentencing, and reparations.

LAW 6650. Advanced Administrative Law. (; 3 cr. ; A-F only; Periodic Fall & Spring)
This course will study laws and doctrines governing the administrative practices of federal government agencies and judicial review thereof. The course will cover topics including privatization of government functions, presidential supervision and control of agency officials, and various doctrines limiting judicial review of agency actions.

LAW 6651. Special Topics in Administrative Law. (3 cr. ; A-F only; Periodic Fall & Spring)
Special Topics in Administrative Law will cover all of the foundational material that is typically included in Administrative Law and Advanced Administrative Law curricula. This course, however, uses traditional administrative law doctrine to explore many of the contemporary, ongoing, unresolved regulatory issues the nation now confronts. For instance, driverless cars, billionaire space travel, social media company rights and responsibilities, federal response to future pandemics, climate change models, and outdated flood maps, are just some of the many areas in which regulatory standards will have to be updated and amended moving forward. But how and by whom? We will dive deeply into these issues and many more. To keep the subject matter of the course fresh, to stay abreast of the latest developments in administrative law, and to address student interests, a portion of the subject matter covered in this course will vary from year to year. Topics covered previously have included: Oversight and Independent Investigations; Presidential Power, Executive Orders, National Emergencies & States of Exception; Government Benefits and the Termination of Benefits; Access to Justice; Structural Reform; and Executive Privilege. Through deep analyses of these Special Topics, students will gain a greater understanding of the laws and doctrines governing the administrative practices of federal government agencies and judicial review. The final paper in this course satisfies the Upper Division Writing Requirement.

LAW 6661. Professional Responsibility - General. (; 3 cr. ; A-F only; Periodic Fall, Spring & Summer)
This course examines the ethical issues that lawyers confront in diverse areas of practice. The primary focus will be on the Model Rules of Professional Conduct and state law. Students will also explore a broader set of ethical questions including how attorney ethics are defined, how they are depicted in pop culture, and what type of conduct lawyers should aspire to in their practice. The course will also consider strategies for reconciling personal values, the law, and the rules of lawyering.

LAW 6662. Professional Responsibility - Business. (; 3 cr. ; A-F only; Periodic Fall)
This course is a survey of rules of professional responsibility for lawyers with an emphasis on the rules that apply to lawyers in corporate and transactional practice. Issues covered include client conflicts, representing close corporations and partnerships, representing venture capitalists and entrepreneurs in start ups, taking stock in lieu of legal fees, representing public companies, Securities Exchange Commission rules of professional responsibility for lawyers under the Sarbanes-Oxley Act, representing banks and other regulated companies, the role of in-house counsel, the responsibility of lawyers for client conduct, and malpractice liability for business lawyers.

LAW 6663. Professional Responsibility - Civil Trial Lawyer. (; 3 cr. ; A-F only; Periodic Fall & Spring)
The goal of this class is to learn the Model Rules of Professional Conduct and be able to apply them to situations involving ethical issues, with an emphasis on (but not completely limited to) civil litigation situations.

LAW 6664. Professional Responsibility - Criminal Law Ethics. (; 3 cr. ; A-F only; Periodic Fall & Spring)
The primary objective of this course is to educate you about the ethical problems facing lawyers and judges in criminal investigations and lawsuits. You will study the lawyer?s morality, the adversary system and the duties of the criminal defense lawyer, client autonomy, the duty and limits of zealous representation, lawyer-client trust and confidence, perjury and the search for the truth, counseling and preparing witnesses, the ethics of cross-examination, judges? ethics, conflicts of interest, and prosecutors? ethics.

LAW 6665. Professional Responsibility - Government. (; 3 cr. ; A-F only; Periodic Fall)
Students in this course should become familiar with the ABA Model Code of Professional Conduct and other aspects of the law governing lawyers, as well as with selected statutes and regulations governing conflicts of interest and ethical obligations of United States government employees. Throughout the course, there will be an emphasis on ethics rules, other laws, and practical considerations of importance to government lawyers.

LAW 6667. Professional Responsibility - Legal Malpractice. (; 3 cr. ; A-F only; Every Fall)
This course will survey ethics rules governing lawyers with a focus on the interrelationship between the Rules of Professional Conduct and legal malpractice law, a specialized form of tort law that varies in critical aspects from classic negligence doctrine. In addition to teaching the substantive law of legal ethics and legal malpractice, the course will focus on helping students recognize and avoid real life risks of malpractice exposure and liability.

LAW 6700. Consortium Study. (; 0-12 cr. ; A-F or Audit; Every Spring & Summer)
Study at another law school. prereq: dept consent

LAW 6702. Legal History Workshop. (; 2 cr. ; A-F only; Periodic Fall)
This seminar brings in leading scholars engaged in projects at the intersection of law and history. The goal of the seminar is to provide students with an introduction to the field of legal history and an opportunity to engage with scholars working on innovative projects that span from the ancient to the modern world, covering a range of geographical regions as well. Workshop sessions will be devoted to the presentation and discussion of works-in-progress of the guest scholars. Collectively, their works will encourage students to think comparatively about the role of law in defining the nature and limits of state power, and more broadly about the historical dynamics of law and society, with particular attention to the ways in which law has served not only as a mode of governance, but also as a cultural resource, enabling individuals to contest conventional ideas about race, class, and gender difference, and the very meaning of social justice.

LAW 6703. U.S. Trade Sanctions and Export Controls Law. (; 2 cr. ; A-F only; Periodic Fall & Spring)
The course will examine the U.S. legal architecture for regulating the export and release of goods, technology and software. The topics covered will include embargoed

destinations under U.S. law (Crimea, Cuba, Iran, North Korea, Syria), sanctioned persons (blacklisted individuals and entities), restricted goods, technology and software (defense items, high-technology goods, software and data), and restricted end uses (defense, nuclear, weapons proliferation). By the end of the course, students will be able to: (1) analyze a multinational corporation's operations and examine the extent of risk of export violations; (2) understand how the U.S. government initiates enforcement action and penalizes export violations; (3) identify and research agency regulations, executive orders, statutes and court cases relevant to particular export-related problems; (4) advise companies and individuals on how to mitigate risk and avoid liability in commercial settings. This course will be of interest to future practitioners in corporate law, white collar defense, government enforcement and those interested in the intersection of U.S. foreign policy and economic commerce.

LAW 6707. Intellectual Property Transactions. (; 2 cr. ; A-F only; Every Spring)
Intellectual property rights have been described as a ?sword and shield.? Rights holders are thought to act offensively by suing or threatening to sue infringers and seeking money damages, irrespective of the holders? marketing and product sales programs. Or they act defensively to protect their current or future market positions by having federal courts enjoin competitors. This course considers a third way: intellectual property rights are also valuable intangible assets that may be bought and sold. In this course, we will explore the principal theories and practices of intellectual property transactions. We will be considering closely the doctrines regulating the assigning and licensing of patent, copyright, trademark, and other intellectual property rights, and we will be questioning critically whether these laws and practices encourage or inhibit commercial activity and innovation. While studying specific transactions in the course, we will be examining the practical uses of intellectual property law to meet commercial objectives.

LAW 6708. Terrorism, Counter-Terrorism, and International Law. (; 2 cr. ; A-F only; Periodic Spring)
Terrorism claims an increasing number of fatalities each year, indiscriminately affecting a broad range of countries and societies, whether developed or developing, warn-torn or at peace and has, in past years, dominated security discourse at domestic, regional and international levels. The 9/11 attacks represented a watershed moment in counter-terrorism regulation, resulting in the United Nations Security Council declaring the phenomenon of international terrorism a ?threat to international peace and security? and the adoption of extensive measures aimed at addressing relevant regulatory gaps at the level of the United Nations, regional organizations and individual states. This regulatory trend has not significantly dwindled since and has in fact seen a boost with the rise of Islamic State in Iraq and the Levant (ISIL) and the so-called foreign fighters phenomenon, with every new incident prompting states and international organizations to contemplate additional legal and policy responses. Consequently, measures aimed at preventing and countering terrorism have now seeped into almost every aspect of domestic, regional or international policies and regulation, including education, banking and finances, immigration and asylum, Internet and communication technologies, the functioning of civil society, charitable and humanitarian organizations, etc. Against this background, the seminar aims to give students an overview of the international legal framework on terrorism and counter-terrorism. It will address the United Nations counter-terrorism architecture and the counter-terrorism response at the level of the United Nations as well as selected regional and domestic initiatives. Discussion will cover a wide range of topics, spanning from the definition of terrorism and the conditions conducive to its spread, to a broad spectrum of counter-terrorism measures, including criminalization of terrorist acts, investigating and prosecuting such acts and relevant fair trial issues, use of force against (suspected) terrorists, preventing terrorist use of the Internet and communication technologies, the foreign fighters phenomenon, etc. Counter-terrorism measures will consistently be analyzed against their compliance with international human rights law. The seminar will further examine the interplay between counter-terrorism regulation and the law governing armed conflict as well as international criminal law. Students will study and discuss primary sources, such as international and regional treaties and conventions, United Nations Security Council and General Assembly resolutions, as well as policy documents and academic literature. Students will finish the seminar equipped with a working knowledge of the global legal regime against terrorism, including the main challenges faced in this area and current trends in regulation.

LAW 6709. Agriculture and the Environment. (; 2 cr. ; A-F only; Periodic Spring)
Land based food and fiber production and processing is the largest segment of the global and national economy. These activities raise increasingly fundamental environmental questions for every level of government and sector of society. This seminar will address selected environmental issues related to agriculture, including crop production and conservation, irrigation, drainage, pesticides, and nutrients; livestock operations and soil/water/air quality; open space/habitat preservation; design of federal farm programs; biofuel initiatives; public land utilization; biodiversity; and globalization. Attorneys, scholars, and public officials will be invited classroom guests. Students will prepare papers and may present their topics to the class. Readings will be selected portions of texts, articles & cases.

LAW 6714. E-Discovery. (; 2 cr. ; A-F only; Periodic Spring)
Familiarity with all aspects of e-discovery is no longer optional for new attorneys and courts are increasingly penalizing attorneys who fail to satisfy their e-discovery obligations. The outcomes of many cases turn on a few key electronic documents that can be missed if the e-discovery process is not carefully pursued. This seminar will follow the life cycle of a case, covering topics such as document preservation, collection, search, review, and production. Students will participate in mock client interviews and meet and confers, receive lectures on important topics such as spoliation, and observe demonstrations of available document search and review technologies. The seminar will also include guest speakers on topics such as an in-house counsel?s perspective on gathering electronic documents.

LAW 6716. Magna Carta and the Evolution of Anglo-American Law. (; 2 cr. ; A-F only; Periodic Fall)
This seminar will examine the origins of Magna Carta in historical context, and study its influence and legacy in English and American law. The seminar will cover the underpinnings of Magna Carta and analyze the contents of the ?Great Charter,? before studying its status as ?fundamental? statutory law in early modern England, the role it played in conflicts between monarchy and Parliament, and its formative influence on documents like the English Bill of Rights. We will proceed to analyze the significance of Magna Carta in colonial and Revolutionary America, particularly in early state constitutions, the US Constitution and the development of federalism. Students will study English and American case law relevant to Magna Carta and work with key historical sources in original published form. A unique aspect of the course will be the integration of material from the Law Library?s Arthur C. Pulling Rare Books Collection. LL.M. students may request instructor permission to enroll.

LAW 6718. Immigration and Criminal Law: Immigration Consequences of Crimes and Criminalizing Migration. (; 2 cr. ; A-F only; Periodic Spring)
In the last decade, there has been an increased emphasis on using the criminal justice system to help determine who is and who is not suitable to live and work in the United States. This phenomenon has had some increasingly interesting effects as the immigration apparatus has been for most of the history of the United States a civil and agency system. The increased reliance on the criminal justice system has caused some overlap of criminal justice norms- including concepts of right to counsel, detention and detainers and warrants. At the same time, the prosecution of federal migration crimes has skyrocketed in the same period to the point where the majority of all federal prisoners are imprisoned because of migration crimes.

LAW 6719. Immigration Reforms through History: An Ongoing Racial Narrative. (; 2 cr. ; A-F only; Periodic Fall)
Students will learn about major immigration reforms through the lens of the social, political, economic, and cultural context that ushered their passage. Students will be presented with a mosaic of information to place them in the place and time of the respective era to facilitate

a deeper understanding of the immigration law narrative and how perceptions of race and identity result in policy and legal reform. The course will examine important portions of each reform bill including the intended goals of legislators and other influential factors such as demographic, economic, and political data. The class will explore societal perceptions of race and immigration in primary source documents and multimedia from each reform period including film, music, art, and news stories. This seminar is structured around major immigration reforms and the seminar will highlight the the Immigration Act of 1924, the Immigration and Nationality Act of 1965, the Illegal Immigration Reform and Immigrant Responsibility Act of 1996 and post-9/11 terrorism related immigration reforms in the 2000?s. The course will be divided into two to three seminar sessions per reform period and for each era the seminar will examine the societal context that led to the legislation, the language of law, case law and the broader policies and assumptions that it reflects. Seminar discussions will also cover how portions of the law currently operate and fit into a historical immigration law narrative.

LAW 6721. Business Reorganization in Bankruptcy. (; 2 cr. ; A-F only; Periodic Spring)
The bankruptcy reorganization process affords business entities extraordinary forms of relief from the claims and legal actions of creditors, all while balancing that relief with the interests of creditors, shareholders, stakeholders, and the debtor's directors and officers. This course examines not only the legal requirements of representing different parties in the reorganization process and the ongoing policy battles over Chapter 11's philosophy, fairness, efficiency, effectiveness, and evolution but also examines numerous strategic approaches to real-world legal problems. In addition to learning to apply the bankruptcy code to numerous legal problems, students will also learn valuable skills to identify leverage points and negotiation and strategy skills.

LAW 6800. International Contracts. (; 3 cr. ; A-F only; Every Spring)
Simulated negotiation of complex international sale-of-goods contract, requiring mastery of issues such as choice of law, dispute settlement, payment terms and devices, quality control terms and devices, and shipment terms.

LAW 6801. Death Penalty. (; 2 cr. ; A-F only; Every Spring)
This seminar focuses on the substantive law of capital punishment and on the procedural aspects of post-conviction proceedings. The course will include an examination of the history of death penalty jurisprudence, the Antiterrorism and Effective Death Penalty Act of 1996, habeas corpus, and state and federal death penalty statutes.

LAW 6802. Arab-Israeli Conflict: Legal Aspects. (; 2 cr. ; A-F only; Periodic Fall & Spring)
This seminar will examine the main legal issues concerning the Arab-Israeli conflict, focusing on a chronological development of the conflict, starting with the Balfour Declaration of 1917 and going up to the present. In doing so, we will examine issues such as the Balfour Declaration, the British Mandate over Palestine, the Partition Resolution, the establishment of the State of Israel, the 1967 (Six-Day) War and UN Security Council Resolution 242, the legal status of the Territories, the legal status of Jerusalem, the attack on the Iraqi nuclear reactor in Osiraq, the first and second Lebanon Wars, the first and second Intifadah, and the peace process between Israel and its neighbors (and with the Palestinians).

LAW 6803. Risk and Compliance: Theory and Practice. (; 2 cr. ; A-F only; Periodic Spring)
This course will offer an introduction to the theory and practice of corporate risk and compliance. This course will not focus on the regulations or on criminal prosecution. Rather, we will focus on the governance, processes and behavioral controls that permit an organization to not just manage but, more importantly, optimize risk. We will answer: What constitutes a good risk management program? What is an effective compliance program? What is a risk-based approach to compliance? How do these formal programs provide corporate controls? We will study the still maturing definitions and indices of a good risk management program - the ability to identify, evaluate and manage risk to maximize the objectives of the company. We will use corporate case studies to understand the Office of Inspector General?s seven elements of an effective compliance program - governance, policies, education, reporting, monitoring, enforcement, and response.

LAW 6804. Government Secrecy. (; 2 cr. ; A-F only; Periodic Fall)
This course introduces students to major mechanisms by which the executive branch of the federal government keeps secrets, including the classification system, the doctrines of executive privilege and state secrets privilege, and prosecuting information leakers. The course also introduces students to some of the major means by which secrecy is challenged, including the Freedom of Information Act, first amendment access and newsgathering claims, and whistleblower protection laws. Throughout the semester, we will discuss a number of recurring themes including the connection between government secrecy and constitutional theories of presidential power, the politics of secrecy and transparency and the role of constitutional discourse in the same, and the costs and benefits of secrecy and transparency.

LAW 6807. Cooperatives and Collective Entrepreneurship: Law, Policy and Practice. (; 2 cr. ; A-F only; Periodic Fall)
Cooperative and mutual business forms have been widely used for purposes of economic development, workforce development and social innovation. Historic examples include agricultural cooperatives, rural electric cooperatives, insurance mutuals and fraternals, credit unions, health maintenance organizations, housing cooperatives and mutually organized non-profits with significant earned income. This seminar will: 1) Illuminate public policy considerations for cooperative forms Explore processes related to formation, governance, operations and distribution; 2) Consider several common and not-so-common practices of this business model; and 3) Discuss and debate the merits ? both economic and social ? of coops as a ?double bottom line? business form.

LAW 6808. Street Law. (; 2 cr. ; A-F only; Every Spring)
Build your understanding of various areas of law and the legal system as you prepare classroom presentations for area high school students. By polishing your ability to explain the law to non-lawyers, Street Law will prepare you to be engaged members of your communities and more effective lawyers. During the Street Law seminar, we will focus on legal topics of interest to teens (and the general public) such as criminal law and procedure, the First Amendment, Constitutional law, the court system, and practical law (juvenile, consumer, employment, cyber). You will also learn teaching strategies including deliberation, case studies, moot court, mini-mock trials, continuums, snap debate and other engaging methods that will transform boring old civics into experiences your students will remember. Equity issues in pedagogy will be examined and tools to address issues will be presented. Street Law students will develop lessons and practice teaching (student presentations) in the seminar's collaborative learning environment. In addition to the weekly seminar, you will partner with area teachers to share your knowledge in a win-win experience using Street Law lessons developed by you, your classmates, and past Street Law participants. Course requirements are class participation, written work: lessons for each teaching session and one short research paper, 10 hours of teaching which usually occurs during the normal school days throughout the semester. Law students may work in teams. There are no exams. By the end of this seminar you will have discovered the meaning of the education phrase 'to teach is to learn twice.' No teaching experience is needed.

LAW 6810. Overturning Criminal Convictions: Post-conviction Relief Policy, Law, and Practice. (; 2 cr. ; A-F only; Periodic Spring)
Other than through direct appeals, individuals can use a variety of legal mechanisms to overturn and vacate a criminal conviction. This course provides a practical and theoretical framework on these processes. Co-taught by experts in criminal law and ?crimmigration? ? the intersection of criminal law and immigration law ? this course will delve into post-conviction remedies at the state and federal level. Through substantive lectures, practitioner perspectives, and practical exercises, students will learn about the history and policies behind different post-conviction relief (PCR) schemes and when pursuing PCR is appropriate for individual clients. The course will delve into

various procedural and substantive rules governing PCR and the ?nuts and bolts? of representing clients in PCR proceedings, including drafting petitions and negotiating with the prosecuting authority. Finally, the course will use criminal cases of individuals facing deportation or removal as template examples of the importance of PCR in the criminal justice system.

LAW 6813. Social Science Evidence. (; 2 cr. [max 3 cr.] ; A-F only; Periodic Fall & Spring)
This course will examine the use of social science based evidence in legal proceedings. The course will start with a brief consideration of the relevant rules of evidence including the Daubert decision regarding expert testimony. Several weeks will be devoted to social science methods and core concepts of statistics. The balance of the course will consider some specific areas where social science evidence has been particularly important. Students will prepare briefs summarizing relevant social science evidence and present oral arguments on a topic of their choice; some possible topics include future dangerousness, domestic violence, racial profiling, work place discrimination, discriminatory jury selection, discriminatory sentencing, deterrence, trademark dilution, eyewitness identification, jury selection, judicial bias related to campaign fundraising. In addition to preparing briefs and presenting oral arguments, members of the class will play the roles of members of the three-judge appellate court hearing the oral argument and questioning counsel. The course meets the upper division writing requirement.

LAW 6814. Racketeering and the RICO Act: Criminal & Civil Liability. (; 2 cr. ; A-F only; Periodic Spring)
This course will consider the Racketeer Influenced and Corrupt Organizations Act (RICO), which grabs more headlines and is more sweeping in its application than practically any other federal statute. Originally intended as a weapon against the Mafia, RICO has evolved into a statute used to fight a wide variety of corrupt practices. RICO is also increasingly becoming an important aspect of international business. In 2014, Chevron brought RICO claims against a U.S. lawyer who allegedly bribed foreign officials in order to obtain a multi-billion dollar judgment in a foreign tribunal. RICO, however, has its limits. Courts are beginning to weigh in heavily against RICO?s application to extraterritorial disputes. When RICO claims were alleged in the sex abuse cases against the Catholic Church, courts struck down the claims on the basis that the plaintiffs sought compensation for personal injuries, which are not within the scope of the statute. Enterprise, pattern and causation issues under RICO present some of the most complicated legal questions that any lawyer will ever confront.

LAW 6817. Practical Estate Planning. (; 2 cr. ; A-F only; Every Spring)
This course will focus on the day to day life of the estate planning lawyer, from the initial client interview and analysis of financial data to the implementation of appropriate planning techniques based upon a client?s situation and assets. Subjects addressed will include: ethical considerations; probate and methods for avoiding it; use of trusts; gift, estate and generation-skipping transfer tax planning; planning with life insurance; planning with retirement assets; planning for charitable gifts and bequests; planning for lifetime gifting to individuals; post-mortem planning and premarital agreements.

LAW 6818. White Collar/Corporate Crime. (; 2 cr. ; A-F only; Periodic Spring)
This class will consider the theory and practice of white collar litigation in the criminal arena. We will begin with a survey of basic principles and theories and then turn to the main substantive areas of white collar criminal liability, examining the most common regulatory schemes encountered in the interface between corporations and criminal law: mail and wire fraud, money laundering, RICO, and obstruction of justice. Next, we will discuss practice in white collar defense and prosecution, looking at discovery, plea negotiation and trial challenges unique to allegations of criminal malfeasance in corporate settings. We will examine federal laws, sentencing regulations, and Supreme Court pronouncements that control punishment for common white collar offenses. Finally, we will return to overarching policy questions, considering the role of federal courts in the imposition of criminal liability, and the consequences of overlapping state and federal jurisdiction over white collar offenses, particularly as revealed in the investigation and prosecution of public corruption cases.

LAW 6821. Public Interest Advocacy and State Attorney General. (; 2 cr. ; A-F only; Periodic Fall & Spring)
State Attorney Generals are a fixture of American jurisprudence. All 13 American colonies had an Attorney General, and today all 50 States and the District of Columbia provide legal services through an Office of State Attorney General. Each office possesses broad jurisdiction and to varying degrees is independent from the executive and the legislative branch of state government. Attorneys General in 43 states are elected statewide on a partisan basis. The combination of sweeping jurisdiction and constitutional independence has given rise to a unique American legal institution of growing importance. State attorneys general are currently leading the national response to the opioid crisis, nicotine-related health issues, immigration, health care and a multitude of other critical issues. Students will learn about the broad and diverse work of state AGs. The course will cover the day-to-day challenges that state Attorneys General face, which includes delivering the legal advice that will guide state government in a constitutional and ethical manner. The course will also cover the relationship of Attorneys General with Governors, state legislatures and agencies, the federal government, the private bar, and a myriad of advocacy organizations. It will focus both day to day responsibilities as well as on some of the most controversial legal issues affecting society today. Although Attorneys General are often in the news litigating both in favor and in opposition to Presidential policies, the focus of this class is not on suing or defending the President. Although each State is unique, the course will demonstrate that State Attorneys General address similar challenges and issues across the various state. The course will show how decisions that Attorneys General make often reflect the independence of the Office. This independence is most often revealed when Governors, legislatures, other elected officials, state agencies or the federal government exceed their constitutional or statutory authority. The course considers also the unique ethics issues that Attorneys General and their staff must confront.

LAW 6822. Legislative Process. (; 2 cr. ; A-F only; Periodic Spring)
Examines and tests academic and judicial assumptions and theories about the legislative process.

LAW 6825. Labor & Antitrust in the Gig Economy and Beyond. (; 2 cr. ; A-F only; Periodic Fall)
This seminar will engage the intersection of labor and antitrust regulation?and the role of labor in antitrust regulation?from the perspective of today?s so-called gig economy, while taking in broader doctrinal, policy, analytical, and historical questions. We will grapple with current policy questions as well as the historical and conceptual foundations of market regulation, covering such topics as: the status of gig workers under antitrust and labor law; the allocation of economic coordination rights under antitrust law, including rules concerning vertical and horizontal coordination; the meaning of fair competition; and how law shapes the fissured workplace. A reading response paper, a mid-term paper, and a final paper are required.

LAW 6827. Women's International Human Rights. (; 2 cr. ; A-F only; Every Spring)
This seminar addresses the history and legal context of women?s human rights; the UN Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) and its impact; gender and human rights in the international system; specific topics such as property and other economic rights, reproductive rights, and violence against women; and the role of nongovernmental organizations in making CEDAW work for women.

LAW 6830. Corporate Counsel. (; 2 cr. ; A-F only; Every Fall & Spring)
Participants will learn the unique challenges of working in-house as corporate counsel with public, private, or nonprofit organizations, developing perspectives and skills to think like and be effective business lawyers and leaders. Students will work individually and in teams to address simulations of problems regularly encountered by corporate counsel, including in areas of risk, compliance and ethics management, governance and the board of directors, leading in crisis, business strategy and planning, international transactions, investigations, litigation management,

employment, and intellectual property. Participants may conduct research, draft agreements and memoranda, conduct interviews, negotiate, and develop papers based on practical exercises that are the backbone of the course. Students will explore the three fundamental roles of corporate counsel?acute technician, wise counselor, and lawyer as leader. This course involves questions beyond ?what is legal? and focuses on ?what is right,? using specific illustrations drawn from the contemporary business world.

LAW 6831. Law, Race, and Social Psychology. (; 3 cr. ; A-F only; Periodic Fall)
Study of how the law affects race and social psychology.

LAW 6832. Cybercrime and Cybersecurity. (; 2 cr. ; A-F only; Periodic Spring)
This course will cover the key constitutional, statutory, technological, and policy issues regarding computer crime, electronic-evidence gathering (including electronic surveillance), and cybersecurity. The course grade will be determined by a final paper, a brief class presentation based on the final paper, and class participation. Criminal Procedure: Investigation (LAW 6085) is recommended but not required as a prerequisite.

LAW 6833. Alternative Dispute Resolution. (; 3 cr. ; A-F only; Every Fall & Spring)
This course examines dispute resolution processes outside of, or supplemental to, the civil trial system with particular emphasis on negotiation, mediation, and arbitration as dispute resolution mechanisms. This examination includes a study of the procedures and dynamics associated with each mechanism as well as an overview of the pertinent legal framework. A particular focus is on the skills dimension, and students will participate in a number of simulation exercises designed to assist in the development of the lawyering skills associated with each process.

LAW 6834. Federal Habeas Corpus. (; 2 cr. ; A-F only; Periodic Fall)
This course will study the evolution of habeas corpus and how the habeas remedy is utilized in the federal court system today. This study provides students an opportunity to observe how constitutional law, criminal law and procedure, civil procedure and even trial and appellate practice all bear upon the courts' struggle to apply habeas corpus law to individual cases. The cases studied are representative of the detentions that may be challenged in federal habeas, e.g. enemy combatants in military custody, state prisoners on death row and immigrants in Homeland Security custody.

LAW 6835. Comparative Perspectives. (; 2 cr. ; A-F only; Periodic Spring)
The course will cover comparative perspectives on various topics.

LAW 6836. Trade Secret Law. (; 2 cr. ; A-F only; Periodic Spring)
This course is an exploration of perhaps the least studied of the legal regimes protecting commercially valuable information, trade secret law. Patents and copyrights receive considerably more attention, at least as studied disciplines. But the importance of trade secrets and laws protecting them are no less important, and increasingly businesses are recognizing this reality. The focus of this course will be the ways trade secrets come to exist, how they are used, and how they can be protected, and the enforcement mechanisms used to achieve that protection. We will explore the sources of state-based trade secret law, the common law and statutes, and seek an understanding of relevant federal law and the interplay of state and federal law. Because a true understanding of trade secrets only can be obtained by understanding their relation to and differences from inventions covered by patents, we also will make sure to contrast these regimes throughout the course.

LAW 6837. Contract Drafting. (; 2 cr. ; A-F only; Every Fall & Spring)
This seminar will take the contract principles that students learned in their first year and build upon them in a practical way. Students will review and revise contracts, draft sample provisions, draft contracts from ?scratch,? and discuss options for managing risk through effective drafting.

LAW 6839. Supreme Court. (; 2 cr. ; A-F only; Periodic Spring)
In this course, we will explore the role and function of the Supreme Court in our governmental system. Although you have been exposed to Supreme Court decisions in your other law-school classes, this class will concentrate on how the Court makes those decisions, as well as the Court's relationship to the other branches of government. We will begin the course by examining the nomination and confirmation process. Then we will proceed to consider cases currently pending before the Court, first discussing current petitions for certiorari and then deciding several pending merits cases. Your final task will be to write a research paper on a topic related to the Supreme Court or an opinion in one of the merits cases we discuss in class.

LAW 6843. Financial Crises and Scandals and How to Minimize Them. (; 2 cr. ; A-F only; Periodic Spring)
The Great Financial Crisis (GFC) is the most important economic and legal event in most of our students? lives ? and most of the things they know about the GFC are myths. The GFC arose from a series of spectacular policy failures that persisted for 15 years (1994-2008). Most of these policy failures became public law, but other failures came from the repeal or refusal to adopt effective public law. Preventing or at least dramatically reducing future GFCs is the Nation?s most important economic task. The course offers an introduction to the economic, criminological, and psychological principles central to banking and banking regulation and integrates them with law. The sources of law we develop include administrative, criminal, civil, bankruptcy, securities, and commercial law. Students will be required to prepare an interdisciplinary policy memorandum recommending a specific policy or group of policies to counter a material contributor to financial crises.

LAW 6844. Advanced Real Estate Transactions. (; 2 cr. ; A-F only; Periodic Spring)
This ?hands on? course exposes students to the real world issues, documentation, and experiences that an attorney in the area of commercial real estate law would encounter. The course emphasizes the theory behind the provisions that are contained in various transaction documents as well as the realistic results of negotiation and their effect upon actual transactions. Students draft real estate documents, participate in negotiation sessions with follow up discussion regarding the results of those negotiations, and evaluate alternative real estate investments. The course provides a well-rounded understanding of basic commercial real estate documentation and transactions. The class also provides a foundation for all transactional lawyers, whether or not they will practice in the real estate field. Major topics include the following: real property contracts and conveyance documents; mortgages, deeds of trust and other loan documents; leasing documentation; title insurance and land title surveys; real estate markets, securitization and development; and real estate investments and analysis.

LAW 6845. Employment and Family-Based Immigration Law. (; 2 cr. ; A-F only; Periodic Spring)
Students will learn how to use business, employment, and family-based immigration law procedures and strategies in private practice. These areas comprise more than 60% of the work performed by immigration lawyers, as measured by the 2011 and 2016 American Immigration Lawyers Association Practice Surveys. Students will explore the relationship between federal and state control of immigration and benefits associated with immigration status. They will also explore how to build an evidentiary record that will carry them through administrative and judicial appeals. Students will apply ethical rules within the family and business immigration law contexts. Prereq: recommend Law 6872 Immigration Law

LAW 6846. Philosophy of Punishment. (; 3 cr. ; A-F only; Every Spring)
This seminar concerns normative justifications for the substantive criminal law and for state systems of punishment for crime. It examines literatures in the philosophy of punishment from the early 19th century (e.g., Kant, Hegel, Bentham) onwards, in contemporary criminal law and punishment theory (many writers), and in social theory (e.g., Durkheim, Weber, Marx, Foucault, Wacquant), concerning justifications for punishing at all, and whom, and how much, and functional questions about the larger social purposes that punishment serves. A focus is on the usefulness of existing paradigms for understanding and justifying such recent developments as restorative justice, community justice, therapeutic jurisprudence, and specialized drug and domestic violence courts.

LAW 6847. U.S.-China Trade War. (; 2 cr. ; A-F only; Periodic Spring)
This course will examine U.S.-China economic conflict over the last five years, often referred

to as a trade war, including restrictions on the exchange of goods, services, investment, technology, and software. The course will focus on U.S. restrictions on imports from and exports to China that have been imposed over the last five years. To a lesser extent, we will also look at China?s actions to restrict U.S. access to the Chinese market, protect (or take, in some cases) U.S. intellectual property, and to block U.S. investment in China. The U.S. economic relationship with China has drastically changed over the last five years. To date, the Biden Administration has continued many of the policies implemented by the Trump Administration with respect to China. In the near term, economic friction between China and the United States is certain. Over the long term, although the precise points of conflict will change, it seems likely that economic conflict between the two countries will continue. This seminar will use the conflict to examine key legal elements of U.S. trade and investment policy. In particular, this seminar will examine: What is the ?trade war? and what U.S. and Chinese policies does it include?; What are the origins and impacts of the trade war?; What legal, political, and economic factors contribute to the trade war?; and What ?off-ramps? exist to de-escalate the conflict? Although we will focus on legal developments relating to the trade war, we will also discuss diplomatic, economic, and political considerations driving economic conflict between the countries. This course will, therefore, examine a host of legal and policy issues.

LAW 6848. Appellate Advocacy. (; 2 cr. ; A-F only; Periodic Spring)
This experiential learning course will provide simulation experiences for all phases of appellate advocacy, from post-trial motions through cert. petitions. We will develop case studies based on trials that present numerous issues for appeal, then use these studies as the foundation for exploration of each step of the appellate process. Students will strategize appellate choices, learn the importance of issue preservation, become conversant with Federal Rules of Appellate Procedure, and apply their brief writing and oral advocacy skills. Experienced appellate advocates will work with the students and provide insight.

LAW 6850. Criminal Punishment. (; 3 cr. ; A-F only; Periodic Spring)
A graduate-level seminar in the law, policy, and empirical research relevant to criminal punishment. The seminar covers multiple jurisdictions, using interdisciplinary and comparative perspectives. Readings are extensive, plus a research and writing component. The content of the seminar will depend in part on each student's selection of a research topic. All students will serve as discussion leaders during the semester and will give presentations on their research in the final weeks.

LAW 6851. Practice-Ready Legal Research. (; 2 cr. ; A-F only; Every Fall & Spring)
Practice-Ready Legal Research is a simulation course in which students apply legal research methods and techniques to scenarios involving a hypothetical client. Over the semester, students learn legal research concepts, sources, and tools through a combination of lectures, in-class activities, and writing assignments.

LAW 6852. Pandemic: Overview and Exploration of Private Law Issues. (; 2 cr. ; A-F only; Periodic Fall)
The course initially provides an overview of the crisis, governmental responses (both internationally and the differing ones by various states in the United States), the economic crisis, and the current state of treatment protocols and potential vaccines. It then turns to its primary focus: the myriad of primarily private law legal issues resulting from the pandemic. Among the areas of the legal system and private law that the course will address are the following: (1) recent Federal legislation (the CARES Act) in response to the pandemic; (2) contractual and commercial law issues; (3) bankruptcy law; (4) securities law and financial markets regulation; (5) employment law issues, the gig economy, and ?working? from home; and (6) the future of legal practice and the practice of law in the law firm, corporate in-house, and governmental agency settings.

LAW 6853. Law, Biomedicine and Bioethics. (; 3 cr. ; A-F only; Periodic Fall)
This course is an immersion in the fascinating cross-disciplinary domain where law, biomedicine, and bioethics meet. We will examine the history of this field, key controversies that have driven that history, the range of applicable law (state, federal, and international), the evolution of modern bioethics and its interaction with law, and the articulation of policy (from commissions, NGOs, professional societies, and others). The course will consider competing accounts of the relationship of law, biomedicine, and bioethics, as well as controversy over current issues, including response to the COVID-19 pandemic. We will begin by considering the nature of bioethics and its relation to law. We will then examine the history of modern bioethics, starting with the Medical Trial at Nuremberg after World War II and progressing to development of research ethics. We will proceed to analyze the evolving role of law and bioethics in governing assisted reproduction, cloning and other emerging technologies including gene editing, genetics and genomics, organ transplantation and the determination of death, life-sustaining treatment and care of the dying, and physician-assisted suicide (sometimes called "physician-assisted death") and euthanasia. We will then focus on how bioethics and law are addressing crucial issues arising in the current pandemic. Finally, we will consider clinician responsibilities and vulnerabilities in the face of ethical and legal controversy.

LAW 6857. Corporate Tax. (; 3 cr. ; A-F only; Periodic Spring)
An introduction to Subchapter C of the Internal Revenue Code and the taxation of shareholders and corporations. The class will include an in-depth study of Section 351 and corporate formations; the capital structure of a corporation; nonliquidating distributions including dividends and Section 301; redemptions of corporate stock including Section 302; and both taxable and tax free acquisitions, including Section 368 reorganizations. The course will not address international transactions, but will attempt to emphasize real world, current corporate tax problems.

LAW 6858. Principles of Corporate Governance: The Role and Responsibilities of the Corporate Board. (; 2 cr. ; A-F only; Periodic Fall)
This course will provide students with the tools and understanding to better advise corporate and nonprofit board clients. This course will also help students in their roles as future corporate and nonprofit board members.

LAW 6859. Conflict Resolution. (; 2 cr. ; P-F only; Periodic Fall)
As lawyers, we spend untold hours reading case law - stories of individual and collective disputes over time. We learn the rule of law and how the law is applied to the facts of those stories and we use that analysis to guide our practices and coach our clients. We learn to look at statutes, codes, and regulations in order to analyze problems and make recommendations that guide behavior. We are in the business, then, of conflict resolution - yet we rarely take the time to lay a proper foundation for that work. Conflict work begins with the self: understanding one's own innate responses and preferences when dealing with conflict. Accordingly, this class begins with self-assessment and self-reflective exercises designed to improve awareness of our triggers, blind spots, and biases. The role of effective communication in conflict resolution will be central. The class will also examine the intersection between power and conflict, and the ways in which cultural and other specific identities may inform our experiences. Students in this course will improve their conflict competency - defined as the ability to identify and effectively respond to conflict - and will develop practical skills that correlate with better outcomes in personal and professional life. Class sessions will be a mixture of lecture, small group discussion, simulation and role plays, and self-reflective exercises.

LAW 6862. Sexual Orientation, Gender Identity, and Human Rights. (; 2 cr. ; A-F only; Periodic Spring)
Few areas of law have changed as quickly or as dramatically as those regulating the rights of members of the LGBTQ community. This is true in Minnesota, nationally, in foreign jurisdictions, and at the international level. These evolving debates span numerous areas of law, including criminal, asylum, family, employment, civil rights, and human rights. This course will critically review the history and broader context of these legal developments to ask: where should we go from here? Through the lens of paradigmatic cases and events, we will examine local, national, and international advocacy approaches to a wide range of human rights issues affecting

LGBTQ people: criminalization, violence, stigma, forced migration, marriage, family, housing, health, employment, and freedom of speech and association. The course will analyze how factors like race and class have shaped the LGBTQ rights movement in the US and beyond, with an emphasis on how laws and policies that appear neutral on their face can nevertheless have a disparate impact on members of the LGBTQ community. Students will study primary and scholarly sources, supplemented by narrative and other artistic material. Through focused interactions with guest speakers, students will have the opportunity to learn from practitioners working on litigation, advocacy, and mobilization in Minnesota, the US, and abroad. Coursework consists of independent research projects informed by students? interests. Students will finish the seminar with a better understanding of the relevant law and the choices and challenges faced by human rights advocates in a rapidly changing field.

LAW 6864. Law of Lobbying. (; 2 cr. ; A-F only; Periodic Spring)
This class is intended to provide students with an understanding of the legal regulations on federal and state lobbying, as well as provide them with practical experience with the profession of lobbying.

LAW 6866. Sex Discrimination. (; 2 cr. ; A-F only; Periodic Fall)
Sex discrimination/legal prohibitions. Modern/historical contexts. Women's legal status before/after rise of first organized women's rights movement. Rise of second women's movement/emergence of heightened constitutional scrutiny for sex-based distinctions.

LAW 6867. Practice-Ready International Legal Research. (; 2 cr. ; A-F only; Every Spring)
This course will expose students to primary and secondary sources of international & foreign law and research methodologies. It will prepare students to research and analyze international and foreign legal issues in a range of practice environments including: policy and advocacy work, arbitration practice, and litigation in international tribunals and in U.S. federal courts.

LAW 6868. Sentencing Advocacy. (; 2 cr. ; A-F only; Periodic Fall)
Sentencing advocacy has assumed the vanguard position of criminal defense. In what the Supreme Court has acknowledged has become an essentially administrative system of criminal justice, sentencing advocacy is now a critical - in some cases, the only - component in the criminal defense lawyer's arsenal, and the site of some of the most sophisticated developments in the litigation of criminal cases. Taking this understanding as its backdrop, this class explores the role of sentencing advocacy in state and federal sentencing systems, the factors that influence its quality, and the insights from social scientists that can critique and improve it. The class will introduce the students to several guest speakers (defense lawyers, prosecutors, judges, social scientists and mitigation specialists) who will put the role and quality of sentencing advocacy in perspective. Most significantly, students will learn themselves, through hands-on involvement in actual pending cases, how to strategize, research, and develop an effective sentencing petition. Thus, the class instructor will seek out cutting-edge/novel/interesting sentencing issues in the cases of court-appointed lawyers in state and federal cases (with the appointed lawyer's consent) for which students can draft the sentencing memoranda, research the sentencing guideline and mitigation issues, and develop the client's counter-narrative to the prosecutor's position. The students' work in this class will be subject to a strict confidentiality protocol to be developed in consultation with the Director of the Law Clinics. prereq: Law 6085 Criminal Procedure or Law 6229 Criminal Process: From Bail to Jail

LAW 6869. George Floyd?s Minneapolis: Past, Present, and Moving Forward. (; 1 cr. [max 2 cr.] ; P-F only; Periodic Fall)
This course will examine the May 25, 2020 killing of Minneapolis resident George Floyd and the unrest, uprising, and momentum for racial justice it has sparked. Students will hear from experts on topics, such as racial inequity in the criminal legal system, policing reform, housing segregation, economic inequality and concentrated poverty, and the school-to-prison-pipeline as they explore the historical, socio-political, geographic and legal contexts, and implications of George Floyd?s killing.

LAW 6871. Visual Advocacy. (; 1 cr. [max 2 cr.] ; A-F only; Periodic Fall)
Lawyers are, above all, communicators. In your legal career, you will advocate for your clients by communicating with long, type-written documents like legal briefs and memoranda. Plan on it. But communicators need more than written words-now more than ever. The world in which you will practice communicates in a manner foreign to most lawyers, using a wide array of sensory tools geared to persuade, clarify, entertain, and enthrall. This course is designed to train you to use what may be the most important non-written tool a communicator can possess: the doctrine of visual design. In this course, we will review: -the principles of visual design, -the fundamental skills of graphic design, -the design cycle process, and -the application of these principles to the legal practice. This course will cover specific strategies for visualizing legal arguments and concepts, including the creation of case organization tools, argumentative graphics, and trial demonstratives. Class assignments will entail drafting and revising the types of documents that you might be asked to create in practice. We will also explore the theory and impact of visual advocacy by questioning judges and first-chair lawyers on the most valuable and persuasive use of visual design. We expect you will learn that visual advocacy is not about making boring things look pretty. Rather, it provides a process for enhancing legal communication by improving comprehension and engagement.

LAW 6872. Immigration Law. (; 3 cr. ; A-F only; Every Spring)
This course deals with the history of immigration to the United States, the role of the federal government in regulating immigration, visas for non-immigrants and immigrants, procedures and grounds for removal, asylum refugee status, citizenship, discrimination against aliens, the intersection between criminal law and immigration law, and ethical issues facing immigration lawyers. The course includes in-class lawyering skill exercises such as client interviewing and counseling, participating in an immigration court hearing, and legislative advocacy on immigration reform measures. These exercises are designed to train students in the skills necessary to become successful immigration lawyers.

LAW 6873. Nonprofit Law. (; 2 cr. ; A-F only; Periodic Spring)
This seminar covers the legal requirements and policy implications for nonprofit organizations. Course topics include state law issues related to the formation of nonprofit organizations, nonprofit governance models, director fiduciary responsibilities, liability concerns for directors and volunteers, dissolution, state attorney general oversight, and regulation of fundraising. We will also study federal tax law governing nonprofit organizations, including tax exempt status, classification of charities as private foundations or public charities, deductibility of contributions, challenges and opportunities for charitable organizations to partner with for profit entities and otherwise engage in commercial activities, limits on compensation for executives, and the ability of nonprofit organizations to engage in advocacy. Students will consider ?best practices? for operation and governance of nonprofit organizations and ways to demonstrate accountability to donors and other stakeholders. Prerequisite or Corequisite: Law 6012/6072 Corporations or Law 6051 BA/Corps or Law 6100 Tax I

LAW 6874. Politics of Legal Policy. (; 2 cr. ; A-F only; Periodic Fall)
This seminar has three goals. First, and most important, the seminar allows students to write a research paper on a subject of their choice. Second, the seminar aims to introduce students to selected tools used for policy analysis such as cost-benefit analysis. Third, the seminar introduces students to selected issues concerning education. As to the paper, students may pick any topic which provides them with professionally relevant intellectual capital that they wish to acquire. The topic must be sufficiently narrow that they can make an intellectual contribution to the subject they present. A broad subject which might require a book-length treatment for the author to make a contribution would not be appropriate. During the last third of the semester, each student will present their research topic to the class. Most often the presentation is of a draft, not a final version, of their papers.

LAW 6876. Digital Evidence. (; 2 cr. ; A-F only; Every Spring)
This seminar will cover the fast growing area of digital evidence and the legal issues that arise

when digital evidence is investigated and used in criminal law and civil practice.

LAW 6879. Poverty and Human Rights. (; 2 cr. ; A-F only; Periodic Fall)
This course focuses on how the international human rights legal framework addresses the symptoms and causes of systemic poverty with an emphasis on the practical application of those norms to real-life situations. We will explore what a rights-based approach to poverty eradication means for governments and other development actors and learn how communities and advocates are leveraging human rights law to combat poverty in a variety of contexts. The class will consider a wide range of topics spanning domestic and global poverty; urban and rural contexts; the gendered dimensions of poverty; environmental justice; privatization of public services; threats to the rights to food, water, education, and housing; collective rights of indigenous peoples and peasants; the situation of human rights defenders; and reparations. Students will study primary documents and interact with practitioners working in the U.S. and abroad on litigation, policy advocacy, mobilization, and governance. The coursework consists of simulated advocacy and advisory reports. Students will finish the seminar equipped to bring a working knowledge of the international human rights system to their future roles.

LAW 6880. Campaign Finance and Election Law. (; 2 cr. ; A-F only; Periodic Fall & Spring)
This course will provide students with an in-depth review of federal and state campaign finance and election law. We will begin with a review of the Supreme Court decisions that have shaped the current status of federal election law, most notably Buckley v. Valeo. We will review other notable cases like McConnell, Austin, and Wisconsin Right to Life and will conclude with Citizens United. Also, the federal component will include an overview of the Federal Election Campaign Act and a review of the powers of the Federal Election Commission and a review of some of its notable advisory opinions. Additionally, a second portion of the class will be devoted to a review of Minnesota Statute Chapters 10A and 200-212, the corpus of Minnesota campaign finance and election law. We will review decisions by the Minnesota Campaign Finance Board and review decisions by the Minnesota Supreme Court, as well as those of the Minnesota Federal District Court interpreting Minnesota election law.

LAW 6881. Comparative Laws. (; 2 cr. ; A-F only; Periodic Fall)
The aim of this course is to introduce you to the largest legal system in the world, namely the Civil Law System, which is used by most countries where Common Law doesn?t apply. We will study the basics of Contracts and Torts in the two leading countries, through the French Code Civil (CC) and the German one (BGB). We will make a short introduction to civil procedure, in order to allow you to work on Court decisions in both systems and, by the same time, we will analyze, and discuss, as usual, some Court?s decisions (in English) to familiarize you with them. Lectures, in the book, will give you an overview of the subject of each class, and the courts? decisions will allow us to understand how judges make decisions in the two systems, by comparison to Anglo-American Common Law. The goals are to make you comfortable with the main aspects of contracts and torts laws as well as with Court decisions, their reasoning, how judges justify decisions on given articles of the code and not others.

LAW 6885. Advanced Environmental Law. (; 2 cr. ; A-F only; Every Spring)
This seminar will examine current environmental issues through class discussion led by leading public, private, and nonprofit environmental lawyers. Students will prepare two 2,500 word papers during the semester relating to seminar topics. There is no exam. The course will provide students with in depth knowledge of current environmental issues and also introduce them to life and practice as an environmental lawyer.

LAW 6886. International Human Rights Law. (; 3 cr. ; A-F only; Every Fall)
Role of lawyers using procedures of the United Nations, Organization of American States, State Department, Congress, U.S. Courts, and nongovernmental organizations to address international human rights problems. Is there a law of international human rights? How is that law made, changed, and invoked? Problem method used.

LAW 6887. Law of International Organizations. (; 2 cr. ; A-F only; Periodic Spring)
This course will examine the principal issues regarding organizations whose membership is that of states. This examination will scrutinize the legal personality and powers of such institutions; the manner in which the states parties as members participate; enforce decisions through mechanisms; dispute settlement; peace and security undertakings.

LAW 6888. Creative Legal Reasoning. (; 1 cr. ; P-F only; Periodic Spring)
This is a discussion based seminar in which the students decide from the facts of actual cases what the law should be. They use logic, instinct, experience, common sense, and all other mental and emotional processes that are the substance of the law and very much involved in its making. The only forbidden ingredient in the discussions is known or suspected law.

LAW 6889. Laws of War. (; 3 cr. ; A-F only; Every Spring)
This course focuses on two interrelated bodies of law: rules pertaining to the use of force in international law (known as the jus ad bellum) and rules regulating the conduct of hostilities under the laws of international and non-international armed conflict (known as international humanitarian law, the laws of armed conflict, or the jus in bello). The course will cover such issues as the ?Just War? theory, its history and its relevance in the modern world; the general prohibition on the use of force under Article 2(4) of the UN Charter; use of force by the UN: collective security and law enforcement actions; individual and collective self-defense; humanitarian intervention; and nuclear weapons in international law. The course will also consider regulation of the means and methods of warfare focusing on the Geneva and Hague laws: the four Geneva conventions protecting the wounded, sick, and shipwrecked, prisoners of war, and civilians; the means and methods of war, including lawful and unlawful weapons and targets; the law of internal armed conflicts; and asymmetric warfare.

LAW 6890. Rule by Law in China: An Advanced Seminar. (; 2 cr. ; A-F only; Periodic Fall)
This course will take a comparative law approach in discussing the development of legal discourse, and the ever increasing influence of Western jurisprudence, in modern and contemporary China. We will discuss at length the formation of ?Rule by Law? as a ?grand narrative? in its historical context, the controversy around different interpretations of ?Human Rights,? and the burgeoning civil rights movements in the Mainland.

LAW 6896. Law and Artificial Intelligence. (; 2 cr. ; A-F only; Periodic Fall & Spring)
Increasingly the world, and even the law, is being run by self-learning algorithms, autonomous robots, and other technologies that have replaced tasks historically performed by human beings. Brain-machine interface is also on the rise, creating real-life cyborgs. This seminar will explore the many legal implications of this rise in algorithms, artificial intelligence (AI), robots, and brain-machine interface. Through assigned readings, weekly discussion, and engagement with local experts in AI, robotics, and neural engineering, students will explore the many promises and perils of AI. The course will include modules on: how AI is transforming legal practice in areas such as e-discovery; labor market impact of AI; the possibility of non-human adjudication of cases; use of AI to understand legal language; whether robots should have rights; legal and ethical dimensions of brain-machine interface; transhumanism; regulation of self-driving cars and drones; governance of autonomous weapons systems; and how law should address the rise of predictive analytics in determining liability.

LAW 6897. Game Theory. (; 2 cr. ; A-F only; Periodic Fall & Spring)
Game theory, the analysis of the logic of strategic behavior within interpersonal interactions, offers useful insights into how legal rules affect the way people behave. This seminar introduces what constitutes a game, payoffs, and basic solution concepts, such as the Nash Equilibrium. The seminar focuses on how various models, particularly the prisoner?s dilemma, coordination games, and ?chicken,? can be used to study problems that arise in an array of legal fields, including but not limited to tort, contract, antitrust, bankruptcy, and environmental law.

LAW 6898. International Bankruptcy. (; 2 cr. ; A-F only; Periodic Fall)
Today?s bankruptcy practice seldom centers around one debtor filing one case in a United

States bankruptcy court. Most corporations of any size have operations and assets in more than one country. In addition, many troubled corporations are part of a ?corporate group? that includes affiliated entities operating in numerous countries, many of which will file their own insolvency proceedings in their countries of incorporation. The most obvious example of this trend is the Lehman Brothers group of companies: approximately 80 Lehman affiliates commenced insolvency proceedings in 16 countries. International Bankruptcy is a course designed to deal with this world of multi-jurisdictional insolvency. The course consists of two modules, Comparative Insolvency Law and Managing Cross-Border Cases. The first module covers six class sessions. After an introductory session explaining the role of insolvency law in national economies and setting out the framework for comparative insolvency law, we will survey the insolvency laws of Canada, Brazil and Mexico, Japan and China, England and Western Europe. Common topics include prerequisites that must be satisfied before an insolvency case can be filed, whether an automatic stay of collection and other proceedings exists, how the case is administered (judicial, administrative or other), and whether the system is focused on liquidation or permits reorganization. We will then turn to ?Managing Cross-Border Cases.? We will devote two sessions to the European Union?s insolvency regulation that co-ordinates insolvency proceedings pending in EU nations. Four sessions will analyze chapter 15 of the U.S. Bankruptcy Code. Chapter 15 facilitates cooperation among courts in countries in which related insolvency proceedings are pending. Our final session will focus on the use of chapter 11 by foreign entities.

LAW 6901. Energy and Utility Law. (; 2 cr. ; A-F only; Periodic Spring)
Public utilities are providers of electricity, natural gas, water and telecommunications; essential services and foundations of our economy. Over many decades a complex, nuanced and often bulky set of laws and regulations have developed, iterated, and evolved that apply just to public utilities, especially those providing energy services. Using a combination of lecture, experienced guest speakers, legal writing, student presentations, and group discussion, this course will expose students to this unique area of law, regulation and policies as well as the associated decision-making processes.

LAW 6902. Cannabis Law and Policy: Past, Present, and Future. (; 2 cr. ; A-F only; Periodic Fall & Spring)
For good or bad, cannabis is ever present in American life. This course explores the gradual legalization of cannabis in the United States juxtaposing it in part against Prohibition, considers policy rationales ranging from revenue for state coffers to emerging views relating to criminalization and punishment, and then analyzes in detail the myriad of existing and emerging legal areas that are impacted by the state legalization of a substance that remains illegal under Federal law. Among the areas of the public and private law that the course will address are the following: (1) state regulation of medical and recreational cannabis use; (2) criminal law; (3) contractual and commercial law issues for cannabis companies; (4) bankruptcy and assignment for benefit of creditors? (?ABC?) law; (5) securities law and financial markets regulation; (6) employment law issues; and (7) the future of cannabis law in dual state and Federal settings.

LAW 6905. Military Law and Advocacy. (; 2 cr. ; A-F only; Periodic Spring)
Gain practical knowledge in advocacy, argument and legal writing for civil law practice through application of federal law and regulation to selected military based client scenarios. Topics include Servicemembers Civil Relief Act (SCRA) protections, board of military corrections appeals, military line of duty determinations and appeals, special victims counsel program and client advocacy role. The course is highly practical and will include a number of drafting assignments. Military experience is not required to take this course.

LAW 6906. Public Law Workshop. (; 2 cr. ; A-F only; Periodic Fall & Spring)
This seminar will bring nationally recognized scholars to Minnesota to present their current work on public law topics, such as constitutional law, administrative law, antidiscrimination law, criminal law, environmental law, and family law. The seminar is designed to introduce students to the world of legal scholarship and the nature of scholarly exchange, and to expose students to cutting edge topics of legal debate. Workshop sessions will be devoted to the presentation and discussion of works-in-progress from outside speakers. In preparing for five of the class sessions, students will be expected to write short, critical papers examining the work to be presented. Grades will be based on these papers and on students' participation during the workshop sessions.

LAW 6907. Congress, the President, and the Constitution. (; 2 cr. ; A-F only; Periodic Fall)
Congress and the President are constitutional collaborators and rivals in governance. This seminar examines the scope of their respective powers under Articles I and II of the Constitution, concentrating on the various clauses that define the powers of each branch and how they differ, occasionally overlap, and check one another. Topics include the scope of congressional commerce, appropriations, delegation, investigatory power and the powers of the president as the chief executive. Commander-in-chief, and to ensure that the laws are faithfully executed.

LAW 6909. Abolition and the Carceral State. (; 3 cr. ; A-F only; Periodic Fall)
Using the lens of abolitionist thought, this course will explore the past, present, and future of the carceral state. It will place the present-day movements to abolish police and prisons in historical perspective and explore the ways history has been used by activists in pursuit of racial justice and social equality. The work of the course will include archival research and students will have the opportunity to engage with scholars, advocates, and community organizations as they formulate and carry out their projects.

LAW 6911. International Commercial Arbitration. (2 cr. ; A-F only; Periodic Fall)
International commercial arbitration is an increasingly important and common means of resolving disputes arising from contracts between citizens or companies from different countries. This course introduces students to the history, philosophy, advantages, process, and ethics of international commercial arbitration, with an emphasis on real cases and practical applications. The course covers differences between international arbitration and domestic arbitration/litigation, national arbitration statutes, agreements to arbitrate, arbitral jurisdiction, procedural rules, discovery/disclosure, hearings, evidence, arbitral awards, enforcement of awards, and ethical issues arising for both arbitrators and advocates in international commerical arbitration.

LAW 6912. Law Firm Practice and Management. (2 cr. ; A-F only; Periodic Fall)
The practice of law is a business as well as a profession. This seminar course provides an introduction to some of the important and developing issues in the business of practicing law, whether as a solo practitioner or in a larger law firm. The topics of study will include developing and retaining clients, finances and financial controls, trends in the legal profession, conflicts of interest and ethical compliance, case handling and administration, insurance and risk management, hiring and supervision of employees, business formation, and law firm governance. Prominent lawyers and law firm managers will serve as guest lecturers and panelists in presenting certain topics.

LAW 6915. Race and the Law: Systems, Structures, and Solutions. (2 cr. ; A-F only; Periodic Fall)
This course will examine the history of whiteness and legal racism through the lens of land, education, and criminal justice. The course is structured to examine the connections between traditional legal topics (land, education, crime) using case law, theory, and practical application. Students will create a final project that highlights a community harm, proposes practical solutions, and will present their research to members of applicable community organizations.

LAW 6916. Biblical Law and Jewish Ethics. (; 3 cr. ; A-F only; Periodic Fall & Spring)
This course introduces students to the original meaning and significance of religious law and ethics within Judaism. Law is the single most important part of Jewish history and identity. At the same time, law is also the least understood part of Judaism and has often been the source of criticism and hatred. We shall therefore confront one of the most important parts of Jewish civilization and seek to understand it on its own terms. In demonstrating how law becomes a fundamental religious and ethical ideal, the course will focus on the biblical and Rabbinic periods but spans the entire history of Judaism. Consistent with the First Amendment, the approach taken is secular. There are no prerequisites: the course is open to all qualified students. The course begins with ideas of

law in ancient Babylon and then studies the ongoing history of those ideas. The biblical idea that a covenant binds Israel to God, along with its implications for human worth - including the view of woman as person - will be examined. Comparative cultural issues include the reinterpretations of covenant within Christianity and Islam. The course investigates the rabbinic concept of oral law, the use of law to maintain the civil and religious stability of the Jewish people, and the kabbalistic transformation of law. The course concludes with contemporary Jewish thinkers who return to the Bible while seeking to establish a modern system of universal ethics. The course investigates the historical origins of the premise of the American founding: the idea that "all men [humans] are created equal." How does it become "self-evident" that every human is or should be a legal person, with rights that should properly be inviolable? The course employs the method of academic religious studies to teach the immense cultural contributions of antiquity to illuminate and help address contemporary cultural problems. The course also investigates the origins of constitutional thought in antiquity and provides comparative evidence to shed new light on current debates about the relation of the Supreme Court (as interpreters) to the normative text of the American Constitution. The premise of the course is the discipline of academic religious studies. The assumptions of the course are therefore academic and secular, as required by the First Amendment. All texts and all religious traditions will be examined analytically and critically. Students are expected to understand and master this approach, which includes questioning conventional cultural assumptions about the composition and authorship of the Bible. Willingness to ask such questions and openness to new ways of thinking are essential to success in the course.

LAW 6918. Rule of Law. (2 cr. ; A-F only; Periodic Spring)
This seminar will examine the concepts and core principles of the Rule of Law. Seminar sessions will be devoted to identifying the meaning of the terms ?rule of law? and ?independence of the judiciary.? The importance of a strong and independent legal profession to the rule of law will be discussed. Seminar sessions will focus on such issues as the problem of corruption and the rule of law, the relationship between human rights law and the rule of law, and the challenges of war crimes and genocide. The seminar will explore the relationship between the rule of law and economic development and alleviation of poverty. The seminar will include a discussion of the responsibility of lawyers to support and promote the rule of law within their own country and in other developing countries.

LAW 6921. Refugee and Asylum Law. (; 2 cr. ; A-F only; Periodic Spring)
This course will introduce and explore the main concepts, laws, institutions and policies that form the international regime for the protection of refugees. In 2014 the United Nations High Commissioner for Refugees (UNHCR) estimated that there were 51.2 million forcibly displaced persons, including 16.7 million refugees and 33.3 million internally displaced persons (IDPs), a significant increase from 2013. The refugee crisis in Europe, which began in mid-2015 and continues unabated in 2016, has only increased those numbers. Human displacement continues to be one of the most important and intractable human rights issues facing the international community. The course objectives are to: - examine the assumptions, origins and evolution of refugee law and the refugee regime; - understand who is protected from serious harm by international, regional and domestic law; - explore the rights afforded refugees and other categories of forced migrants; -investigate various legal and policy impediments to asylum-seeking; -assess the scope, limits and potential of international co-operation regarding refugees. Overall, the course will examine the relationship between refugee law, international human rights law and domestic law, and will provide students with an understanding of how this relationship affects state obligations toward refugees, asylum-seekers and internally displaced persons. prereq: recommended Law 6011/6071 International Law and Law 6886 Intl Human Rights Law

LAW 6922. Business Law Concentration. (; 1 cr. ; P-F only; Every Fall)
This seminar is intended as an introduction and overview for students interested in completing the Business Law Concentration; students in the concentration are encouraged to take the seminar. The course will explore the careers, social roles, and professional obligations of business lawyers in a variety of specialties through readings and in panel sessions with practitioners as well as adjunct and full-time faculty at the Law School. Students will also choose and meet with a mentor selected from a group of local business lawyers. Students will review the Law School?s business law curriculum, both providing feedback on the courses available and receiving guidance that will help them shape their own trajectory within the concentration.

LAW 6923. Federal Reserve System - Legal and Policy Perspectives. (; 2 cr. ; A-F only; Periodic Fall)
The purpose of this two-credit course is to provide an enhanced understanding of the Federal Reserve System and its key roles as the U.S. Central Bank. The course will cover legal underpinnings of the Fed?s core responsibilities in monetary policy, supervision and regulation, financial services, and financial stability. The course focus will include detailed review and understanding of the Federal Reserve Act, the Dodd-Frank Act and other key legislation, Fed actions in response to the 2008 Crisis and the 2020 Pandemic, along with contemporary policy and legal perspectives on the Fed's mission areas that affect the United States economy, payments systems, and supervision of financial institutions. Students will understand the nature and extent of Federal Reserve System authority, both as originally conceived and as this authority evolved through the 109 years of the Federal Reserve's existence.

LAW 6925. Patent Law In Practice. (; 1 cr. ; S-N only; Every Spring)
The field of patents extends across the boundaries of business, technology, innovation, and law. In this course, students will be introduced to a broad range of patent related topics presented by leading practitioners working at the intersection of law and technology. The course is designed to provide an overview of patent law topics, for example: Patents Now and the Future; Strategic Patents; Patent Analytics; Patent Firm Business Model; Patent Agent/Attorney Roles; Global Patent Procurement; Inventors and Inventions; Claiming Inventions; Patentable Subject Matter; Patent Litigation; Patents Appeals and Trials. Leading practitioners lead a discussion for each of these topics. Subject matter experts may include corporate and law firm lawyers, patent agents, intellectual asset managers, consultants, tech transfer officers, and business owners.

LAW 6926. Intellectual Property In Practice. (; 1 cr. ; S-N only; Every Fall)
The field of intellectual property extends across the boundaries of business, technology, innovation, and law. In this course, students will be introduced to a broad range of IP related topics presented by leading practitioners working at the intersection of law and technology. Topics may include trade secrets, copyrights, trademarks, patents, IP transactions, IP litigation, emerging technologies, intellectual asset management, IP valuation, and commercialization. Lecturers may include corporate general counsels, firm lawyers, transactional lawyers, litigators, consultants, tech transfer officers, R&D Leaders, and CTO.

LAW 6927. Comparative Corporate Governance and Financial Regulation. (; 2 cr. ; A-F only; Periodic Spring)
This course explores the public and private character of regulatory governance--how regulatory instruments and functions differ across distinct jurisdictions--and, in particular, divergences and convergences across Ireland, Europe and America. Co-located at the law schools in UCD and at the University of Minnesota, this module draws on faculty at both institutions, representatives from regulatory agencies, and practitioners, to provide a thematic analysis of the contemporary regulatory challenges in the fields of financial regulation and corporate governance.

LAW 6928. Cooperative Lawyering and Problem Solving Courts: Lawyers as Peacemakers. (; 2 cr. ; P-F only; Periodic Spring)
This is a non-traditional seminar for students who are interested in exploring a manner of practicing law broader than the win/lose paradigm of the adversary system. This seminar will explore peacemaking opportunities for lawyers at several levels: - Practicing lawyers engaged in different varieties of cooperative lawyering will make guest presentations. - Effective peacemaking requires personal awareness and self-

control, and so the course will introduce students to mindfulness, a fundamental tool for peace of mind, as well as basic skills in peaceful communication. - We will examine the recent developments in neuroscience and evolutionary psychology that help explain the dynamics of human conflict. - Finally, we will look at how the lessons about peacemaking apply to political and religious conflict. As a case study in political conflict, we will choose a hotly contested current event. The class requires an open mind and a willingness to share personal thoughts and experiences.

LAW 6949. Biotechnology & Patent Law. (; 2 cr. ; A-F only; Periodic Spring)
This course emphasizes patent law principles and doctrines as applied to biotechnology, including pharmaceutical, patents. Although there will be some coverage of United States Patent and Trademark Office policies as well as biotechnology patent principles in non-U.S. jurisdictions, the focus will be on U.S. Federal Circuit and Supreme Court case law developments. Topics include patent eligibility of biotechnological inventions including diagnostics and ?natural? products such as genes, claim strategies, written description, enablement, utility, best mode including requirements for biological deposits, inventorship, inherent anticipation, obviousness, infringement, and the intersection of patent and FDA regimes for small molecules and biologics.

LAW 6953. Race and American Law. (; 2 cr. ; A-F only; Periodic Spring)
This seminar addresses the racial and legal history of major racial groups in the U.S., including African Americans, Native Americans, Asian Americans, Latinos, and Whites. In addition to these histories, the seminar includes the following topics: competing definitions of race and racism; the legal system's contribution to the construction of race; race, voting, and participation in democracy; developing notions of equality; segregation and education; race, marriage, and family; race and crime; and responses to racism.

LAW 6959. Coding for Lawyers. (; 1 cr. ; P-F only; Periodic Spring)
In this digital driven world, more legal professionals are migrating to a combination of law and coding as dual set of skills are becoming increasingly valuable and programming expertise is certainly providing a competitive advantage when it comes to advising legal tech companies. Lawyers need an understanding of the possibilities and limitations of coding, how to implement it, and how long it would take to develop certain solutions. This seminar will provide that foundation. It aims to equip prospective legal professionals with the tools to understand the basic concepts of coding relating to technologies and applications that are changing the legal profession. This will enable them to become familiar with the design and operation of legal technologies. Given that information is increasingly being stored electronically, coding is of value because it assists with searching, organising, filtering and presenting information. This is of particular use for the purposes of discovery in litigation. In addition, data analytics and artificial intelligence use algorithms which facilitate research and review activities, conducting these tasks in ways that are cheaper and faster than human lawyers. Since these techniques are code-based, lawyers will draw value in the medium to long term from understanding these skills and systems. This seminar provides: an introduction to legal tech in the digital age; an overview of lawyers as project managers; an overview of artificial intelligence and its impact on legal tech; an introduction to programming in Python, machine learning and natural language processing techniques as part of legal tech solutions; and insights into the latest trends in legal tech. Students will not be expected to be fluent coders by the end of the course, but to have an appreciation and understanding of the capabilities of coding.

LAW 6960. Judicial Writing. (; 3 cr. ; A-F only; Every Spring)
This course focuses on developing the writing abilities and practical knowledge of prospective judicial law clerks. The class will center around six writing assignments, which will include a bench memo, jury instructions, trial court order, and several appellate opinions. Only one writing assignment will require a work product exceeding 7 double-spaced pages. Most of the reading for the class will consist of materials relating to these six writing assignments, including attorneys? briefing, relevant portions of the record, key precedents, and samples of past materials. Class will also provide students with practical information about how to be an effective law clerk, drawing heavily on guest talks from local federal and state judges and law clerks. Topics will include how to rely on the case record, the importance of understanding local procedural rules, and the centrality of the standard of review.

LAW 6999. Transfer. (; 1-50 cr. [max 100 cr.] ; P-F only; Every Fall, Spring & Summer)
Credits received from another law school.

LAW 7003. Legal Research & Writing Instructor. (2 cr. [max 4 cr.] ; P-F only; Every Fall)
Student Legal Research and Writing Instructors for legal writing students. Students are invited to apply to teach in the first-year Legal Research and Writing course each spring for the following academic year.

LAW 7004. Structured Study Group Instructors. (2 cr. [max 8 cr.] ; S-N only; Every Fall & Spring)
Instructors are assigned to work with single first-year class.

LAW 7005. Senior Legal Research & Writing Instructor. (; 2 cr. [max 4 cr.] ; A-F only; Every Fall)
This course is limited to students who have already completed one year (or one semester, in a one-semester course) of teaching, and who return to teach for a second year (or semester). No application is necessary, returning students should make arrangements directly with the Director of Legal Writing.

LAW 7006. ABA Negotiation Competition Team. (; 1-2 cr. ; P-F only; Every Fall)
ABA Negotiation team participants receive credit for participation in regional competition and one more credit if they advance to national competition.

LAW 7007. Law in Practice Student Instructor. (; 1-2 cr. [max 8 cr.] ; P-F only; Every Fall & Spring)
Students enrolled in this course will serve as student instructors in the Law in Practice (LiP) Program. In the fall semester, student instructors will work with the directors of LiP to develop and refine the content of the course and the course materials that will be used in the spring. In the spring semester, student instructors will be assigned to one of the LiP law firm sections and will work alongside and under the direction of the faculty member overseeing that section. The duties of the student instructors will include (1) serving as mentors/liaisons 1L students, including answering their questions and assisting with their preparation for simulations; (2) assisting adjunct professors with classroom instruction; (3) assisting law firm faculty in evaluating and providing feedback on written assignments; (4) conducting legal research to improve and refine simulated case files; (5) working with faculty to develop remote alternatives to in-person simulations; (6) observing and suggesting improvements and refinements to lawyering skills simulations; (7) drafting and revising materials and meeting with standardized clients to help prepare them for their participation in simulations; and (8) providing administrative support including local grade tracking, processing written assignments, coordinating with adjunct faculty, mediators and judges on simulation scheduling and logistics, and course material management.

LAW 7008. CL: Insurance Law. (3 cr. [max 6 cr.] ; A-F only; Every Fall)
The Insurance Law Clinic offers students an excellent opportunity to learn litigation skills and insurance basics while effectively and confidently representing individuals during all stages of an insurance claim and/or dispute with an insurer. Work includes investigating, preparing and tendering an insurance claim, writing demand letters to insurers, drafting litigation pleadings, including complaints, discovery documents, motions, briefs, settlement agreements and other court documents, dealing with clients and opposing counsel, and courtroom litigation and ADR. The clinic?s coverage cases deal with many types of insurance, including: auto liability, homeowner?s property, health and disability, life, and commercial general liability (CGL). Through classroom instruction and case supervision, students learn the basic concepts and legal principles involved in property and liability insurance, and they will gain experience in a broad range of practice skills, such as negotiation, legal writing, case investigation, mediation, client counseling, and state court practice.

LAW 7009. CL: Insurance Law Directors. (2-3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)

Students work with Insurance Law Clinic

LAW 7010. CL: Innocence. (3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
Students work side-by-side with staff attorneys from the Innocence Project of Minnesota (IPMN) as they investigate and litigate inmates' claims of actual innocence. These investigations go to the heart of current issues in the criminal justice system, such as the reliability of eyewitness identification, the problem of false confessions, the use of snitches and informants, government misconduct, ineffective assistance of counsel, and forensic sciences including DNA testing. Class time is devoted to training and case work. Students are assigned cases and expected to gather source materials such as police reports and transcripts. They will organize and summarize those materials. After educating themselves about their cases, students will design and implement an investigative plan with their supervisor and pursue that investigation. This may include locating evidence, experts and witnesses. If proof of innocence is developed they may draft post- conviction motions. Interested students may also participate in policy work. This clinic puts students on the cutting edge of scientific and social science issues that affect the practice of law in the criminal justice system as well as hands-on experience in managing and analyzing large-scale cases for litigation.

LAW 7011. CL: Innocence Project Director. (3 cr. [max 6 cr.] ; A-F or Audit; Every Fall)
Student director for Innocence Clinic.

LAW 7012. CL: Environmental and Energy Law. (; 3 cr. [max 6 cr.] ; A-F only; Every Fall)
The Environmental Law Clinic is a client-driven course based on representation of nongovernmental organizations. This Clinic will improve your skills in analyzing problems in environmental law and policy, and allow you to work directly with advocates on environmental issues. Our clients are typically nonprofits or other nongovernmental entities seeking legal advice on advocacy in the legislative or regulatory arenas related to a wide range of environmental issues, including clean water, renewable energy, utilities law and concentrated animal feeding operations. This year-long Clinic engages in projects related to achieving environmental and energy sustainability through the management of land, water and energy resources. Projects often include the following: (1) providing advice to local NGOs; (2) representation of NGOs before an administrative state body; (3) production of legal research reports; (4) support organizations participating in regulatory decision- making processes, such as the Public Utilities Commission; and (5) education or advocacy presentations to citizens and elected or appointed decision-makers. Client management skills and legal research methods are honed throughout the year-long projects.

LAW 7013. CL: Environmental and Energy Law Directors. (2-3 cr. [max 6 cr.] ; A-F only; Periodic Fall)
Directors for Environmental and Energy Law Clinic.

LAW 7015. CL: Employment Law. (3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
The Employment Law Clinic provides student attorneys with a unique look at both sides of the employment relationship through litigation representation of individual employees and transactional counseling of nonprofit employers. Student attorneys are introduced to the employee's perspective through litigating unemployment insurance (UI) appeals. These appeals require full representation, including client interviewing, counseling, preparation and execution of direct and cross examination, as well as closing statements. Student attorneys interface with the DEED website on behalf of the client, represent the client in the telephonic appeal hearing, and manage every aspect of the lawyer/client relationship with the assistance of a supervising attorney well-versed in the management of these cases. Recommended course: Law 6632 Employment Law

LAW 7016. CL: Employment Law Directors. (; 2 cr. [max 4 cr.] ; A-F only; Periodic Fall & Spring)
Student directors with Employment Law Clinic and their cases.

LAW 7018. Intercollegiate Trial Team. (; 2 cr. [max 4 cr.] ; A-F only; Every Spring)
Students compete in trial teams. prereq: Trial practice

LAW 7025. NAAC/ABA Competition Team. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall & Spring)
The ABA/NAAC competition team is composed of four to six 3Ls, chosen from the participants in the Civil Rights/Civil Liberties Moot Court, based on performance in the Maynard Pirsig Honors Tournament. The ABA/NAAC holds regional competitions across the country. Prereqs: JD Student and Law 6002

LAW 7026. NAAC/ABA Competition Director. (; 1-2 cr. [max 4 cr.] ; A-F only; Every Fall & Spring)
Director for NAAC/ABA moot court competition. prereq: dept consent

LAW 7027. ABA Moot Court Competition Managing Director. (; 1-2 cr. [max 3 cr.] ; A-F only; Every Fall & Spring)
Managing director for ABA moot court. prereq: dept consent

LAW 7028. Thurgood Marshall Competition Team. (1 cr. [max 2 cr.] ; A-F only; Every Fall)
The Thurgood Marshall Moot Court is composed of 2Ls and 3Ls. The selection process is similar to the ABA/NAAC competition team. The Thurgood Marshall Moot Court is unique in that every round takes place in a courtroom in Washington D.C., and it coincides with the midyear meeting of the Federal Bar Association.

LAW 7030. CL: Consumer Protection. (; 3-4 cr. [max 8 cr.] ; A-F only; Every Fall & Spring)
The Consumer Protection Clinic represents individuals who are victims of marketplace fraud or who have disputes regarding consumer credit, debt collection, motor vehicle fraud, predatory lending or similar matters. The Clinic also assists legislators, regulators, and advocacy groups in policy matters, such as drafting consumer protection legislation. The Clinic participates in impact legislation by initiating and acting as co-counsel in class action or related matters.

LAW 7031. CL: Consumer Protection Directors. (3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
Student instructors for consumer protection clinic.

LAW 7035. Environmental Law Moot Court. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall)
The Environmental Moot Court program introduces students to the art of appellate advocacy by focusing on current issues in environmental law. Students research two areas of environmental law. prereq: JD Student

LAW 7036. Environmental Law Moot Court Director. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall & Spring)
Environmental law moot court student director. Student Directors help adjunct professors teach the Environmental Moot Court course. Student Directors help teach class sessions, provide written feedback on written student work, and provide feedback and training on oral arguments. prereq: dept consent

LAW 7038. Environmental Law Moot Court Managing Director. (; 1-2 cr. [max 3 cr.] ; A-F only; Every Fall & Spring)
Environmental law moot court managing director. prereq: dept consent

LAW 7040. CL: Community Mediation. (3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
The Community Mediation Clinic offers 2Ls and 3Ls the opportunity to learn from mediation practitioners and participate as civil mediators in community and court cases, to serve as facilitators in restorative justice conferences and to create and present trainings in community conflict resolution education programs. The U is one of only a handful of the nation's top law schools presently offering this type of clinical program. Conflict Resolution Center (CRC), one of Minnesota's oldest non-profit mediation organizations, offers a comprehensive mediation clinic. Students who successfully complete the Fall course will be eligible for the Minnesota Rule 114 Roster of Qualified Neutrals and enroll in the Spring clinic. This course features classroom instruction and interactive exercises. It emphasizes the facilitative model of mediation while providing a survey of other mediation styles and models. Topics covered include: conflict theory, styles of conflict resolution, statutes and rules governing mediation, ethical considerations, cultural considerations in mediation and the applicability of facilitative mediation in housing, family, and harassment courts, schools, businesses, and employment work. Classroom time is split between lecture, discussion and interactive role plays and exercises with coach/instructor feedback.

LAW 7041. CL:Community Mediation Directors. (2-3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
Student directors for Mediation Clinic. Fall 3 cr; Spring 2 cr.

LAW 7042. CL: Federal Immigration Litigation. (; 3-4 cr. [max 8 cr.] ; A-F only; Every Fall & Spring)
The Federal Immigration Litigation Clinic is part of the James H. Binger Center for New Americans and will teach second and third year students to effectively represent clients in federal impact immigration litigation. The clinic lasts a full academic year. Cases may include appellate litigation before the U.S. Circuit Courts of Appeals, U.S. Supreme Court, and Board of Immigration Appeals, as well as litigation before U.S. District Courts and immigration courts. Cases may deal with asylum and related issues, challenges to the unlawful detention of immigrants, as well as the intersection of immigration and criminal law. Students will also learn about the substance and process of immigration policy making, at both the legislative and administrative levels, and may engage in immigration policy outreach and advocacy projects that advance the Binger Center's priorities for systemic change in immigration law. Through classroom instruction and case supervision, and working in case teams, students will learn substantive immigration law, administrative and federal rules of procedure, and a broad range of skills important to the effective representation of clients in federal immigration litigation, including: client contact and communication, case management, legal writing and drafting, oral advocacy, courtroom skills, legal ethics, communications and negotiations with opposing counsel, case analysis / vehicle selection, and case strategy / coordination with co-counsel, allies, amici, and media.

LAW 7043. CL: Federal Immigration Litigation Director. (3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
Director for Federal Immigration Litigation Clinic.

LAW 7047. Joseph P. and Carol Z. Sullivan Health Law Moot Court Competition Team. (; 2 cr. ; A-F only; Every Fall)
A national competition that focuses on health law. The team will be coached by local attorneys that specialize in health law and/or appellate advocacy. Additional local attorneys that specialize in health law and/or appellate advocacy serve as guest judges during oral argument practices. All competitors travel to Southern Illinois University School of Law in early November for the competition. This team is unique in that although it requires some coursework in August, the competition ends in early November.

LAW 7048. Moot Court Competition Team. (; 1 cr. [max 2 cr.] ; A-F only; Periodic Fall & Spring)
On occasion the Law School fields competition teams associated with a topic connected to a concentration or a faculty specialty.

LAW 7055. Civil Rights/Civil Liberties Moot Court. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall)
Students prepare memoranda, briefs, and arguments in a moot court case. Tutorial instruction in legal analysis, legal writing, and oral argument. Intramural moot court competition judged by prominent members of bench/bar. Team of students selected to represent the University in ABA Moot Court Competition. prereq: JD Student

LAW 7056. Civil Rights/Civil Liberties Moot Court Directors. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall)
Director for Civil Rights/Civil Liberties Moot Court. Student Directors help adjunct professors teach the Civil Rights/Civil Liberties Moot Court. Student Directors help teach class sessions, provide written feedback on written student work, and provide feedback and training on oral arguments. prereq: dept consent and JD Student

LAW 7057. Civil Rights/Civil Liberties Moot Court Research Director. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall & Spring)
Research director for Civil Rights/Civil Liberties moot court. prereq: dept consent

LAW 7058. Civil Rights/Civil Liberties Moot Court Managing Director. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall & Spring)
Director of Civil Rights/Civil Liberties Moot Court team.

LAW 7065. National Moot Court. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall)
Preparation, substantial editing, and rewriting of appellate brief. Oral advocacy training with coaches. Intramural oral competition leads to selection of team to represent the University in National Moot Court Competition. prereq: JD Student

LAW 7066. National Moot Court Director. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall & Spring)
Student Director for national moot court. Student Directors help adjunct professors teach the National Moot Court course. Student Directors help teach class sessions, provide written feedback on written student work, and provide feedback and training on oral arguments. Prereq: dept consent

LAW 7067. National Moot Court Administrative Director. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall & Spring)
Administrative director for national moot court. The Administrative Directors help adjunct professors teach the National Moot Court course. Administrative Directors help teach class sessions, provide written feedback on written student work, and provide feedback and training on oral arguments. Prereqs: dept consent

LAW 7068. National Moot Court Competition Team. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall)
The competition team is a group of six 3Ls selected from the second year program. Team members research and write two briefs, and prepare oral arguments. They compete at the regional competition, and if successful, they go on to the nationals. prereq/coreq 7066 National Moot Court Director

LAW 7075. International Moot Court. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall)
The University of Minnesota Law School's International Moot Court (IMC) Program is the international law component of the Law School's greater moot court program. Students who participate in IMC learn basic principles of public international law through readings of seminal international law cases and other select readings. Students apply these principles to their completion of written and oral advocacy exercises. prereq: JD Student

LAW 7076. International Moot Court Director. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall & Spring)
Director for international moot court. Student Directors help adjunct professors teach the International Moot Court course. Student Directors help teach class sessions, provide written feedback on written student work, and provide feedback and training on oral arguments. Prereq: dept consent and JD Student

LAW 7077. International Moot Court Administrative Director. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall & Spring)
Administrative director for international moot court. prereq: dept consent

LAW 7078. Philip C. Jessup International Moot Court Competition Team. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall)
The Philip C. Jessup International Moot Court Competition team focuses on international law. Students are selected based on applications submitted in the spring of the prior year. Students on the Jessup team research and draft a full memorial (brief) with each other. After finalizing their written memorial, students practice their oral arguments with their coaches in preparation of the competition.

LAW 7079. International Moot Court Competition Team. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall)
Each year, the Law School fields a competition team that travels abroad. Competitions vary annually. prereq: JD Student and Law 6002, or LLM/LLMB Student

LAW 7085. Intellectual Property Moot Court. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall)
The Intellectual Property Moot Court furthers students' research, writing, and oral advocacy skills using case problems based primarily on patent, copyright, and trademark issues. Case problems also may involve computer law and antitrust issues. Leads to participation on a University team for the Giles S. Rich Moot Court competition. prereq: JD Student

LAW 7086. Intellectual Property Moot Court Competition Team. (; 1-2 cr. [max 3 cr.] ; A-F only; Every Fall)
The Intellectual Property Moot Court Competition Team is composed of the two to four student directors who help run the I.P. Moot Court program. Students are selected based on their overall performance during their second year as well as a written statement as to why they want to be a director and on the competition team. Unlike most moot court competition teams, each team writes two briefs -- one on each side of the case. And unlike most competition teams, team members receive multiple rounds of detailed feedback

on their briefs from team coaches. The team(s) attend the regional competition, usually in the third week of March. The top two teams at the regional competitions qualify for nationals in Washington, D.C., usually held in early April. The team(s) also participate in the Minnesota Intellectual Property Law Association Cup Competition. prereq: JD Student, Law 6002, and Law 7085 prereq or coreq

LAW 7087. Intellectual Property Moot Court Director. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall & Spring)
Director for intellectual property moot court. Student Directors help adjunct professors teach the I.P. Moot Court course. Student Directors help teach class sessions, provide written feedback on written student work, and provide feedback and training on oral arguments. prereq: dept consent and JD Student

LAW 7088. CL: Intellectual Property and Entrepreneurship. (2 cr. ; A-F only; Every Fall)
The IP and Entrepreneurship Clinic is a one-semester course (Fall Semester - 2 Credits). Students will attend class weekly and each class session involves a mixture of lecture, interviewing and counseling exercises, and writing exercises. The lectures cover core legal topics and questions frequently encountered in an IP and entrepreneurship related legal practice in order to prepare students for interactions with clients. At least three classes consist of drop-in workshops where student attorneys interview limited-representation clients, and engage in problem solving and counseling during the course of each workshop. Each workshop will be followed by in-class roundtable discussions of intellectual property issues encountered and the counseling given. Evaluation of student performance turns on classroom engagement, participation, performance in oral and written exercises, and attendance at workshops. The clinic will not take on cases or establish on-going client relationships. Instead, students will meet with clients at workshops where the clients will sign an Acknowledgement of Limited Representation. Most of the work will occur at the workshop. Depending on the complexity of the matters presented, clients may opt to return to a later workshop, or they may be referred elsewhere for representation. Prereq: JD Student. Previous or concurrent registration in 6224, or 6608, or 6613. Or previous registration in 5224, or 5608, or 5613.

LAW 7092. CL: Bankruptcy Clinic. (; 3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
This clinic is grounded in the development of practical skills necessary to effectively advise and represent individuals in serious financial difficulty. The Bankruptcy Clinic includes a classroom component, which prepares the students to counsel clients about consumer bankruptcy, introduces important portions of the Bankruptcy Code and Rules, and discusses the students' cases in a group setting. This classroom component also features guest speakers, such as bankruptcy judges, panel trustees, and location practitioners. Students will receive training from Bankruptcy Court staff in electronic filing. Students in the Bankruptcy Clinic can expect to be advising clients of their options, communicating with their creditors, filing Chapter 7 bankruptcy cases, and representing clients at the meeting of creditors. Students may also have the opportunity to represent clients in adversary proceedings, including discovery and trial as well as settlement negotiations with both creditors and the U.S. Trustee. Occasionally, students represent individual creditors as well.

LAW 7093. CL: Bankruptcy Clinic Director. (; 2-3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
Director for bankruptcy clinic. prereq: dept consent

LAW 7097. William McGee Civil Rights Moot Court Competition Team. (; 1 cr. [max 4 cr.] ; A-F only; Every Fall)
This competition is typically held locally at Mitchell Hamline School of Law in St. Paul, MN. The competition is national, and schools from across the country travel to compete. The Law School has a strong record of success at this competition. During the oral argument preparation period, team members engage in traditional oral argument practices, practices with guest judges, and also a variety of oral argument workshops designed to improve both skills and substantive knowledge. prereq: JD Student and Law 6002

LAW 7098. CL: Indian Child Welfare Act. (; 2 cr. [max 4 cr.] ; A-F only; Every Fall)
The Indian Child Welfare Act Clinic (the "ICWA Clinic") is a full academic year, four credit program beginning in the fall semester. The casework focuses on litigation involving the Indian Child Welfare Act (ICWA) and Tribal Code. During the fall semester, class sessions will focus on the historical context, present day application and future implications of ICWA. This will include a focus on understanding ICWA in the broader context of Indian Law. Classes will include guest lecturers, who are leaders in the American Indian Community. The class will include guided discussion and analysis of the historical context and role of courts in the lives of American Indian families. The class will provide a context to consider the effectiveness and equity of the child protection system in the lives of American Indian families today. Students will learn Juvenile Court and Tribal Court procedure and advocacy skills to provide direct representation to families. Classes will not meet in the spring semester.

LAW 7099. CL: Indian Child Welfare Clinic Director. (; 2 cr. [max 4 cr.] ; A-F only; Every Fall)
Director for Indian child welfare clinic. prereq: dept consent

LAW 7100. Law Review Editors. (; 2 cr. [max 4 cr.] ; S-N only; Every Fall & Spring)
Credit given without grade for satisfactory participation. prereq: instr consent

LAW 7102. Law Review: Research & Writing. (1 cr. [max 2 cr.] ; P-F only; Every Fall & Spring)
This course provides an opportunity to research and write a journal note under faculty supervision. Each student will write an outline and at least three drafts, and will also orally present and answer questions about their note. The course is required for and open only to staff members of Minnesota Law Review.

LAW 7106. Indian Law Moot Court Director. (1 cr. ; A-F only; Every Fall & Spring)
Director for Indian Law Moot Court.

LAW 7117. CL: Civil Rights Enforcement. (2-3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
The Civil Rights Enforcement Clinic offers students the opportunity to enforce the civil rights laws of the US by assisting in the investigation and litigation of cases in the US Attorney's Office for the District of Minnesota in Minneapolis. The clinic includes both classroom seminars and fieldwork. Classroom instruction focuses on the Civil Rights Act, the Fair Housing Act, the Americans with Disabilities Act, the Equal Educational Opportunities Act, the Uniformed Service Members Employment and Reemployment Rights Act and the Matthew Shepard and James Byrd, Jr. Hate Crimes Prevention Act, along with statutory interpretation and federal investigation techniques and procedure. Following the initial class instruction in the fall, students will be assigned in the spring pending federal civil rights investigations and cases. They will work closely with assistant US attorneys, investigators and paralegals on investigation tactics, evidence gathering, pleading drafting, deposition preparation, document review, legal research, litigation strategy, and settlement negotiations.

LAW 7120. CL: Racial Justice Law. (3-4 cr. [max 7 cr.] ; A-F only; Every Fall)
The Racial Justice Law Clinic will teach second and third year Law students how to engage in direct representation, strategic litigation, and other forms of advocacy as part of a greater movement to advance the rights of Black, Indigenous, Latine/x, Asian-American Pacific Islander, and/or other People of Color. In its first year, Clinic students will do the work of setting up a legal practice from the ground up. Students will determine the priority issue areas for the Clinic's legal advocacy in partnership with impacted community members, local movement leaders, and organizations already working to advance equity and justice for people of color in Minnesota. Clinic priorities will be dynamic and responsive to community needs and therefore may vary from year to year. Issue areas may include some combination of policing, employment, education, housing, and/or others. Through classroom instruction, students will learn fundamental Critical Race Theory concepts and apply those teachings as guiding principles throughout their legal practice. Through the seminar, case supervision, and case team work, students will learn a broad range of skills important to community and movement lawyering and to the effective representation of clients in civil rights litigation and complementary forms of advocacy, such as: community outreach; building and maintaining relationships with

potential community partners, co-counsel, and clients; planning and leading listening sessions; engaging in public speaking and public education; client contact and communication; client interviewing; legal ethics; legal research and fact investigation; and crafting a strategic plan and recommendations for the Clinic's near-term docket and priority issue areas.

LAW 7127. Patent Drafting and Oral Advocacy Competition Team. (1 cr. [max 2 cr.] ; A-F only; Every Fall)
This Competition team furthers students' patent research, patent drafting, and oral advocacy. In the Competition's Regional stage, the team prepares a written patent application and defends it before a judges panel. In the Competition's contingent National stage, the team amends the application and defends it before another judges panel. The course is open to 8 students (i.e., two teams of up to 4 JD and MS students). JD students should add themselves to the waitlist, share their resumes with the instructor, and request enrollment in the course. prereq or co-req one of the following: Law 6224/5224 Patents, Law 6231/5231 Patent Prosecution I, Law 6243/5243 Patent Research & Writing, or Director of Patent Law Programs permission

LAW 7200. Law and Inequality Journal Editor. (; 2 cr. [max 8 cr.] ; S-N only; Every Fall & Spring)
Credit given without grade for satisfactory participation. prereq: instr consent

LAW 7202. Law & Inequality Journal: Research & Writing. (1 cr. [max 2 cr.] ; P-F only; Every Fall & Spring)
This course provides an opportunity to research and write a journal note under faculty supervision. Each student will write an outline and at least three drafts, and will also orally present and answer questions about their note. The course is required for and open only to staff members of Law and Inequality: A Journal of Theory and Practice.

LAW 7246. CL: Housing Law. (; 3 cr. ; A-F only; Every Spring)
Under the supervision of a veteran Mid-Minnesota Legal Aid housing attorney, this clinic is grounded in the development of practical skills necessary to effectively represent low income tenants facing eviction, housing repair problems, utility shutoff and lockouts, and eviction cases in their rental history in Hennepin County Housing Court. The two hour classroom component includes interviewing, clinic computer network training, professional responsibility, substantive housing law topics concerning the types of actions handled in the clinic, and case simulations in which students participate in interviewing, drafting, motion practice, trial and negotiation simulations patterned after real housing cases. Housing Law Clinic cases provide a unique opportunity to handle cases from beginning to end. House Court cases are very active cases, which move faster than many other types of civil litigation. Student attorneys may experience interviewing, investigation, drafting pleadings, discovery, motion and trial practice and appeals. Often students obtain final decisions or settlements in cases that they started. Some cases may involve the delicate act of advising a client that the client does not have a good case.

LAW 7247. CL:Housing Clinic Director. (; 2 cr. [max 4 cr.] ; A-F only; Every Spring)
Director for housing clinic. prereq: dept consent

LAW 7300. Minnesota Journal of International Law Editor. (; 2 cr. [max 8 cr.] ; S-N only; Every Fall & Spring)
By selection only. Credit given without grade for satisfactory participation.

LAW 7302. Journal of International Law: Research & Writing. (1 cr. [max 2 cr.] ; P-F only; Every Fall & Spring)
This course provides an opportunity to research and write a journal note under faculty supervision. Each student will write an outline and at least three drafts, and will also orally present and answer questions about their note. The course is required for and open only to staff members of Minnesota Journal of International Law.

LAW 7350. CL: Sports & Name, Image, and Likeness. (; 3 cr. [max 6 cr.] ; A-F only; Every Fall)
Student attorneys in the Sports & NIL Clinic will work with and assist clients attending institutions across the Upper Midwest, notably student-athletes and social media influencers, in navigating the rapidly changing landscape of name, image, and likeness. Specifically, student attorneys in the clinic will work with these clients as it relates to partnerships with brands and being able to leverage the clients? newly recognized Name, Image and Likeness (NIL) rights. The Sports & NIL Clinic is a placement clinic, and clients will be entering into representation agreements with attorneys at Fredrikson & Byron, P.A. NIL is a rapidly evolving area of law, and students, especially those participating in athletics, may be able to profit on their NIL rights. The Clinic will represent students for whom paid representation is not feasible in their circumstances. Student attorneys participating in the clinic will work with clients in several ways. For example, the University of Minnesota has a policy that any brand partnership entered into by a student-athlete cannot conflict with existing contractual agreements the University may have. The student attorneys can assist these student-athletes by conducting contractual cross-referencing to ensure compliance with this requirement. Additionally, the student attorneys can assist with due diligence regarding brands offering their partnership, assist with document drafting for compliance purposes, and review the contracts these brands are proposing to the clinic clients. Recommended prereq/coreq - LAW 6837 Contract Drafting

LAW 7400. CL: Human Rights Litigation and International Legal Advocacy. (; 3-4 cr. [max 8 cr.] ; A-F only; Every Fall)
This clinic provides students with experience in human rights advocacy which may include litigation in federal or state courts and advocacy before the United Nations, the federal and state legislative and executive branches, and working in coalitions of nongovernmental organizations. The clinic provides participation in clinical projects and skill-building exercises. The process will facilitate discussion of the pros and cons of various advocacy mechanisms, possible conflicting strategies among stakeholders, and how particular strategies are chosen and implemented. The clinic's class component includes core lawyering skills such as interviewing, counseling, negotiation, and legal ethics in practice, and subjects such as how to practice before international human rights systems, how to use international law sources in legal arguments before U.S. courts, working with clients with Post-Traumatic Stress Syndrome, the different types of oral advocacy and writing in human rights advocacy, and the use of education, outreach, and the media in advancing a strategy.

LAW 7401. CL: Human Rights Litigation and International Legal Advocacy Directors. (; 3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
Directors for Human Rights Litigation/ International Legal Advocacy Clinic. prereq: dept consent

LAW 7420. CL: Family Law. (3-4 cr. [max 8 cr.] ; A-F only; Every Fall)
This clinic is grounded in the development of practical skills necessary to effectively develop and move family law cases from initial client interview to Judgment and Decree. Of the twelve classes in fall semester, two classes consist of simulated learning and the other ten consist of lecture with in-class exercises, such as, calculating child support, answering paternity hypotheticals, and a class on professional responsibility. The two simulations include: client interview for a dissolution with children (which prepares students for their first client file); and a default hearing. The simulations are grounded in one fictional family law case file. The Family Law Clinic may or may not offer students an opportunity to participate in trial. To obtain trial advocacy skills applicable in any litigation setting, students are advised but not required to enroll in Evidence and Trial Practice.

LAW 7421. CL: Family Law Directors. (3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
Family Law clinic student directors.

LAW 7500. CL: Criminal Defense. (; 2 cr. [max 4 cr.] ; A-F only; Every Fall)
In the Criminal Defense Clinic, you will have a challenging and rewarding experience working as a student-attorney defending clients in Hennepin County District Court. Through your classroom and courtroom work, you will develop client-centered trial skills that will serve you well as you embark on your career as a lawyer. You will also be challenged to think critically and creatively about the criminal justice system, the role of defense lawyers, legal ethics, and criminal law and procedure. The course will involve a combination of classroom work and supervised student representation of clients charged with petty misdemeanor offenses in Hennepin County District Court. Student lawyers will represent

clients at all stages of the criminal process, including arraignments, pretrial conferences, and trials. The focus of the course will be to develop the skills to provide client-centered representation in criminal cases. Prereq: Law 6219

LAW 7501. CL: Criminal Defense Directors. (; 2 cr. [max 4 cr.] ; A-F only; Every Fall & Spring)
Director for criminal defense clinic. prereq: dept consent

LAW 7550. CL: Criminal Prosecution. (; 3 cr. ; A-F only; Every Fall)
The primary goal of the Prosecution Clinic is to provide students with the opportunity to develop the substantive and practical skills to function as an effective and ethical prosecutor in the criminal justice system. The prosecution clinic course will involve a combination of classroom work and supervised student prosecution of individuals charged with petty misdemeanor, misdemeanor, and gross misdemeanor offenses in Hennepin, Ramsey, and Anoka County District Courts. Students handle cases at all stages of the criminal process including arraignments, pre-trial conferences, and court trials. There is also a seminar component that includes lectures on substantive criminal law and procedure, criminal justice policy issues, simulation exercises, role playing, skills training exercises, and self-evaluation. prereq: Law 6219 Evidence (or co-req)

LAW 7551. CL: Criminal Prosecution Director. (; 2 cr. ; A-F only; Periodic Fall)
Student directors for the Criminal Prosecution Clinic.

LAW 7570. CL: Federal Prosecution. (; 2-3 cr. ; A-F only; Periodic Fall & Spring)
Students assist in prosecution of federal criminal cases under supervision of assistant U.S. attorneys and faculty supervisor.

LAW 7571. CL: Federal Prosecution Clinic Director. (; 2-3 cr. ; A-F only; Periodic Spring)
Director for federal prosecution clinic.

LAW 7572. CL: Federal Defense. (; 3 cr. ; A-F only; Every Spring)
In this clinical seminar, students assist in the defense of indigent persons charged with federal crimes, under the supervision of the Federal Public Defender for the District of Minnesota and assistant federal public defenders. Fieldwork includes assignments such as research and writing of Eighth Circuit appeal briefs, memoranda in support of or response to motions, and legal research on a wide variety of topics. When cases are available, students may also be given various second-chair assignments in the preparation for and conduct of court and jury trials. If consistent with assignment deadlines, students are encouraged to observe other trials and federal criminal court proceedings. In addition to regular conferences, students work about twelve hours per week on clinic assignments. Each student will arrange a regular weekly schedule for their clinic work at the Federal Public Defenders Office in Minneapolis. prereq: LAW 6085 Criminal Procedure and LAW 6009 Criminal Law. NOTE: This course requires certification pursuant to the student practice rule and is open to JD students only.

LAW 7600. Minnesota Journal of Law, Science, and Technology Editor. (; 2 cr. [max 8 cr.] ; S-N only; Every Fall & Spring)
Scholarly publication addressing legal issues that arise from emerging technologies in areas such as copyrights, trademarks, patents.

LAW 7602. Journal of Law, Science & Technology: Research & Writing. (1 cr. [max 2 cr.] ; P-F only; Every Fall & Spring)
This course provides an opportunity to research and write a journal note under faculty supervision. Each student will write an outline and at least three drafts, and will also orally present and answer questions about their note. The course is required for and open only to staff members of Minnesota Journal of Law, Science & Technology.

LAW 7606. Independent Research and Writing. (1-2 cr. [max 8 cr.] ; A-F only; Every Fall, Spring & Summer)
Note: Law 7606 and 7608 both provide credit for independent writing projects; the difference is that 7606 satisfies the J.D. Upper Division Writing Requirement, while 7608 does not (except on a case-by-case basis before fall 2016). The registrar will assign students to 7606 or 7608 based on whether the student seeks, and the supervisor approves, upper division writing credit. Students may earn 1 or 2 credits (and in exceptional circumstances, 3 credits) for researching and writing a note, article, memo, or other paper on a legal topic. At least 5,000 words are required for one credit, at least 7,500 for two credits, and at least 11,250 for three credits. Students must consult with their faculty supervisor on their topic and research plan and receive feedback from their supervisor on the drafting process. To register, the student should confer with a supervising faculty member, draft a description of the proposed project, and complete the online Independent Research form. prereq: Law student. Non-law students may enroll in LAW 5908 or LAW 7608.

LAW 7607. Independent Field Placement - Experiential. (1-3 cr. ; P-F only; Every Fall, Spring & Summer)
Note: Law 7607 and 7609 both provide credit for independent field placements; the difference is that 7607 satisfies the Experiential Learning Requirement, while 7609 does not. The Registrar will assign students to 7607 or 7609 based on whether the student seeks and the advisor approves experiential learning credit. Students may earn up to three credits in a semester for work in a legal practice setting under the supervision of a qualified field supervisor and a faculty advisor. At least 50 hours of law-related activities are required per credit. The student is responsible for identifying a field placement setting and supervisor, finding a faculty advisor, and submitting the Independent Field Placement Enrollment Form for approval by the Associate Dean of Academic Affairs prior to enrollment. Students must complete an online application form in order to register for an Independent Field Placement course AFTER obtaining pre-approval from their faculty advisor.

LAW 7608. Independent Research and Writing. (; 1-3 cr. [max 8 cr.] ; A-F only; Every Fall, Spring & Summer)
Law 7606 and 7608 provide credit for independent writing projects; the difference is that 7606 satisfies the J.D. upper division writing requirement, while 7608 does not (except on a case-by-case basis before fall 2016). The registrar will assign students to 7606 or 7608 based on whether the student seeks and the supervisor approves upper division writing credit. Students may earn 1 or 2 credits (and in exceptional circumstances 3 credits) for researching and writing a note, article, memo, or other paper on a legal topic. At least 3,750 words are required for one credit, at least 7,500 for two credits, and at least 11,250 for three credits. To register, the student should confer with a supervising faculty member, draft a description of the proposed project, and complete the online Independent Research form.

LAW 7609. Independent Field Placement. (1-3 cr. ; S-N only; Every Fall, Spring & Summer)
Note: Law 7607 and 7609 both provide credit for independent field placements; the difference is that 7607 satisfies the Experiential Learning Requirement, while 7609 does not. The Registrar will assign students to 7607 or 7609 based on whether the student seeks and the advisor approves experiential learning credit. Students may earn up to three credits in a semester for work in a legal practice setting under the supervision of a qualified field supervisor and a faculty advisor. At least 50 hours of law-related activities are required per credit. The student is responsible for identifying a field placement setting and supervisor, finding a faculty advisor, and submitting the Independent Field Placement Enrollment Form for approval by the Associate Dean of Academic Affairs prior to enrollment. Students must complete an online application form in order to register for an Independent Field Placement course AFTER obtaining pre-approval from their faculty advisor.

LAW 7621. Immigration Law Field Placement. (1-3 cr. ; P-F only; Every Fall & Spring)
This course provides an opportunity for students interested in Immigration Law to work alongside practitioners. The instructor and student will work together to find an appropriate placement that matches the student's interests and host's needs. Placements are limited. Interested students should contact the instructor. Previously taking LAW 6872 Immigration Law is not required, but preferred.

LAW 7622. Human Rights Law Field Placement. (1-3 cr. [max 6 cr.] ; P-F only; Every Fall & Spring)
This course allows students to learn about human rights law in practice by working directly with organizations and practitioners in the field. In addition to the supervised placement work, students in this course will meet periodically throughout the semester

to share and assess the experience. Prior to enrolling, students should contact the instructor directly to identify a potential host organization that would fit the student's background and interests. Recommended Prerequisite: Law 6886 International Human Rights Law or Law 6011/6071 International Law.

LAW 7623. Public Interest Field Placement. (1-3 cr. [max 6 cr.] ; P-F only; Every Fall, Spring & Summer)
This course provides an opportunity for students to work with and learn from lawyers in government agencies and 501(c)3 nonprofit organizations. Students who have already secured field placements in the public interest sector may enroll after receiving instructor approval. The instructor and student may also work together to identify suitable host organizations.

LAW 7624. Corporate Externship Field Placement. (1-3 cr. [max 6 cr.] ; P-F only; Every Fall, Spring & Summer)
In this course, each student is placed in a company's legal department to experience the work of in-house counsel. The student may take the course for 1-3 credits with 50 hours per credit to be completed during the semester. Substantive projects are assigned by the company and may include corporate policies, codes of conduct, employment law, vendor and supplier agreements, SEC filings and documents, international and comparative law, finance, lease review, and intellectual property. Each student will also experience in-house practice through a variety of opportunities such as joining meetings, attending company events, informational meetings with attorneys and other executives, and other ways to observe the flow of work and life in the corporate world. Students must complete a number of assignments, such as weekly journals and a final reflection paper, and they must attend several meetings with the instructor during the semester.

LAW 7628. Judicial Field Placement. (; 2-3 cr. [max 6 cr.] ; P-F only; Every Fall, Spring & Summer)
The Judicial Externship class provides an opportunity for students to learn about both lawyering and judging by observing and participating in the work of a judge and his or her staff. Which judges and courts participate varies each term, but externships are typically available with federal magistrate-judges and with judges at the federal district court, federal court of appeals, federal bankruptcy court, state trial court, state court of appeals, state tax court, and American Indian tribal courts. State trial court placements are with judges handling criminal, civil, family, or juvenile court matters and with problem-solving courts (e.g., drug court). Externships may also be available at the Office of Administrative Hearings and with the federal Immigration Court. Separate application to those courts is required; watch for notice about placement possibilities through the Career Office. Federal court placements (Federal District Court, Federal Magistrate-Judges, and Federal Court of Appeals) are made using an application process that occurs a few months before the start of the term. Notification will be sent to all students about deadlines for applying. For the rest of the placements, students registered for the class will be asked to complete a form specifying their preferences and to submit a resume, transcript, and cover letter to be used in the placement process. Students will be assigned based on their requests and the judges' needs. After placement, each student arranges a work schedule with the assigned judge and his or her staff. Students are encouraged to arrange their class schedules to have several large blocks of time available for fieldwork; free mornings are especially important for attending court hearings. Fieldwork in chambers generally includes both substantive assignments in research and writing and observation of court proceedings. Substantive assignments will depend upon the nature of the court's calendar and may include such work as preparing a memorandum or proposed order and decision on a summary judgment motion, summarizing and evaluating deposition testimony, or researching substantive legal issues raised in a motion, trial, or appeal. Students may observe a variety of proceedings, ranging from settlement conferences to motions hearings to trials to appellate arguments. They may be proceedings conducted in cases for which the student is performing research or they may be part of unrelated cases. The precise nature of the assignments and observation opportunities in chambers is at the discretion of the judge and the judge's staff.

LAW 7629. Patent Field Placement. (1-3 cr. [max 6 cr.] ; P-F only; Every Fall, Spring & Summer)
This course provides an opportunity for students to work with and learn from lawyers and patent professionals in industry and law firms. The instructor and student will work together to find an appropriate placement that matches the student?s interests and host?s needs. Prereq or co-req one of the following: Law 6224/5224 Patents, Law 6231/5231 Patent Prosecution I, Law 6243/5243 Patent Research & Writing, or Director of Patent Law Programs permission.

LAW 7640. Remote Semester Field Placement. (10 cr. ; P-F only; Every Fall)
The Remote Semester Program gives students the opportunity to gain valuable experience in the legal profession and in public service while earning credits toward their law degree. Students will work for a government or nonprofit organization and earn 10 credits (H/P/LP/F) for work performed. Students will also be required to earn 2 additional credits by enrolling in the Independent Research & Writing Paper.

LAW 7675. CL: Child Advocacy and Juvenile Justice. (; 3-4 cr. [max 8 cr.] ; A-F only; Every Fall)
The Child Advocacy and Juvenile Justice Clinic (the 'CAC') is a full academic year, seven-credit program beginning in the fall semester in which students represent indigent clients in juvenile delinquency and child welfare matters before the Hennepin County Juvenile Court and custody cases before the Hennepin County Family Court. Students have previously been actively involved in two cutting edge areas of the law: they have represented adults seeking custody of unaccompanied immigrant minors under the Special Immigrant Justice Status federal statute, and they have represented inmates serving life without parole (LWOP) in Minnesota prisons for offenses they committed as juveniles. In connection with their LWOP cases, students have represented clients in extensive proceedings before state and federal courts, including the District of Minnesota and the Eighth Circuit.

LAW 7676. CL: Child Advocacy Director. (; 3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
Director for child advocacy clinic. prereq: dept consent

LAW 7678. CL: Civil Rights Appellate. (4 cr. ; A-F only; Every Spring)
The state and federal appellate courts play an important role in explaining what our laws mean, and their decisions have far-reaching effects that impact many aspects of daily life. In the Civil Rights Appellate Clinic, students will immerse themselves in the work of the state and federal appellate courts, including state supreme courts and the U.S. Supreme Court. They will develop strong skills in oral and written appellate advocacy while working on cases involving issues of civil rights, social and criminal justice, and racial equity. Students will be involved in all aspects of the clinic?s work and specific projects will vary each semester depending on the clinic?s current caseload and the stage of the assigned appeals. Projects may include participation in case selection, reviewing the record on appeal, in-depth research and argument development, drafting merits briefs or amicus briefs that will be filed in court, and participating in preparation for oral argument. Whenever possible, students will participate in client meetings and assist in developing case strategy. The subject matter of the casework will center on civil rights and social justice work and may involve issues such as prisoner?s rights, capital punishment, voting rights, gender equity and rights of LGBTQ + individuals, section 1983 litigation, federal habeas appeals, or racial discrimination and inequity. The clinic will be accompanied by a weekly seminar, where students will learn key components of appellate advocacy, strategize on casework, and engage with guest speakers who are experts in the appellate field.

LAW 7700. Off-Campus Legal Studies. (; 0-18 cr. [max 36 cr.] ; S-N only; Every Fall & Spring)
Study at another law school. prereq: dept consent

LAW 7750. CL: Community Legal Partnership for Health. (; 3 cr. [max 6 cr.] ; A-F only; Every Fall)
Students in this clinic will provide legal services at the Phillips Neighborhood Clinic, the Community University Health Care Clinic and Hope Lodge to help identify and resolve legal issues affecting patients care and wellbeing. Students will develop skills that can be used in any number of practice settings, including interviewing and counseling, case

management, problem-solving, persuasive fact analysis, legal drafting, negotiation, effective oral communication, and interdisciplinary collaboration. Through participation in this course, students will be given the opportunity to change clients' lives by helping them assert their rights and obtain necessary benefits and services. Students will learn about legal issues that affect people with health issues, the complex intersection of law and health, the medical-legal partnership (MLP) model of legal services delivery, and client-centered and holistic approaches to the lawyer-client relationship. Students will learn their own style of lawyering and ways to improve time management, client management, and communication and advocacy skills.

LAW 7751. CL: Community Legal Partnership for Health Directors. (2-3 cr. [max 6 cr.] ; A-F only; Every Fall)
Students in this clinic will work with various health service students at the Phillips Neighborhood Clinic to identify and resolve legal issues affecting patients care and wellbeing. Students will develop skills that can be used in any number of practice settings, including interviewing and counseling, case management, problem-solving, persuasive fact analysis, legal drafting, negotiation, effective oral communication, and interdisciplinary collaboration. Through participation in this course, students will be given the opportunity to change clients' lives by helping them assert their rights and obtain necessary benefits and services. Students will learn about legal issues that affect people with health issues, the complex intersection of law and health, the medical-legal partnership (MLP) model of legal services delivery, and client-centered and holistic approaches to the lawyer-client relationship. Students will learn their own style of lawyering and ways to improve time management, client management, and communication and advocacy skills.

LAW 7800. Second Year Legal Writing. (1 cr. ; P-F only; Every Fall)
Second year Law students must complete a writing requirement. Registration in Law 7800 represents registration in a qualifying course until the selection process is completed in mid-summer.

LAW 7820. International Family Journal: Assistant Editor. (2 cr. [max 4 cr.] ; S-N only; Every Spring)
Assumption of editorial responsibilities under the direction of the faculty editors of The International Survey of Family Law, a faculty-run journal that solicits, edits, and publishes articles from highly regarded academics, judges, and practitioners assessing family law developments throughout the world. The principal editorial responsibilities will involve working with prominent international scholars, lawyers, and judges in preparing their work for an English language publication. Interested students should contact the instructor for information on how to apply.

LAW 7842. CL: Immigration and Human Rights. (; 3-4 cr. [max 8 cr.] ; A-F only; Every Fall & Spring)
The Immigration and Human Rights Clinic represents persons seeking asylum in the United States, human trafficking victims and immigrant detainees. This clinic, which is part of the James H. Binger Center for New Americans, provides students with extensive client contact, legal writing, and courtroom advocacy experience. Students receive frequent and detailed feedback on all of their clinic work. For their representation of clients in asylum cases, students interview and counsel their clients on a regular basis, research conditions in the countries where their clients suffered persecution, write briefs and represent their clients in hearings at U.S. Immigration Court. Depending on the resolution of their case at the trial level, students will write appellate briefs to the Board of Immigration Appeals and the 8th Circuit Court of Appeals. For their representation of human trafficking victims, students interview their clients, research the relevant law, interact with government officials who have investigated the trafficking scheme, and prepare applications for visas that permit their clients to remain in the United States. Students also represent immigrant detainees at hearings in Immigration Court to determine if they have defenses to deportation. Students also work on public policy and community outreach projects which bring them into contact with immigrant rights groups at the state and national level. As a result of their work in the clinic, students learn about U.S. immigration law and policy and participate in the Binger Center's innovative strategies for improving the lives of immigrants through strategic litigation, well informed public policy, and community outreach and education. LAW 6872 Immigration Law strongly recommended.

LAW 7843. CL: Immigration Clinic Director. (; 3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
Director for immigration clinic. prereq: dept consent

LAW 7844. CL: Detainee Rights. (3-4 cr. [max 8 cr.] ; A-F only; Every Fall & Spring)
The Detainee Rights Clinic is part of the Center for New Americans and will provide students multifaceted opportunities to represent non-citizens facing removal from the United States who are detained at Immigration and Customs Enforcement (?ICE?) facilities in the Twin Cities area. Students will learn substantive immigration law through the seminar component, with a particular focus on removal defense and immigration detention. Due to the intertwining of criminal and immigration law, or ?crimmigration,? students will gain knowledge of Minnesota criminal law and criminal procedure. Students will learn about administrative legal remedies and relief that are available to those facing removal as well as the procedures and mechanisms in place to decide whether a person can remain in the United States.

LAW 7845. CL: Detainee Rights Clinic Director. (3 cr. [max 9 cr.] ; A-F only; Every Fall & Spring)
Student rirector for Detainee Rights Clinic.

LAW 7850. CL: Clemency Project. (; 3 cr. ; A-F only; Every Fall & Spring)
The Clemency Project Clinic advocates for inmates serving disproportionately long prison sentences. Inaugurated in 2014 in response to President Obama's clemency initiative for non-violent and low-level federal inmates, the Project has since expanded its client-base beyond federal clemency applicants to include state clemency applicants and also petitions for a judicial "second look" at the inmate's sentence under available processes, including, for example, compassionate release regulations, release mechanisms under the First Step Act, and habeas corpus. Students meet once a week and explore sentencing processes in state and federal sentencing systems, the role of sentencing advocacy in securing favorable outcomes, the factors that influence its quality, and the insights from social scientists that can critique and improve it. The class draws on the wealth of interdisciplinary expertise on the University of Minnesota campus as well as in our local professional community.

LAW 7851. CL: Clemency Project Directors. (2 cr. [max 4 cr.] ; A-F only; Every Fall)
Student directors for Clemency Project clinic.

LAW 7860. CL: Business Law. (; 3 cr. ; A-F only; Every Fall & Spring)
The Business Law Clinic is a one-semester 3-credit learning experience for 3Ls. Students learn about the transactional practice of business law in a weekly class, which also serves to guide and support students while they provide transaction-based legal assistance to small businesses, nonprofits and entrepreneurs. The clinic experience closely replicates the practice of business law.

LAW 7861. CL: Business Law Directors. (; 2 cr. [max 4 cr.] ; A-F only; Every Summer)
Directors for multi-professional business law clinic.

LAW 7875. CL: Criminal Appeals. (; 2 cr. ; A-F only; Every Fall & Spring)
Students prepare an appellate brief on behalf of a criminal defendant in a felony case supervised by an assistant state public defender. Emphasizes quality of legal research, writing, and argument. Advanced research/ writing clinic. prereq: Courses in [criminal law, criminal procedure, professional responsibility]

LAW 7900. CL: Domestic Abuse Prosection. (; 2-3 cr. ; A-F only; Every Fall & Spring)
Students participate in supervised prosecution of misdemeanor domestic assault cases. Students handle cases at all stages of criminal process: arraignments, pretrial conferences, trials.

LAW 7910. CL: Rural Immigrant Access. (; 2 cr. ; A-F only; Every Spring)
Students in the Rural Immigrant Access Clinic will participate in pop-up legal clinics in rural communities that have limited access to immigration attorneys and have experienced dramatic increases in immigration apprehension and detention. These full-day legal clinics will be held in a range of

spaces in Minnesota, including community centers, churches, schools and libraries. Students will also conduct comprehensive legal intakes with a rapidly growing detained immigrant population held in rural county jails in Minnesota. Students will complete comprehensive intakes with noncitizens and their families to identify potential avenues for immigration relief. Under the supervision of faculty, students will provide legal advice to clients about their options, make legal and social service referrals, and provide safety planning preparation for noncitizens at risk of deportation including the creation of custodial documents to be utilized in family courts. When confronted with complex immigration problems that require additional research, students will research legal problems and provide written legal advice to immigrant families.

LAW 7950. CL: Tax. (; 3-4 cr. [max 8 cr.] ; A-F only; Every Fall)
This clinic is grounded in the development of practical skills necessary to effectively represent low- income taxpayers who have a tax controversy. Tax cases generally include audits of tax returns, filing and trying cases in Tax Court and Federal District Court, and bringing taxpayers into collection compliance. Since the Earned Income Credit and refundable Child Tax credits are now the major form of public welfare benefits for low-income workers and, thus, often an important component of tax controversies, the Clinic offers opportunities to work on these issues with clients. Clinic students do not generally prepare tax returns unless it is required to resolve the controversy. Clinic students participate in a clinic seminar during the fall semester, which provides training in clinic office procedures, lawyering skills and professional responsibility with an emphasis on those relevant to tax practice, and tax procedure and law relevant to representing low-income taxpayers. Guest speakers from the IRS, MN Department of Revenue and practicing bar provide useful information about the practice of tax law. Students who would benefit from enrollment include those that have an interest in tax, business or bankruptcy practice who will find it helpful to understand the workings of the tax administration authority (i.e. IRS/MNDOR); who are interested in pursuing a career in public interest law; who have an interest in administrative and statutory law practice; have an interest in assisting immigrants meet the tax requirements for citizenship; or students who just want to make a difference in the lives of poor, immigrant or disabled individuals. Prereq or coreq Law 6106; Recommend Law 6100

LAW 7951. CL: Tax Clinic Director. (; 3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
Director for tax clinic. prereq: dept consent

LAW 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
prereq: [completion of LL.M. or 24 credits of graduate study]

Linguistics (LING)

LING 5001. Introduction to Linguistics. (4 cr. ; Student Option; Every Fall, Spring & Summer)
Scientific study of human language. Methods, questions, findings, and perspectives of modern linguistics. Components of the language system (phonetics/phonology, syntax, semantics/pragmatics); language acquisition; language and social variables; language and cognition; language change; language processing; language and public policy; language and cognition.

LING 5105. Field Methods in Linguistics I. (; 4 cr. ; Student Option; Every Fall)
Techniques for obtaining/analyzing linguistic data from unfamiliar languages through direct interaction with native speaker. prereq: [[4201 or 5201], [4302W or 5302]] or instr consent

LING 5106. Field Methods in Linguistics II. (4 cr. ; Student Option; Every Spring)
Techniques for obtaining/analyzing linguistic data from unfamiliar languages through direct interaction with a native speaker. prereq: [5105, grad major] or instr consent

LING 5201. Syntactic Theory I. (3 cr. ; Student Option; Every Fall)
Concepts/issues in current syntactic theory. prereq: Ling 5001 and graduate student or honors student, or instructor consent

LING 5202. Syntactic Theory II. (3 cr. ; Student Option; Every Spring)
Modern syntactic theory. Syntactic phenomena in various languages. Syntactic argumentation, development of constraints on grammar formalisms. prereq: 5201 or instructor consent. LING 5201 is directed towards honors students and graduate students.

LING 5205. Semantics. (; 3 cr. ; Student Option; Every Fall & Spring)
Analysis of sentence meaning. Semantic properties. Relations such as analyticity, entailment, quantification, and genericity. Philosophical background, formal techniques of semantic analysis, how sentence meaning depends on word meaning, syntax, and context. The role of semantics in grammatical theory. prereq: [4201 or 5201] or instr consent

LING 5206. Linguistic Pragmatics. (; 3 cr. ; Student Option; Every Spring)
Analysis of linguistic phenomena in relation to beliefs and intentions of language users; speech act theory, conversational implicature, presupposition, information structure, relevance theory, discourse coherence. prereq: [4201 or 5201] or instr consent

LING 5207. Advanced Semantics. (3 cr. ; A-F only; Every Fall)
In this course, we will explore some semi-advanced to advanced topics in the field of natural language semantics. Broadly construed, natural language semanticists study how human beings process complexity in meaning in language, with the building blocks being how small units of meaning compose together to form larger and larger units, all of which are produced and understood in milliseconds. Building on the fundamental foundations of semantic theory learnt in Semantics, Advanced Semantics is geared towards providing expansive knowledge on several vital topics that current vibrant research in the field is concerned with. The array of topics include quantifier scope, definiteness and indefiniteness, plurals and mass/count nouns, attitude predicates and attitude ascription, event semantics, tense and aspect, modality and conditionals, questions, focus and alternative semantics, and imperatives. As we make our way through the critical last few decades of formal semantics through these vast and diverse topics, we will balance empirical coverage and formalism with development of intuition and methodology. Prerequisites: LING 5205 - Semantics I

LING 5302. Phonological Theory I. (3 cr. ; Student Option; Every Fall)
How sounds are organized/patterned in human languages. Phonological theory/problem-solving for advanced work in in linguistics. Analyzing data. Presenting written solutions to problem sets. prereq: 5001 or honors student or instructor consent. LING 5302 is directed towards honors students and graduate students.

LING 5303. Phonological Theory II. (3 cr. ; Student Option; Every Spring)
Phonology of human languages. Reading papers in the literature. Doing research in phonology. prereq: 5302 or instr consent. LING 5303 is directed towards honors and graduate students.

LING 5461. Conversation Analysis. (; 3 cr. ; Student Option; Periodic Fall)
Discourse processes. Application of concepts through conversation analysis. prereq: 3001 or 3001H or 5001 or instr consent

LING 5462. Field Research in Spoken Language. (; 3 cr. ; Student Option; Periodic Spring)
Transcribing/analyzing talk and movement related to talk. Applying concepts to recorded conversations. prereq: 3001 or 3001H or 5001 or instr consent

LING 5601. Historical Linguistics. (; 3 cr. ; Student Option; Every Spring)
Historical change in phonology, syntax, semantics, and lexicon. Linguistic reconstruction. Genetic relationship among languages. prereq: 3001 or 3011H or 5001

LING 5801. Introduction to Computational Linguistics. (; 3 cr. ; Student Option; Spring Odd Year)
Methods/issues in computer understanding of natural language. Programming languages, their linguistic applications. Lab projects. prereq: [4201 or 5201] or programming experience or instr consent

LING 5900. Topics in Linguistics. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Topics vary. See Class Schedule.

LING 5993. Directed Study. (1-3 cr. [max 10 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed study for Linguistics. Prereq instr consent, dept consent, college consent.

LING 8005. Research Paper Workshop. (; 3 cr. [max 12 cr.] ; S-N or Audit; Every Spring)
Workshop on research methodology/writing in linguistics. prereq: [5105, 5202, 5205, [4302W or 5302]] or [instr consent, grad ling major]

LING 8105. Field Methods in Linguistics I. (; 4 cr. ; Student Option; Every Fall)
This course focuses on a core methodological tool in linguistics: working directly with native speakers of a language in order to gather information about that language. To gain practice and understanding in this broad methodological technique, we discuss practical fieldwork concerns, including: approaches to organization and record-keeping; techniques and pitfalls for conducting interviews; developing a good working relationship with native speaker consultants; ethical issues; and the relation between linguistic theory and language data. Each year, the course will tackle these issues in the context of a particular language of focus, working directly with a native speaker of that language in order to gain an understanding of the basic grammatical structure of the language. Students will learn to conduct interviews with the language consultant in class and will practice these techniques on their own as they pursue individual research projects through weekly interviews conducted outside of class. The course relies on knowledge of linguistic theory that students bring from syntax (LING 4201 or 5201) and phonology (LING 4302 or 5302) courses, but does not require any background knowledge of the language that we will investigate. Prerequisites: LING 5001, LING 5201, LING 5302 and be an enrolled graduate student in the Linguistics program; or instructor consent

LING 8106. Field Methods in Linguistics II. (; 4 cr. [max 8 cr.] ; Student Option; Every Spring)
Continued analysis through work with a native speaker of language begun in 8105. Greater emphasis on analysis of recorded texts of various kinds. Some grammars of the language/contents compared with field notes from previous semester. prereq: 8105 (taken in same academic yr)

LING 8200. Topics in Syntax and Semantics. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall)
Syntax and semantics of natural language, with particular emphasis on the interface between the two. prereq: 5202, 5205 or instr consent

LING 8210. Seminar in Syntax. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall)
Current issues in syntactic theory. Topics vary. prereq: 5202, 5205 or instr consent

LING 8300. Topics in Phonetics and Phonology. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall)
N/A prereq: 5303 or instr consent

LING 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

LING 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

LING 8500. Topics in Second Language Acquisition. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
tbd prereq: 5001, 5505

LING 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

LING 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

LING 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

LING 8888W. Thesis Credit Dissertation Seminar. (; 1-3 cr. [max 24 cr.] ; No Grade Associated; Every Fall & Spring)
A means for students to make progress on the dissertation in a structured setting. Brings together students writing on related topics. Credits are applied to doctoral thesis credits. Contact instructor for description. prereq: Doctoral student who has passed oral prelims

LING 8900. Seminar: Topics in Linguistics. (; 3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Topics vary. See Class Schedule. prereq: instr consent

LING 8921. Seminar in Language and Cognition. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall)
Language-related issues in cognitive science from a linguistic perspective. Serves as elective for cognitive science minor, but only for linguistics nonmajors. prereq: instr consent

LING 8991. Independent Study. (; 1-4 cr. [max 15 cr.] ; Student Option; Every Fall & Spring)
Independent Study prereq: instr consent

Logistics Management (LM)

LM 8892. Readings in Logistics Management. (; 1-8 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
Readings useful to student's individual program or objectives that are not available in regular courses. prereq: Adviser consent or instr consent

LM 8894. Graduate Research in Logistics Management. (; 1-8 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
Individual research on an approved topic appropriate to student's program and objectives. prereq: Adviser consent or instr consent

MN Studies in Intl Devel Prog (MSID)

MSID 5001. International Development: Critical Perspectives on Theory and Practice. (; 3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
Study abroad course.

Management (MGMT)

MGMT 5018. Philanthropy & Fundraising Strategy. (2 cr. ; A-F only; Every Spring)
This brief experiential course explores the evolving world of philanthropy and provides an opportunity to directly influence a real-life nonprofit?s funding strategies. It shows students how, despite resource constraints, nonprofit organizations can effectively build meaningful engagement and financial support around society?s most pressing needs. It provides an immersive experience ? supported by a professional ecosystem ? where students can learn, be inspired and leave this class more driven (and capable) to be ?a force for good.? By the end of this course, students will have gained hands-on consulting experience in partnership with nonprofit organizational leaders, active consultants and major philanthropists. They will have devised and presented implementable strategies at the ? virtuous nexus? between potential donors and their client?s organizational needs - solutions which increase engagement and promote lasting symbiotic relationships between the private and nonprofit sectors. They will be well-positioned to make a significant positive impact throughout their careers in the Twin Cities and beyond.

MGMT 5102. StartUp: Customer Development and Testing. (2 cr. ; A-F only; Every Fall & Spring)
Provides a structured process with faculty and mentor oversight for students at any level and from any college at the University to learn the initial process of customer development by testing market acceptance of a specific new business concept. Students primarily take this course individually and must have an idea or technology that they are interested in pursuing. The goal of the curse is to teach the process to quickly and efficiently test the value and market fit for a new concept.

MGMT 6004. Negotiation Strategies. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
At its core, negotiation is the art and science of getting what you want in a world of innumerable interests, possibilities, and standards of fairness---a world in which we must often compete or cooperate with others to do anything from picking a restaurant to transforming markets. The objective of this course is to equip students with a simple, ready-to-use framework from which we can prepare for and engage in negotiations. Topics include interest-based bargaining, psychological biases, multiparty negotiations,

and hard tactics. Regular cases and exercises reinforce our negotiation framework and provide students a safe forum to thoughtfully reflect on their experiences and improve. prereq: MBA or Mgmt Sci MBA student

MGMT 6031. Industry Analysis and Competitive Strategy. (; 4 cr. ; A-F only; Every Spring)
Processes by which firms maximize long-term returns in face of competition, uncertainty, changing market/technological conditions. Resource commitments to gain sustainable advantage. Choices to leverage resources. prereq: MBA 6301 (previously MBA 6300), MBA student

MGMT 6032. Strategic Alliances. (; 2 cr. ; A-F only; Periodic Fall & Spring)
How inter-/intra-alliance rivalry influences global competitive landscape. How interplay of competitive/cooperative arrangements among firms invigorate intellectual/operational tasks. Designing/managing international strategy, organizational structure, and alliances. prereq: MBA or Mgmt Sci MBA studentt

MGMT 6033. Strategy Implementation. (; 2 cr. ; A-F only; Periodic Fall & Spring)
This course focuses on strategy execution at both the organizational and functional levels. Specific topics include the relationships between strategy formulation and execution, and between implementation and change. The course goes into depth on the systemic and structural problems that make most of these efforts difficult and often unsuccessful, along with various methods to minimize these problems. prereq: MBA or Mgmt Sci MBA student

MGMT 6034. Strategic Leadership. (; 2 cr. ; A-F or Audit; Periodic Spring)
Role of leadership in making strategy a reality while maintaining learning/adaptive organization capable of meeting competitive challenges. Students prepare project set in an organization. Advanced materials, complex cases. prereq: MBA or Mgmt Sci MBA student

MGMT 6035. Complex and Cross-Cultural Negotiations. (; 2 cr. ; A-F or Audit; Periodic Fall & Spring)
Principles, role play of multi-party/-issue, team-based negotiations/conflicts. How to structure ambiguous situations, bridge national/organizational cultures (e.g., alliances, mergers), functions (R&D, finance), and institutional contexts (regulators, interest groups). prereq: [MGMT 6004, MBA or Mgmt Sci MBA student] or instr consent

MGMT 6041. Competing Globally. (; 2 cr. ; A-F only; Every Fall & Spring)
Dealing with enormous complexity in competitive environment, in strategy, and in organizations. Focuses on strategic/organizational issues in managing across borders. prereq: MBA or Mgmt Sci MBA student

MGMT 6055. Management of Innovation and Change. (; 2 cr. ; A-F only; Every Fall & Spring)
How organizations innovate/change. Focuses on innovation in wide variety of new technologies, products, programs, and services. What paths likely to lead to success/failure. prereq: MBA or Mgmt Sci MBA student

MGMT 6071. Strategic Management of Technological Change. (; 2 cr. ; A-F only; Every Fall)
This course addresses challenges and opportunities in the strategic management of technology. It will equip students with conceptual frameworks tools, and language for analyzing and managing businesses in environments of technological change. Students will understand how new technologies transform industries and create new markets, ways that firms shape and/or respond to technological evolution in industries, and the strategic decisions for managing technological change and creating and capturing value from new technologies. We will also consider the influences of factors outside the control of a particular firm, such as complementary markets or the organization of innovations in the broader technology developing community. Because innovation and responding to technological change involve changing organizations, we will also consider factors in leading and managing organizational change. The course uses a combination of readings, lectures, case discussions, exercises, and simulations, and includes cases and vignettes on situations of specific companies managing technology strategy. Anyone who wants to lead innovation or create and capture value from new technologies should take this course. We live in a world of constant technological change and disruption. An understanding of the patterns and processes of innovation and technological change will help students formulate and execute successful technology strategies.

MGMT 6082. New Business Development. (; 4 cr. ; A-F only;)
Understanding how to develop a new business; analyzing the opportunities and managing the constraints; structuring the venture, obtaining the resources, and writing the business plan; course covers main factors needed to start a successful business--the key operations, marketing, financial, legal, and competitive issues; topics covered are relevant to buyouts, franchises, and the family firm.

MGMT 6083. Consulting. (; 4 cr. ; A-F only; Periodic Fall)
Management consulting. Engaging the client. Problem definition, proposal formulation. Establishing project schedules, work plans. Coordinating work. Writing reports, doing presentations. Evaluating the product. Professional learning, career development, balancing work/family. Field projects. prereq: MBA student

MGMT 6084. Management of Teams. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Factors that influence performance and well-being of groups in organizations. Group dynamics, norms, culture, structure, leadership, decision-making, and problem-solving. Managing dynamics, learning, performance, and creativity of groups. Intergroup relations, incentives, and effect of environment.

MGMT 6085. Corporate Strategy. (; 4 cr. ; A-F only; Every Fall)
Case for/against insourcing vs outsourcing, and corporate diversification. Managing a multi-business firm. Role of acquisitions/mergers in corporate diversification. Contrasting mergers with strategic alliances. Corporate restructuring and divestitures. prereq: MBA or Mgmt Sci MBA student

MGMT 6086. Technology and Strategy. (; 4 cr. ; A-F only; Periodic Fall)
Limitations/strengths of various strategy models in different technology contexts. Innovation vs. imitation. Vertical/horizontal integration in high tech industries. Aligning technology strategy with business strategy. Renewing, sharing, leveraging corporate technology competencies across business units. Roles of CEO/CTO in technology intense businesses. prereq: MBA student

MGMT 6100. Topics in Management. (; 1-4 cr. ; A-F only; Periodic Fall & Spring)
Topics vary. prereq: CSOM grad student or instr consent

MGMT 6101. Independent Study in Strategic Management and Organization. (; 1-8 cr. [max 16 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Students contract with faculty on independent studies. prereq: instr consent or dept consent

MGMT 6305. The International Environment of Business. (; 4 cr. ; A-F only; Every Fall, Spring & Summer)
Introduction to international trade/finance theory and political economy. Institutional governance of international trade/monetary policy, differences in political-economic/sociocultural systems, implications for managerial decision-making. prereq: MBA or Mgmt Sci MBA student

MGMT 6310. Cross-Cultural Management: Developing Intercultural Compentence. (2 cr. ; A-F only; Every Spring)
The emphasis of this course is on people-related (i.e., psychological and behavioral) issues that arise when managing across cultures. Through the use of cases and interactive experiential activities, this course will develop your intellectual ability to critically examine, analyze, and deal with cross-cultural problems in business contexts, while also cultivating a tolerance for ambiguity that is necessary in the global workplace. The combination of materials and experiences will allow you to evaluate your cross-cultural savvy, understand and appreciate the nuances of cultural identities and the impact these have on work relationships, and create a plan to increase your intercultural competence.

MGMT 6345. Powerful Problem Solving. (; 2 cr. ; A-F only; Every Fall)
One of the key distinguishing characteristics of effective leaders is the ability to parse through the overwhelming number of inputs we all receive to understand what needs to be done. ?What problem are we trying to solve?? is a crucial question that too often goes unaddressed in the rush to ?just fix it?. Powerful Problem Solving will expose students

to a clear problem-solving framework and process, a variety of perspectives on how to approach problems, as well as individual and group activities and assignments to inform and sharpen skills.

MGMT 6402. Integrative Leadership: Leading Across Sectors to Address Grand Challenges. (; 3 cr. ; A-F only; Every Fall)
Are you interested in working across government, business, and the non-profit sector for public good? Are you wondering how you can create sustainable shared leadership on challenges that can best be addressed together? This course explores multi-sector leadership and related governance and management challenges from a variety of perspectives and provides an opportunity for students to work together to apply what they are learning individually and in teams through in-class exercises and a final team project. The course is taught by a team of interdisciplinary faculty and considers different contexts, forms, and specific examples of multisector leadership that can enable transformative action to tackle a significant societal issue and achieve lasting change. Credit will be not be granted if credit has been received for GCC 5023, OLPD 6402, PUBH 6702, PA 5105, PA 5130, LAW 6623 prereq: Doctoral or master's student

MGMT 6411. Corporate Responsibility. (2 cr. ; A-F only; Every Fall)
Managing with appreciation for corporate responsibility. Corporate responsibility/how executives think about it. Factors that make assessing corporate responsibility complex. Need for business leaders to understand/make choices with respect to corporate responsibility issues. prereq: MBA 6301 (previously MBA 6300), CSOM grad student

MGMT 6465. Leadership and Personal Development. (2 cr. ; A-F only; Every Fall & Spring)
Understanding effective leadership. Identifying personal leadership strengths/vulnerabilities through feedback. Developing leadership skills through practice as informed by theory/ evidence. Exercises, role play. Creating customized leadership development plan. prereq: CSOM Grad student or dept consent

MGMT 8101. PhD Seminar: Theory Building. (; 2 cr. [max 4 cr.] ; A-F only; Every Spring)
Problem formulation, conceptual modeling, and theory building, in the social and behavioral sciences. prereq: Business admin PhD student or instr consent

MGMT 8102. Research Methods I - Applied Empirical Methods. (2 cr. ; A-F only; Fall Even Year)
This is a course in applied empirical methods, focusing on approaches to causal inference commonly used in strategic management and entrepreneurship research, as well as other research design and execution issues. We will discuss issues of the validity of independent and dependent measures, econometric approaches to implementing various designs. We will study these methods by reading and discussing empirical papers in strategy and entrepreneurship and by working with data in problem sets.

MGMT 8104. PhD Seminar: Research Design. (2 cr. ; A-F only; Every Spring)
Problem formulation, conceptual modeling, and research design in the social and behavioral sciences.

MGMT 8202. Seminar in International Management. (; 2 cr. [max 4 cr.] ; A-F only; Spring Odd Year)
Overview of the field of international management research. prereq: Business admin PhD student or instr consent

MGMT 8302. Seminar in Organizational Theory. (; 4 cr. [max 4.02 cr.] ; A-F only; Fall Odd Year)
Major theories and current research on organizational and interorganizational topics from a macro perspective. prereq: Business admin PhD student or instr consent

MGMT 8401. Strategy I. (; 2 cr. ; A-F only; Spring Odd Year)
Review of research in strategy. prereq: Business admin PhD student or instr consent

MGMT 8402. Seminar in Behavioral Strategy. (; 2 cr. [max 4 cr.] ; A-F only; Fall Even Year)
Designed to help doctoral students interpret and conduct research on strategic management. Will focus on research that reflects a behavioral approach to strategy. prereq: Business admin PhD student or instr consent

MGMT 8403. Strategy II. (; 2 cr. [max 4 cr.] ; A-F only; Spring Odd Year)
This is the second strategy core course for Business admin PhD students in Strategic Management and Entrepreneurship. It will focus on both strategy content and process. prereq: Business admin PhD student or instr consent

MGMT 8404. Seminar in Non-Market Strateg. (; 2 cr. ; A-F only; Fall Odd Year)
This is a Ph.D. seminar in the field of nonmarket strategy, i.e., the strategies by which firms alter, influence, or adapt to their existing institutional environment in order to gain competitive advantage. Drawing on foundations in both institutional economics and institutional theory, the seminar examines a body of recent research in the field of strategic management that studies how and to what effect firms engage with political, legal, and social stakeholders. While the primary focus of the course is on the antecedents and consequences of such nonmarket strategies for firms, we shall also consider the impact of these strategies on social welfare, and the resulting implications for public policy. prereq: Business admin PhD student or instr consent

MGMT 8405. Seminar in Technology Strategy. (; 2 cr. [max 8 cr.] ; A-F only; Fall Even Year)
This is a course that will cover theories and phenomena that are central to the field of technology strategy. The course will include readings on a broad range of topics and perspectives pertaining to firms? technology and innovation strategy. An illustrative list of readings are provided below. These readings will be grouped into required and recommended readings. The course is intended to prepare students to undertake research in technology strategy. Towards this goal students will prepare summaries of assigned readings, serve as discussion leaders for the class topics and write a research proposal (including a research question, theory and hypotheses and research design) that builds on the course concepts. prereq: PhD student or instr consent

MGMT 8501. Seminar in Entrepreneurship. (4 cr. ; A-F only; Spring Even Year)
This seminar provides a broad introduction to the field of entrepreneurship. It helps students develop the skills and knowledge needed to conduct their own research within this domain. It introduces them to the theoretical and empirical foundations of the field of entrepreneurship as a scholarly discipline. It will familiarize students with key debates in the field. It will also sharpen students' conceptual and analytical skills, and help them develop their research agenda.

MGMT 8892. Readings in Management Theory and Administration. (; 1-8 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
Intensive research on a management topic; major term paper. prereq: Business admin PhD student or instr consent, adviser consent

MGMT 8894. Graduate Research in Management Theory and Administration. (; 1-8 cr. [max 16 cr.] ; Student Option; Every Fall, Spring & Summer)
Research project on a management problem of interest to student; may be completed in cooperation with a business firm. prereq: Business admin PhD student or instr consent, adviser consent

Management of Technology (MOT)

MOT 5001. Technological Business Fundamentals. (2 cr. ; A-F only; Every Fall)
Basics of operations, strategy, decision-making in technology-driven business. Market opportunity assessment, finance/financial decision-making, organizational roles. Work in teams to analyze aspects of business opportunity. prereq: Degree seeking or non-degree graduate students

MOT 5002. Creating Technological Innovation. (2 cr. ; A-F or Audit; Every Spring)
Course provides students with techniques to create new ideas, and lead an organization to bring them successfully to market. It will include examples of the dynamics of technological industries, and technology strategies. Topics include effective practices to generate ideas, processes to move them to market, and intellectual property. Students will work in teams to develop a strategy to commercialize a new technology. prereq: Degree seeking or non-degree graduate students.

MOT 5003. Technological Business Planning Workshop. (1 cr. [max 2 cr.] ; A-F only; Every Fall & Spring)
Applies lessons of 5001 or 5002 directly to technology of the student's choosing,

possibly thesis topic. Aspects of strategic technology plan or business plan, culminating in presentation of plan. Must be taken in parallel with 5001 or 5002. prereq: Degree seeking or non-degree graduate students. Student must also enroll for MOT 5001 or MOT 5002.

MOT 5101. Introduction to Electrification. (3 cr. ; A-F or Audit; Every Fall)
Introduction to Electrification is the first in a series of electrification courses intended to prepare technologists, engineers, scientists, and technically minded managers for the migration to an electric future. It will cover electrification trends in the industry, the current state of the art, and a survey of core technologies and safety procedures key to the electrification process. There will be lecture and hands-on components.

MOT 5991. MOT Independent Study. (; 1-3 cr. [max 1 cr.] ; S-N or Audit; Periodic Fall)
Independent study in MOT-related topic. prereq: MOT grad student

MOT 8111. Marketing Management for Technology-based Organizations. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Function of marketing strategy in technology-based organizations. Emphasizes marketing industrial products. Issues in product strategy, including pricing, promotion, product mix, and sales/distribution decisions. prereq: Grad MOT major

MOT 8112. Accounting for Decision Making. (1.5 cr. [max 2 cr.] ; A-F or Audit; Every Fall)
Introduction to methods for estimating/analyzing product costs and for using cost information to make product mix and pricing decisions. Cases from technology-oriented firms illustrate principles of activity-based costing. Uses of cost data in managerial decision making, budgeting/control, and financial statement analysis. prereq: Grad MOT major

MOT 8113. Operations Management for Competitive Advantage. (1.5 cr. [max 2 cr.] ; A-F or Audit; Every Spring)
Overview of operations functions. Impact of operation management on a firm's competitiveness and network of trading partners. Key relationships between operations and other value chain functions. Integrating operations decisions to achieve objectives. Product-process design, quality management, supply chain management, technology management, work force issues. prereq: Grad MOT major

MOT 8114. Strategic Technology Analysis. (; 1.5 cr. [max 2 cr.] ; A-F only; Every Fall)
Technology, its creation, history, and dynamics/interaction with economics, industry, and society. Role of technology in business and management. Tools/techniques for analysis of technologies. Emerging technologies, their significance. prereq: Grad MOT major

MOT 8121. Managing Organizations in a Technological Environment. (; 1.5 cr. [max 2 cr.] ; A-F or Audit; Every Fall & Spring)
General management principles for organizations, people, and business systems in technology-intensive industries. Application of managerial approaches to project, business, and corporate levels of organizations and to demands entrepreneurial/established technology firms. prereq: Grad MOT major

MOT 8122. Financial Management for Technology-based Organizations. (; 1.5 cr. ; A-F or Audit; Every Spring)
Creating value within the organization. Financial methods important to managers of technology-based organizations. Budgeting capital, projecting financial needs, and managing working capital. prereq: Grad MOT major

MOT 8133. Managerial Communication for Technological Leaders: Persuasive Writing and Speaking. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Oral and written communication. Introductory and specialized workshops on topics such as presentation skills, memo and report writing, listening skills, and visual aid design and integration. prereq: Grad MOT major

MOT 8212. Developing New Technology Products and Services. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Review of methods and organizational strategies for development of new technology products. Product development strategy. Necessary organizational interactions between research/development, operations, marketing, and intellectual property strategy in design/delivery. prereq: Grad MOT major

MOT 8213. Macroenvironment of Technology. (; 1.5 cr. [max 2 cr.] ; A-F or Audit; Every Fall & Spring)
Development of scenarios of anticipated social, political, governmental, and economic forces affecting technological change. Use of scenarios to respond to industry threats, opportunities, and uncertainties. Corporate strategies, including building alliances for global competitiveness. prereq: Grad MOT major

MOT 8214. Technology Foresight and Forecasting. (; 2 cr. ; A-F only; Every Fall)
Tools/techniques for technology forecasting, assessment, and strategic foresight for decision making in busines/government. Technology dynamics, R&D strategy, portfolio management, resource allocation. prereq: Grad MOT major

MOT 8218. Digital Transformation. (1 cr. [max 1.5 cr.] ; A-F only; Every Spring)
The objectives of the course are to introduce the students to the topic of digital transformation and to have them recognize the importance of the topic in today?s increasingly digital world, including for their organizations. The course will emphasize that transforming to a digital organization is a highly intentional collaboration between technology and business leaders that identify what being digital means for a company and where the company is on the digital maturity continuum. The course is not theoretical in nature; it will discuss pragmatic digital transformation journeys grounded in the experiences of numerous corporations.

MOT 8221. Project and Knowledge Management. (1.5 cr. [max 2 cr.] ; A-F or Audit; Every Spring)
Survey/application of project and knowledge management in management of technology. Business/engineering project/knowledge management. Planning, scheduling, controlling. Budgeting, staffing, task/cost control. Communicating with, motivating, leading, and managing conflict among team members. Cross-functional development of concepts/processes. prereq: Grad MOT major

MOT 8224. Pivotal Technologies. (; 1 cr. [max 2 cr.] ; A-F or Audit; Every Fall)
Technologies expected to play pivotal roles in future industrial development. State-of-the-art for each technology. Barriers/opportunities for commercialization. Guest expert lectures. Students analyze potential applications of technologies to industry. prereq: MOT grad major

MOT 8231. Managing Information Resources in Technology-based Organizations. (; 1 cr. ; A-F or Audit; Every Fall & Spring)
Managing information resources/technology in an organization where technology is a critical part of value chain. Database management systems, electronic commerce. Managerial issues: strategic planning for IT/IS, infrastructure, outsourcing, competitive value, implementation. prereq: Grad MOT major

MOT 8232. Managing Technological Innovation. (; 2 cr. ; A-F or Audit; Every Spring)
How technological innovation is important to business success, can be managed, and may drive business strategy. Organizational dynamics of innovation, how it may be enhanced. Bringing innovations to marketplace in existing businesses and new ventures.

MOT 8233. Strategic Management of Technology. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Identifying key issues, formulating strategies for situations involving business/technology. Industry dynamics, competitive challenges for improving corporate performance and leveraging technological competence. prereq: Grad MOT major

MOT 8234. Capstone Project. (; 0.5-2.5 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Applied research activity, specifically related to management of technology, in cooperation with participant's home organization. Working with a faculty adviser and work mentor, students address an industry-based management of technology project, venture, process, or challenge. Formal presentation to capstone committee is required. prereq: Completion of two semesters, grad MOT major

MOT 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall & Summer)
(No description) prereq: Master's student, adviser and DGS consent

MOT 8500. Innovation Leadership and Organizational Effectiveness. (; 0.5-2 cr. ; A-F only; Every Fall & Spring)

Made up of four ? credit units that unfold over four semesters of MOT program. Building talent, organizational capability, culture needed to execute innovation strategy. prereq: MOT major

MOT 8501. Leading Individual & Team Performance. (1.5 cr. ; A-F only; Every Fall)
Develop the context and capability innovation leaders need to optimize engagement and performance at the individual and team levels. Emphasis is placed on foundational principles, capabilities and practices that help leaders self-manage, engage and influence diverse team members, and generate shared commitment for team and project success. prereq: MOT grad major

MOT 8502. Innovation Leadership and Organizational Effectiveness. (1 cr. ; A-F only; Every Spring)
The MOT 8501 and 8502 sequence provides emerging and mid-career technology professionals with the leadership mindset, tool set, and skill set needed to focus, align, and engage multi-disciplinary individuals and teams in translating technology assets and foresight into customer solutions that generate profitable growth. MOT 8502 explores the role of outstanding leaders as developers of innovation strategy and architects of the organizational capability and team commitment needed to execute strategic choices. Emphasis is placed on principles and practices that help leaders focus on the right strategies, build the organizational capability required to execute a strategy, foster continuous improvement in individual and business performance, and lead change initiatives to sustain commitment versus compliance across diverse stakeholders. Students will practice improving their team effectiveness and develop a change leadership plan to support implementation of a key business initiative.

MOT 8900. Conflict Management. (; 0.5 cr. ; Student Option; Every Fall)
Theory and methods for applying conflict management techniques in organizations. Cooperative and competitive models of conflict, basics of bargaining, conflict strategies, communication styles, listening skills, dispute resolution, third-party mediation, and use of computers for conflict mediation. prereq: Grad MOT major

MOT 8910. Corporate Responsibility. (; 1 cr. ; A-F or Audit; Every Fall & Spring)
Principles of stakeholder management. Ethical framework for responsible management of investors, employees, suppliers, customers, and external community. Moral leadership, trust in organizations, and quality control. New metaphors and techniques for managing the socially responsible organization. prereq: Grad MOT major

MOT 8920. Science and Technology Policy. (; 1.5 cr. ; A-F or Audit; Every Fall)
Role of government in science/technology. Impact of policy on economy/society. Ways companies/individuals may influence science/technology policy. Technology-related public policy in the United States, elsewhere. prereq: MOT grad student

MOT 8921. Global Management of Technology. (0.5 cr. ; A-F only; Every Spring)
Global management of technology. prereq: MOT student

MOT 8930. Topics in Emerging Technologies. (; 0.5 cr. ; S-N or Audit; Every Spring)
Invited speakers give half- or full-day seminars on special topics in emerging technologies (e.g., energy systems, tissue engineering, thermal spray coating technology). prereq: MOT grad student

MOT 8940. Managing Intellectual Property. (0.5-1 cr. ; A-F only; Every Spring)
Characteristics of Intellectual Property (IP), its role in technology enterprises. Law of patents, trade secrets, trademarks, copyrights, know-how and other IP. Effect of IP rights acquisition and asset valuation on company competitiveness. IP protection/licensing strategy. prereq: MOT grad student

MOT 8950. International Management of Technology Project. (; 2 cr. ; A-F or Audit; Every Spring)
On-site residency in international locations for up to two weeks. Visits to local, technology-intensive companies. Lectures/discussions with company executives, government officials, and university faculty. Comparative analysis of management of technology concepts/issues in an international business context: social, economic, cultural, and governmental perspectives. Written assignment required. prereq: MOT grad student

MOT 8960. Seminars in Management of Technology (MOT) and Innovation. (1 cr. [max 2 cr.] ; S-N only; Every Fall & Spring)
Seminars on emerging topics in technology management and innovation. prereq: MOT grad major

Managerial Communications (MCOM)

MCOM 5400. Managerial Communications for the HR Professional. (; 2 cr. ; A-F only; Every Fall & Spring)
Memo writing, oral presentations, and team communication required of HR professional. Emphasizes hands-on, experiential learning, including videotaping. prereq: HRIR student

MCOM 5500. Enhancing Your Executive Image in Business Communications. (2 cr. [max 4 cr.] ; A-F only; Every Fall)
Techniques to project executive presence in all business communications. prereq: MBA student

MCOM 5515. Persuasive Writing in Business. (; 2 cr. ; A-F only; Periodic Fall)
Writing to motivate/affect change. Form/content. Techniques of persuasion. Producing polished text. Writing with power. prereq: MBA student

MCOM 5535. Strategies and Skills for Managerial Presentations. (; 2 cr. ; A-F only; Periodic Fall)
Delivering key messages with clarity/confidence, regardless of audience or setting. Maximizing impact as a speaker, seated/standing. Personal communication style and audience. Tailoring message. Handling questions/answers. Using audio/visual tools. Presenting as a team. prereq: MBA or Mgmt Science MBA student

Marketing (MKTG)

MKTG 6051. Marketing Research - Rapid Insights. (; 2 cr. [max 4 cr.] ; A-F only; Every Fall & Spring)
Focus on developing rapid and actionable insights, by learning to form testable hypotheses, collect relevant data quickly, and perform fundamental analytics. Techniques will include survey design, sample design, online data collection, descriptive statistics, and tests for statistical significance. By the end of class, students will be able to provide convincing recommendations for common marketing and analytics-driven decisions. prereq: MBA 6210/6211, MBA or Mgmt Sci MBA student

MKTG 6052. Marketing Analytics: Managerial Decisions. (; 2 cr. ; A-F only; Every Fall & Spring)
Modern marketers use data to drive decisions. This course teaches students a suite of statistics analytic tools to make strategic decisions. Focusing on learning how to apply specific analytic tools to different managerial challenges, students will learn how to leverage data to perform market analyses, segmentation and targeting, customer value assessment, brand management, new product development, among other tasks. Students will be able to apply the learned skills to their work immediately to produce data-driven insights and develop strategic recommendations. The course is also helpful for students who are interested in STEM to improve their stats modeling and other relevant skills.

MKTG 6055. Buyer Behavior. (; 2 cr. [max 4 cr.] ; A-F only; Every Fall & Spring)
This course provides a deep understanding of consumer motivation and psychology to predict behavior in the marketplace. It covers both rational and irrational influences that impact consumers at different stages of the decision-making process. The course gives students the tools to provide insightful, data-driven recommendations by thoroughly understanding the customer. prereq: MBA 6210/6211, MBA or Mgmt Sci MBA student

MKTG 6062. Marketing Channels. (; 2 cr. [max 4 cr.] ; A-F only; Every Fall)
This class focuses on designing go-to-market routes that align with customer purchase journeys, including the selection of channel partners, and fashioning the right channel incentives. We will pay particular attention to contemporary challenges arising from channel fragmentation and addition of online routes-to-market. prereq: MBA 6210/6211, MBA or Mgmt Sci MBA student

MKTG 6072. International Marketing. (; 4 cr. ; A-F only; Periodic Fall & Spring)
Today?s explosion in global e-commerce and logistics networks means most organizations now face an opportunity to broaden their

customer bases and strengthen their brands. At the same time, these firms may face a new set of global competitors including state-supported, foreign companies, or current competitors who have transformed into global marketers. This case-based course arms the learner with a set of frameworks to adapt and lead in today?s global marketing arena. The course culminates in a student-designed, real-world, ?Glocal? marketing plan that launches an offering into an international market. prereq: MBA 6210/6211, MBA or Mgmt Sci MBA student

MKTG 6073. Marketing in High Tech Settings. (; 2 cr. ; A-F only; Periodic Fall)
This class will focus on contemporary markets where the products and services are built on a significant base of intellectual property. Using cases and readings, we will examine major issues such as a) diffusion of multiple generations (e.g., iPhone 7 8, 10. etc.), b) backwards and forward compatibility choices (e.g., Windows XP, 7 and 10), c) revenue model decisions (e.g., license a drug patent versus launching the realized drug) and d) user-centered design (e.g., Nest versus Honeywell thermostats). prereq: MBA 6211 (or MBA 6210 pre-F22) or equiv; MBA student or dept consent

MKTG 6075. Pricing Strategy. (; 4 cr. ; A-F only; Every Fall & Spring)
Marketing begins and ends with the buyer. A marketing perspective on Pricing Strategy focuses on the study of delivering value to buyers in a manner that exceeds the value proposition of marketplace rivals, using both internal and external resources. The purpose of this course is to present a framework and provide analytical tools that can help you handle these pricing challenges. From determining consumer needs to assuring customer satisfaction, a clear understanding of buyer behavior is critical to the successful formulation and implementation of pricing strategy. The profitability of Pricing strategies that account for the competitive environment and the role of collaborators whose interests are aligned with that of the organization are an integral over-arching umbrella that informs the course. There are a wealth of analytical tools used in pricing ranging from Economic Value Analysis, to Break-Even Analysis, to estimation of Demand and Elasticity, to Customer Lifetime Value analyses, to game theoretic analyses of competitive dynamics. This course is designed to provide prospective managers the intellectual and analytical tools necessary to design actionable pricing strategies. There will be a strong emphasis on managerial action, and multiple theoretical perspectives will be discussed. prereq: MBA 6210/6211, MBA or Mgmt Sci MBA student

MKTG 6078. Advertising & Promotion. (; 4 cr. ; A-F only; Every Fall & Spring)
Managing communication. Advertising, sales promotion, public relations, direct marketing. Setting communications objectives and budgets, media selection, creative strategy, sales promotion techniques. prereq: MBA 6210

MKTG 6082. Brand Strategy. (; 2 cr. [max 4 cr.] ; A-F only; Every Spring)
Leaders now realize that brands are one of the most valuable assets they possess. Those leaders who can successfully build, leverage, and protect brands are highly sought after. And today?s brand principles must apply to product branding, personal branding, service branding, place branding, online branding, co-branding, and luxury branding. This course provides learners with frameworks and practical brand knowledge to launch and leverage successful brands in all these disciplines. prereq: MBA 6210/6211, MBA or Mgmt Sci MBA student

MKTG 6083. Customer Analytics. (; 2 cr. ; A-F only; Every Fall & Spring)
Customer Analytics addresses how to use data to learn about and market to individual customers. Marketing is evolving from an art to a science. Many firms have extensive data about consumers' choices and how they react to marketing campaigns, but few firms have the expertise to intelligently act on such information. In this course, students will learn the scientific approaches to analyze and act on customer information. While students will employ quantitative methods in the course, the goal is not to produce experts in statistics; rather, students will gain the competency and working experience to interact with and manage a marketing analytics team. Students gain a working knowledge of linear regression, logit analysis, RFM analysis, tools for market forecasting, pricing optimization, behavior targeting and an introduction to machine learning, recommendations systems, and digital analytics. The course uses a combination of lectures, cases, and exercises to learn the material. This course takes a hands-on approach with real-world databases and equips students with tools that can be used immediately on the job.

MKTG 6084. Persuasion and Influence. (; 2 cr. ; A-F only; Every Summer)
Successful marketers, leaders and communicators must not only make the right decisions-they must also influence others. Successfully managing other people depends on managing the influence process. Doing this effectively requires understanding the psychology of persuasion. This course is about the science of influence & persuasion. Through deeper understanding of human psychology, you will learn scientifically-tested and practical tools to become more influential in your dealings with consumers, clients, coworkers, & managers. Through a mix of lecture, discussion, reading, reflection, and experiential exercises, you will master the tools to be able to mobilize others by strategically crafting your communications. prereq: MBA 6210/6211, MBA student

MKTG 6085. Nudge: Improving Decisions about Health, Wealth and Happiness. (2 cr. ; A-F only; Periodic Fall, Spring & Summer)
People do surprising and funny things. Business leaders, policy makers, and scientists long have been interested in why people do what they do, and for a long time that interest has fallen under the rubric of a "rational man" model. It is now clear that the rational model is imperfect, at best. This course takes a look at the less rational side of life, studying the shortcuts, the low road, and the error-prone processes that enable people to feel, decide, and act efficiently--despite costs to rationality. For most of the past 200 years, most of what organizations, politicians, and well-meaning people did in order to make consumers change their behavior consisted of what might be called "shoves"--heavy-handed, choice-restricting, highly-incentivized, information-dense treatments that basically told consumers what to do (or else!). Those, by and large, do not work. Not only do they not work, they are costly and can even make the unwanted behavior emerge even more than before the shove by creating boomerang or counterproductive effects.

MKTG 6086. Digital Marketing. (; 2 cr. ; A-F only; Periodic Fall & Spring)
Marketing practices have dramatically shifted with the rise of social media and the proliferation of devices, platforms, and applications. This rapidly changing environment presents new opportunities and challenges for marketers. Through a combination of case studies, best practice examples, current news items, and assignments, students learn how the elements of a digital strategy work together with traditional media to attract prospective customers. Specifically, students learn best practices for social media marketing, content marketing, organic and paid search, search engine optimization, e-mail marketing, landing pages and display advertising. Students discuss strategies for reputation management in a world where information is disseminated virally and discover how social media monitoring and data analysis can be used to improve marketing and product development activities. The importance of establishing digital marketing goals and analytics is covered as well as how to measure return on investment for digital activities. Additional focus on analytics through certification assignments, in google analytics and ad search. Exploration of return on marketing measurement and evaluation of digital tactics.

MKTG 6087. Power of Story. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall & Summer)
Abraham Lincoln professed that ?People are more influenced and informed through a story than in any other way.? This course is about harnessing the power of story to become a more influential communicator. Whether you? re presenting data or a new idea, this course will prepare you to overcome challenges such as: How do you get (and maintain) attention? How can you convey complex information quickly? How do you make a broad, abstract idea concrete and tangible enough for people to understand? How do you provide credibility for your idea without resorting to dry statistics? This course = communication science + storytelling workshop. It involves many exercises, activities, and practicing your skills. By focusing on personal storytelling, Power of Story is aimed at those who seek to resonate with others through clear and captivating communication. Prereq: MBA 6301 (previously MBA 6300), CSOM graduate student

MKTG 6088. Strategic Marketing. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
This course looks at strategic decision-making, trade-offs and resource allocation in markets, methods for creating advantage at both the industry and the firm level, the impacts of strategic decisions, and appropriate investment and performance management frameworks. Utilizing an integrated approach to the use of marketing tools and concepts in the formulation and execution of the marketing plan. The material is presented with case studies, lectures, readings, and guest speakers. Focusing on development of framework for strategic marketing planning based on market insights, customer behavior, market segmentation, product positioning, customer experience, market responsiveness, and competitive reaction. The course is designed to be essential for students interested in careers in marketing management, brand management, product management, strategic consulting, and leadership development programs. prereq: MBA 6210/6211, MBA or Mgmt Sci MBA student

MKTG 6090. Marketing Topics. (; 1-4 cr. [max 8 cr.] ; A-F only; Every Fall, Spring & Summer)
Selected topics/problems of current interest considered in depth. prereq: MBA 6210/6211, MBA student

MKTG 6101. Independent Study. (; 1-4 cr. [max 8 cr.] ; A-F only; Periodic Fall & Spring)
Independent directed reading/research.

MKTG 8809. Consumer Behavior Research Methods. (2 cr. ; A-F or Audit; Periodic Fall & Spring)
Seminar. Topics related to conceptual theories/ arguments about experimental design and statistical analysis of experiments. How to design experimental research for testing hypotheses and drawing conclusions. prereq: Doctoral student or [masters programs student, instr consent]

MKTG 8810. Consumer Behavior Special Topics. (; 2 cr. [max 8 cr.] ; A-F or Audit; Periodic Fall & Spring)
Topics related to the fundamentals of consumer behavior such as attitudes, behavioral research methods, branding, consumer well-being, decision making, information processing, and perceptions. See "Class Notes" for details. prereq: Doctoral student or [master's program student, instr consent]

MKTG 8811. Consumer Attitudes and Persuasion I. (; 2 cr. ; Student Option; Fall Odd, Spring Even Year)
Reading, discussing, and evaluating theories of consumer attitudes and persuasion. Theoretical analysis, rather than practitioner focus. prereq: [[MBA 6210 or equiv], business admin PhD student] or instr consent

MKTG 8812. Consumer Attitudes and Persuasion II. (; 2 cr. ; A-F or Audit; Fall Odd, Spring Even Year)
Science of persuasion. Principles of stickiness--universal principles that lead messages to succeed rather than fail. Principles of influence--universal psychological principles that motivate a person to say "yes." prereq: Doctoral student or instr consent

MKTG 8813. Consumer Judgment and Decision Making I. (2 cr. ; A-F or Audit; Periodic Fall & Spring)
Different theoretical approaches taken in judgment and decision-making research. Heuristics/biases, affect in decision making, judgments/decisions over time. prereq: Doctoral student or [master's program student, instr consent]

MKTG 8814. Consumer Judgment and Decision Making II. (2 cr. ; A-F or Audit; Periodic Fall & Spring)
Draws from work on prospect theory and its derivatives. Anomalous choice. Emphasizes on applications to Marketing theory, from inter-temporal choice to regret and counterfactual thinking in consumers/managers. prereq: Doctoral student or [master's program student, instr consent]

MKTG 8831. Seminar: Inter-Organizational Relations. (; 4 cr. ; Student Option; Periodic Fall & Spring)
From an efficiency perspective, inter-organizational networks involved in task of moving goods and services from point of production to point of consumption. Literature covering the functional, institutional, analytical, and methodological traditions, as well as the behavioral school of thought and transaction cost and relational contracting. prereq: business admin PhD student or instr consent

MKTG 8842. Quantitative Modeling I. (; 2 cr. ; A-F or Audit; Periodic Fall & Spring)
Advanced readings seminar. Quantitative research in marketing. Topics from theoretical/ empirical research in marketing, econometrics, and industrial organization. Classic/ contemporary articles. prereq: Doctoral student or [master's program student, instr consent]

MKTG 8843. Empirical Quantitative Models. (; 4 cr. ; A-F or Audit; Periodic Fall & Spring)
Advanced readings seminar. Quantitative research in marketing. Topics from theoretical/ empirical research streams in marketing, econometrics, and industrial organization. Classic/contemporary articles. prereq: Doctoral student or [master's program student, instr consent]

MKTG 8851. Seminar: Marketing Management and Strategy I. (; 2 cr. ; Student Option; Periodic Fall & Spring)
Topics in marketing management and formulation and implementation of marketing strategies. Diversity of thought, within marketing and strategic management literature. prereq: [[MBA 6210 or equiv], business admin PhD student] or instr consent

MKTG 8852. Marketing Management & Strategy II. (; 2 cr. ; Student Option; Periodic Fall & Spring)
PhD seminar. Role of branding within the organization, its business strategy, and its success. Brand management. Critically evaluate fundamental ideas and more recent developments. prereq: Business admin PhD student or instr consent

MKTG 8890. Seminar: Marketing Topics. (; 1-4 cr. [max 8 cr.] ; Student Option; Periodic Fall & Spring)
Current topics and problems of interest considered in depth. Topics vary with each offering. prereq: Business admin PhD student or instr consent

MKTG 8892. Readings in Marketing. (; 1-8 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
Readings useful to student's individual program and objectives that are not available in regular courses. prereq: MBA 6210 or equiv, business admin PhD student or instr consent

MKTG 8894. Graduate Research in Marketing. (; 1-8 cr. [max 16 cr.] ; Student Option; Every Fall, Spring & Summer)
Individual research on an approved topic appropriate to student's program and objectives. prereq: MBA 6210 or equiv, business admin PhD student or instr consent

Master of Biological Sciences (MBS)

MBS 6001. Introduction to Research in the Biological Sciences. (; 1 cr. ; A-F only; Every Fall & Spring)
This course introduces students in the MBS program to resources available to them at the University of Minnesota and in the College of Continuing and Professional Studies. Students will prepare and deliver a scientific presentation and write a critical analysis of a topic in their planned area of concentration. Students also will explore ethical issues in the biological sciences and learn how to avoid plagiarism. This is a hybrid course that includes both online activities and classroom meetings. Required of all MBS students.

MBS 6002. Final Project Course for Plan B MBS Students. (; 3 cr. ; S-N only; Every Fall, Spring & Summer)
MBS 6002 is the final project course for Plan B MBS students who register for this course during their last term in the MBS program. While registered in MBS 6002 students will complete their Plan B project and paper, and the final oral defense will be held in front of a committee of three faculty members. A final grade will be assigned after the student has successfully passed the oral defense and submitted a final version of the Plan B paper to the MBS office. Students intending to register for MBS 6002 need to fill out a Plan B Final Project contract form with their research mentor and submit it to their MBS academic advisor for approval before receiving a permission number to register. This is a three-credit course that is graded S/N.

MBS 6003. Capstone Course for Plan C MBS Students. (; 3 cr. ; S-N only; Every Fall, Spring & Summer)
MBS 6003 is the capstone course for students Plan C MBS students who register for this course during their last term in the MBS program. In MBS 6003 students will complete and defend their Plan C capstone paper. The capstone paper is an in depth and critical

analysis of cutting edge research in the biological sciences that explicitly incorporates the training and experiences students had during the MBS program. The course also requires an oral presentation of the paper. Students intending to register for MBS 6003 must contact their advisor well in advance to discuss their plans and receive approval. A meeting with the course instructor is encouraged before receiving a permission number to register. This is a three-credit hybrid course that includes both online activities and classroom meetings. The course is graded S/N.

MBS 6101. Scientific Literature Workshop. (1 cr. ; A-F only; Every Summer)
MBS 6101 Scientific Literature Workshop gives students an introduction to writing in the sciences with an emphasis on working with sources. Students will learn to read scientific literature like writers, developing an understanding of the goals, formal requirements, and ethical decision-making involved in scientific writing. By reflecting on the purpose of writing in the sciences, analyzing published examples and participating in discussions, as well as creating brief writing assignments, students will learn the important elements of scientific writing and become better prepared for the scientific writing process, both in an academic and a professional setting.

MBS 6110. Graduate Seminar Series. (; 1 cr. [max 3 cr.] ; S-N only; Every Fall, Spring & Summer)
Required for all MBS Plan C students. In MBS 6110, students attend bioscience seminars of their choosing during the semester, write a summary analysis of each seminar to share with other students in the class, and peer review another student?s seminar experience. Seminar reports and peer reviews are submitted to the online course site. Seminars are an essential part of the research mission of the University, and of professional communication across the scientific community. Participation in research seminars allows students to advance their understanding of current questions and ongoing research within their own particular area of interest, or to explore other areas of research within the biological sciences. This is a one-credit course graded as S/N.

MBS 6993. Directed Studies. (; 1-6 cr. ; Student Option No Audit; Every Fall, Spring & Summer)
Directed Studies prereq: dept consent

MBS 6994. Directed Research. (; 1-6 cr. ; S-N only; Every Fall, Spring & Summer)
Directed research. prereq: dept consent

Master of Business Admin (MBA)

MBA 5200. Directed Studies for Curricular Practical Training. (; 1-3 cr. ; S-N only; Every Fall & Spring)
CPT is work authorization which allows a student to work in a job directly related to the student's major area of study before degree completion. prereq: International student with approval from the Program Office

MBA 6031. Financial Accounting. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Basic principles of financial accounting, involving the consecution/interpretation of corporate financial statements. prereq: MBA or Mgmt Sci MBA Student

MBA 6035. Managerial Accounting. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Cost systems introduced as potential sources of sustainable competitive advantage. Focuses on designing cost systems to provide manager with accurate, relevant, and timely information. prereq: 6030, 6230, MBA or Mgmt Sci MBA student

MBA 6108. Leading Self. (0-1 cr. ; A-F only; Every Fall & Spring)
Preparing for leadership journey of full-time MBA program through process of self-examination. Identifying personal leadership strengths/vulnerabilities via external multi-rater feedback and self-assessments. Introduction of leadership competencies. Creating customized leadership development plan.

MBA 6111. Leading Others. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Achieving organizational goals by leading in ways that create motivation, engagement, commitment, positive social interactions, and job performance. Understanding and managing the characteristics of organizations, work groups, and individuals. The role of group dynamics, decision making, cooperation, conflict, and power in leading others. Prior to Fall 2022 course number was: MBA 6110.

MBA 6112. Leading Organizations. (0-1 cr. [max 3 cr.] ; A-F only; Every Fall, Spring & Summer)
Leverage leadership journey of full-time MBA program through Enterprise experience. Course integrated with work of MBA Enterprise teams as they set vision and strategy, translate strategy for optimal team functioning, and execute strategy for clients. Exercises, assessments, role-playing, discussions.

MBA 6121. Data Analysis and Statistics for Managers. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Concepts/ principles of business statistics, data analysis, and presentation of results. Topics: exploratory data analysis and graphics, basic inferential procedures including estimation and hypothesis testing, correlation, bivariate and multiple regression analysis, forecasting and predictive modeling using regression, and introduction to the design of experiments. These methods are selected for their relevance to managerial decision making and problem solving. prereq: MBA or Mgmt Sci MBA student

MBA 6141. Managerial Economics. (; 2 cr. ; A-F only; Every Fall & Spring)
Introduction to some parts of microeconomics that are useful for managers, with attention to the circumstances that give rise to firm profitability. The first half of the course covers supply and demand, price elasticity, and market equilibrium. The second part of the course covers firms with differentiated products and market power, with particular focus on pricing models such as segmentation, bundling, and two part tariffs. Pricing models involve profit maximization and associated conceptual tools. The course touches on game theory and strategic interaction among small numbers of firms and ends with a discussion of market failure and the business opportunities that they sometimes create. The course also emphasizes links to other parts of the core business curriculum. The course makes extensive reference to statistical empirical examples. prereq: MBA or Mgmt Sci MBA student

MBA 6150. Managerial Communications. (; 1 cr. ; A-F only; Every Fall)
Thinking strategically about communication. Writing/presentation skills. Communications best practices, guidelines from research/ experience. Opportunity to practice/strengthen skills. prereq: MBA student

MBA 6211. Marketing Management. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Management of the marketing function; understanding the basic foundational marketing concepts and skills in strategy development and planning of operational and strategic levels pertaining to product offering decisions, distribution channels, pricing and communication. prereq: MBA student

MBA 6221. Supply Chain & Operations. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Supply chain and operations are at the core of how organizations deliver value to their customers. Effectively matching supply and demand is key to the success of any organization and world-class operations can lead to a significant and enduring competitive advantage. In contrast, poorly managed operations and supply chains can result in low customer satisfaction and diminished profit margins, ultimately leading to company failure in the long run. Beyond generating profits, companies around the world are also facing increasing pressure to perform well on the other two dimensions that constitute the ?triple bottom line?, namely people and the planet. By taking an ?end-to-end? view, we will explore a variety of topics related to managing today?s global supply chains, including environmental and social responsibility. The specific questions this course will address include: How can supply chain and operations help firms succeed? What are the issues and trade-offs confronting supply chain and operations managers? What tools and frameworks can managers use to tackle these challenges and develop and sustain a competitive advantage? What are the emergent environmental and social responsibility challenges facing supply chain managers and how should they address them? Topics covered: operations strategy, process analysis, statistical process control, lean operations, forecasting, inventory management under certain demand, sourcing, environmental and social responsibility in supply chains prereq: MBA student

MBA 6231. Financial Management. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
This course is required for all MBA students because of the financial implications of

decisions across all departments and disciplines in business. Managerial decisions can be broken down into two main categories: how to raise capital and how to employ capital. The decisions managers make in this context can add or destroy value. With this context in mind, the course provides students with an understanding of financial markets and the main types of securities that are issued by corporations. The course will leverage basic statistics in understanding of risk of a security as a stand-alone investment and as part of a well-diversified portfolio to provide an understanding of how risk affects required returns of investors. The course emphasizes the concept of time value of money as a basis for decision making. Managers make decisions that affect the cash flows of the firm; the course provides students with a context for thinking about forecasting cash flows, discounting cash flows, and assessing whether the decisions they are considering are value-added for the firm. prereq: MBA 6031 (equiv. is also MBA 6030 before course number change in Fall 2022), MBA student

MBA 6235. Managerial Accounting. (; 2 cr. [max 3 cr.] ; A-F only; Every Fall, Spring & Summer)
Cost systems introduced as potential sources of sustainable competitive advantage. Course focuses on designing cost systems to provide manager with accurate, relevant, and timely information. Taught as part of an integrated functional core. prereq: MBA or Mgmt Sci MBA student

MBA 6241. Competing in a Data-Driven Digital Age. (; 2 cr. ; A-F only; Every Fall & Spring)
Contemporary managers must understand how the convergence of mobility, analytics, social media, cloud computing, and AI are transforming firms, industries, markets, and society. This course provides tools and conceptual frameworks for competing in the digital age. Students will learn state-of-the-art skills in the context of digital disruption, platform based business models, Internet of Things, digital advertising, social networks, social media, big-data, and open innovation that pervade competition in the digital age. These will include the fundamentals of predictive modeling, large scale A/B testing, social networks analysis, and an exposure to the issues on the ethics and bias involved in AI applications. While this course will use case studies in the digital domain, the methods taught here have a wide range of applicability across functions and verticals in modern business environments. prereq: FT MBA, Mgmt Sci MBA or Online MBA student

MBA 6301. Strategic Management. (; 3 cr. ; A-F only; Every Fall & Spring)
This course focuses on the competitive strategy of the firm, examining how firms achieve and maintain superior profitability relative to their competitors in the long run, and the firm's role in building a more just and sustainable world. Starting from overall industry analysis, we cover how firms position themselves to succeed in various competitive contexts based on their resources and capabilities. We then analyze how firms innovate and adapt their capabilities over time, especially in the digital age. We extend our analysis to the scope choices of the firm and discuss how firms can successfully compete across multiple countries and businesses. Throughout the course, case discussions examine and simulate the process through which strategic decisions are made and carried out. Students are placed in the role of decision-makers and frequently asked to analyze the key choices they must make to define, reinforce, and successfully implement the firm's strategy. prereq: MBA or Mgmt Sci MBA student

MBA 6315. The Ethical Environment of Business. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Understanding the ethical environment within which business and managers operate. Focus is on the ethical expectations surrounding organizational activities, firm responsibilities to shareholders and stakeholders, and providing a comprehensive framework for ethical decision-making by individuals. The goal of the class is two-fold. First, to help people in business find a voice and advance a point of view as they go forward with their career. Second, to prepare managers to successfully navigate and manage this critical component of a firm?s competitive environment. prereq: MBA student

MBA 6402. Technology Industry. (; 2 cr. ; A-F only; Periodic Fall)
This course focuses on firms engaged in three major sub areas of technology including e-commerce, defense, and manufacturing sub-sectors. Cases and live case studies to focus on firms ranging from 3M, Lockheed, Amazon, and Google. Federal agency oversight focus includes the Departments of Defense, Transportation, Commerce, and Education.

MBA 6403. Strategic Change in the Energy Industry. (; 2 cr. ; A-F only; Periodic Fall)
Throughout this two-semester program, students participate in coursework that teaches best practices, frameworks, and methodologies crucial for identifying and evaluating new ventures. In a teach-then-apply environment, students manage client based projects solving real-world problems in real time, whether helping an entrepreneur develop their new business or an established organization evaluate opportunities for growth. prereq: MBA or Mgmt Sci MBA student; program approval

MBA 6500. MBA Projects. (; 2-4 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
Interdisciplinary team approach to formulation/ execution of an actual business problem. Teams work on problems currently faced by business, nonprofit, and government organizations in the Twin Cities metropolitan area. prereq: MBA student, instr consent

MBA 6501. Carlson Funds Enterprise: Growth. (; 1-4 cr. [max 12 cr.] ; A-F only; Every Fall & Spring)
Experiential Learning: students integrate finance skills by managing an institutional equity portfolio. Sustainable finance, financial modeling, portfolio management, and presentations to clients / investment professionals are all critical skills developed in this course. prereq: MBA or Mgmt Sci MBA student; program approval

MBA 6502. Carlson Funds Enterprise: Fixed Income. (; 1-4 cr. [max 12 cr.] ; A-F only; Every Fall & Spring)
Experiential Learning: students integrate finance skills by managing an institutional bond portfolio. Sustainable finance, financial modeling, portfolio management, and presentations to clients / investment professionals are all critical skills developed in this course. prereq: MBA or Mgmt Sci MBA student; program approval

MBA 6503. Carlson Ventures Enterprise. (; 2-4 cr. [max 12 cr.] ; Student Option No Audit; Every Fall & Spring)
Carlson Ventures Enterprise (CVE) is intended for highly-motivated entrepreneurially minded graduate and undergraduate students who seek opportunities to develop creative problem solving and critical analysis skills to aid in better identifying, creating and evaluating any new business opportunity, whether a start-up, social venture, or innovation initiative inside a Fortune 500 company. CVE?s comprehensive curriculum includes the best practices, frameworks, and tools used in entrepreneurial and innovative pursuits. In a teach-then-apply environment, students manage client-based projects solving real-world problems in real time, whether helping an entrepreneur develop their new business or an established organization evaluate opportunities for growth. CVE fits with multiple degree plans, in multiple schools at the University, as either a requirement, an elective or a capstone. Registration for this course is by permission only. prereq: MBA or Mgmt Sci MBA student; program approval

MBA 6504. Carlson Consulting Enterprise. (; 1-4 cr. [max 12 cr.] ; Student Option No Audit; Every Fall & Spring)
Connects cutting-edge ideas/technologies from classroom to real problems presented by clients. Students work collaboratively with clients to integrate strategy/technology. How to lead complex change initiatives. prereq: MBA or Mgmt Sci MBA student; program approval

MBA 6505. Carlson Brand Enterprise. (; 2-4 cr. [max 12 cr.] ; Student Option No Audit; Every Fall & Spring)
Students assist companies/organizations with marketing/brand challenges; apply theory, industry best practices. Work collaboratively in real-world environment. Critical thinking, applied marketing skills. prereq: MBA or Mgmt Sci MBA student; program approval

MBA 6990. MBA Topics. (; 2 cr. [max 8 cr.] ; A-F only; Periodic Fall, Spring & Summer)
Various topics.

MBA 6999. Full Time MBA Internship Course. (; 0 cr. ; S-N only; Every Spring)
The focus of this course is to prepare students for internship experience and to help summarize that experience as they look for full

time positions post-MBA. The course will focus on preparation and reflection with the goal of helping each feel ready to apply MBA skills in a work setting whether that is working for an organization, starting a venture, or creating a project experience over the summer. Post-internship we will discuss how to communicate growth and learning over the summer in career marketing materials and communication.

Master of Business Taxation (MBT)

MBT 5223. Tax-exempt Organizations. (2 cr. ; A-F or Audit; Spring Odd Year)
Tax law/issues concerning Section 501(c)(3) and other tax-exempt organizations. Qualification, procedures. Unrelated business income, private foundations (including intermediate sanctions), joint ventures. prereq: ACCT 5135

MBT 6201. Tax Accounting Methods I. (; 2 cr. ; A-F or Audit; Every Spring)
This course covers the federal income tax rules for when income and expense should be recognized. The purpose of this course is to provide students the statutory and regulatory framework for analyzing and explaining the federal income tax consequences of tax accounting methods and periods issues. prereq: ACCT 5135, MBT student - NOTE: Previous course number was MBT 5200.

MBT 6202. Tax Accounting Methods II. (; 2 cr. ; A-F or Audit; Every Spring)
This course covers special topics within the tax accounting methods area, including changes in accounting methods, accounting periods, installment sales, and inventory concepts. The purpose of this course is to provide students statutory and regulatory framework for analyzing and explaining the federal income tax consequences of special tax accounting methods issues. prereq: MBT 5200/6201 NOTE: Previous course number was MBT 5201

MBT 6221. Tax Research, Communication, and Practice. (; 4 cr. ; A-F or Audit; Every Fall)
Tax questions. Locating/assessing potential authority. Communicating research results. Sources of IRS policy. Processing/auditing returns. Rulings, determination letters. Closing agreements. Assessments, collections. prereq: ACCT 5135 NOTE: Previous course number was MBT 5220

MBT 6226. Negotiation Techniques in Taxation. (; 2 cr. ; A-F or Audit; Spring Even Year)
Hands-on approach. Applications from facilitating business sales, mergers, and acquisitions, to representing a client's position before IRS, to controlling TV remote. Negotiation process: planning, pre-negotiation preparation, strategy development. NOTE: Previous course number was MBT 5226.

MBT 6231. Corporate Taxation I. (; 2 cr. ; A-F or Audit; Every Fall)
Federal income taxation of corporations/shareholders. Organization of a corporation. Establishment of capital structure. Determination of tax liability. Dividends, non-liquidating distributions. Stock redemptions, liquidations. prereq: ACCT 5135 NOTE: Previous course number was MBT 5230

MBT 6232. Corporate Taxation II. (; 2 cr. ; A-F or Audit; Every Fall)
Different types of acquisitions, dispositions, reorganizations, and spin-offs involving C corporations. Tax consequences of acquisition to corporations/shareholders involved. Use of 338 elections, limitations on acquired net operating losses/credits, use of covenants not to compete, consulting agreements, deferred payment terms, treatment of transaction costs. NOTE: Previous course number was MBT 5323 prereq: MBT 6231/5230

MBT 6333. Tax Aspects of Consolidated Returns. (; 2 cr. ; A-F or Audit; Summer Odd Year)
Filing. Determining affiliated groups. Election filing. Intercompany transactions. Limitations on certain loss and credit carryforwards. Allocation of federal income tax liability. E&P, investment basis adjustments. Loss allowance rules. Excess-loss accounts. NOTE: Previous course number was MBT 5333.

MBT 6335. Taxation of the Small Business Corporation. (; 2 cr. ; A-F or Audit; Summer Even Year)
Federal income taxation of S corporations. Election eligibility; termination of status; treatment of income and deduction items; distributions, basis of stock and debt. Compensation arrangements in closely held corporations; fiscal year issues; personal service corporations; advantages of C corporations vs. S corporations; corporation liquidation and redemption rules; S corporation's built-in gains tax. NOTE: Previous course number was MBT 5335. prereq: MBT 6231\5230

MBT 6341. Taxation of Partners and Partnerships. (; 2 cr. ; A-F or Audit; Every Fall)
Reviews tax consequences associated with formation, operation, and dissolution of a partnership. NOTE: Previous course number was MBT 5340 prereq: Acct 5135

MBT 6346. ASC 740 Computations and Analysis. (; 2 cr. ; A-F or Audit; Every Fall)
Financial accounting/reporting standards for effects of income taxes from corporate activities. Computation of current/deferred tax expense/benefit. Temporary differences, carryforwards. Computation of deferred tax assets/liabilities, valuation allowances, business combinations. Investments in subsidiaries, equity method investments. Foreign operations, tax allocations, interim period tax calculations. NOTE: Previous course number was MBT 5346.

MBT 6347. Tax Technology and Analytics Fundamentals. (; 2 cr. ; A-F or Audit; Every Spring)
Tax technology is transforming the way tax departments are doing business in many amazing ways. Both public accounting firms and businesses are investing in people, process, data, and technology at a rapid pace. This course provides the student with relevant background on current technologies and associated challenges, managerial approaches, systems design, process, data challenges and risk assessment methods that are specific to the tax technology arena. Additionally, it will focus on the fundamental concepts of project management, business requirements, data analytics, implementation choices, and the necessary business cases that are being conducted in both the public and private sector. prereq: ACCT 5135 NOTE: Previous course number was MBT 5347.

MBT 6348. Advanced ASC 740 Concepts. (; 2 cr. ; A-F or Audit; Spring Even Year)
Examination of topics under ASC 740 Accounting for Income Taxes. Share-based awards, uncertain tax positions, valuation allowances, business combinations, foreign operations, interim period tax calculations. Process design/perspective of stakeholders of income tax accounting. NOTE: Previous course number was MBT 5348. prereq: MBT 6346\5346

MBT 6351. Wealth Transfer I (Estates and Gifts). (; 2 cr. ; A-F or Audit; Summer Even Year)
Taxation of transfers under federal estate and gift tax laws. Property owned by decedent. Retained life estates. Transfers taking effect at death. Revocable transfers. Joint interest. Powers of appointment. Valuation. Expenses, debts, taxes. Charitable bequests, marital deduction. Taxable inter vivos gifts, splitting/credits. prereq: ACCT 5135, MBT student. NOTE: Previous course number was MBT 5350.

MBT 6353. Income Taxation of Fiduciaries. (; 2 cr. ; A-F or Audit; Summer Odd Year)
Simple, complex, and revocable trusts. Estates. Accumulation distributions and income with respect to decedents. Trust accounting income and principal. Distributable net income. Terminations. Excess distributions. NOTE: Previous course number was MBT 5353. prereq: ACCT 5135

MBT 6361. State and Local Taxation. (; 2 cr. ; A-F or Audit; Every Spring)
Examines state levying of individual income, corporate income, property, sales, and excise taxes. Tax problems of businesses with multistate operations. prereq: Acct 5135, MBT student. NOTE: Previous course number was MBT 5360.

MBT 6363. Compensation and Benefits. (; 2 cr. ; A-F or Audit; Fall Odd Year)
Federal income taxation of executive compensation, relevant fringe benefit programs. Benefit programs other than qualified retirement plans. Salary continuation, stock options, non-profit organization plans, health/welfare plans. prereq: ACCT 5135 NOTE: Previous course number was MBT 5363.

MBT 6371. Taxation of Property Transactions. (; 2 cr. ; A-F or Audit; Every Fall)
Determining realized gain or loss and recognized gain or loss, and tax treatment

of that gain or loss on property dispositions. Consequences of property transactions including depreciation, depletion, basis, and capital gains problems. prereq: Acct 5135 NOTE: Previous course number was MBT 5370.

MBT 6381. Tax Aspects of International Business I. (; 2 cr. ; A-F or Audit; Every Fall)
Multinational business operations/transactions involving foreign income. Tax consequences of transactions with/by foreign organizations/ companies. prereq: MBT 6231/5230 NOTE: Previous course number was MBT 5380.

MBT 6382. Tax Aspects of International Business II. (; 2 cr. ; A-F or Audit; Spring Odd Year)
Foreign tax credit, Subpart F planning opportunities, international structuring (joint ventures, use of entity classification regulations). Transfer pricing, foreign currency. Legislative, regulatory, and judicial developments. prereq: MBT 6381/5380 NOTE: Previous course number was MBT 5381

MBT 6383. Transfer Pricing. (; 2 cr. ; A-F or Audit; Spring Odd Year)
This course provides an introduction to transfer pricing issues facing multinational businesses. The discussion will focus on the application of the arm?s length standard as described in US Treasury Regulations 1.482, and application of transfer pricing legislation and regulations in other countries, largely through the transfer pricing guidelines published by the Organization for Economic Cooperation and Development (OECD). The course examines economic models, pricing policies, global intangible property, and controversy involving transfer pricing. Prereq: ACCT 5135. NOTE: Previous course number was MBT 5382.

MBT 6420. Current Topics in Taxation. (; 1-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Tax research/compliance, other tasks. Students submit summary paper. prereq: ACCT 5135, MBT student. NOTE: Previous course number was MBT 5420.

MBT 6501. Business, Government, and Economic Tax Policy. (; 2 cr. ; A-F only; Every Fall)
Effects of business/government on tax system. Social, political, economic, cultural values affecting tax system. Macroeconomics/ implication for taxation. History of taxes/ alternate approaches to taxation, public finance, government expenditures in theory/ practice. Specific taxes. prereq: MBT 6231/5230. NOTE: Previous course number was MBT 5500.

MBT 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

Master of Development Practice (MDP)

MDP 5001. Ways of Knowing for Sustainable Development. (; 2 cr. ; A-F or Audit; Every Fall)
Complexities of interdisciplinary study of development and a range of ways of knowing the field of development studies and sustainability. Approaches practiced by physical, biological, social science, and humanities scholars. "Ways of knowing" in different cultures/groups and from a variety of situated perspectives. Key issues and concepts and key methodological challenges facing us as we engage in interdisciplinary and international development study and practice. Sustainable livelihoods. Team taught when possible by faculty from biological, social sciences, and humanities, or at minimum will include guest lecturers who can offer a range of disciplinary perspectives on questions of development. prereq: Grad MDP major or instr consent

MDP 5002. Program Development Workshop. (3 cr. [max 4 cr.] ; A-F only; Every Spring)
Research/writing skills to support work in international development. Discussion of basic qualitative research methods/data analysis. Qualitative/quantitative data, collaborative research/analysis. Relationship between research/policy. prereq: MDP grad student or instr consent

MDP 5004. International Field Experience. (; 3 cr. ; S-N or Audit; Every Summer)
International field experience. prereq: MDP grad student or instr consent

MDP 5005. Qualitative Methods for Development Practice. (3 cr. ; A-F only; Every Spring)
Course introduces students to qualitative inquiry and analysis in the field of international and/or sustainable development practice. It provides students with first hand experience in research design for development practice applications, including data collection and analysis. The course includes lectures, discussions, presentations, and project based learning. It is considered introductory as a single semester is insufficient to introduce, design, and conduct a comprehensive qualitative inquiry and analysis.

MDP 5100. Post-Field / Pre-Capstone Seminar. (; 1 cr. ; A-F only; Every Fall)
This project-focused seminar meets once at the beginning of the fall semester to collect observations, reflections and insights from the summer field placements. Then, throughout the fall semester, the seminar will meet periodically to stage the spring capstone course. Staging includes a capstone overview session, presentation of projects, team selection process and initial client engagements, the latter being particularly important for teams aspiring to travel during the winter or spring breaks.

MDP 5200. Capstone Workshop in Development Practice. (3 cr. [max 6 cr.] ; A-F or Audit; Every Fall & Spring)
Learning from field experiences. Analytical/ practical skills developed in academic training. Apply skill/experiences to "real world" problem provided by local or international development-focused organization. Reflective practice. prereq: MDP grad student or instr consent

Master of Healthcare Admin (MHA)

MHA 8763. External Forces Affecting Health Services Delivery. (; 2 cr. ; A-F or Audit; Periodic Fall)
Guidance in development of concepts, models, and principles of financing, social policy making, and organizing and human resource development for health services delivery. Written paper and teaching presentation required. prereq: PhD student

MHA 8782. Research Practicum. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Field experience in healthcare research. Supervised independent and team research on selected topics and problems. prereq: PhD student

Master of Marketing (MSMK)

MSMK 6051. Marketing Intelligence. (2 cr. ; A-F only; Every Fall)
Methods for collecting/analyzing data to solve marketing problems. Survey research techniques. Research design, secondary/ primary data collection, sample design, data analysis. Application of techniques to marketing problems, marketing research projects.

MSMK 6052. Marketing Analytics:Decision Making. (2 cr. ; A-F only; Every Spring)
This course focuses on learning how to use quantitative analysis tools to solve real-life problems in business. Rather than developing complicated mathematical models, the course aims at learning how to apply analytic techniques to a typical business decision problem, obtaining business management insights, and developing recommendations. The lecture and group activities will be topic-driven and sample topics include market analysis, targeting, customer value assessment, and new product development. Considering the popularity and convenience of it in business decisions, Excel will be the main software for the course, with occasional application of SPSS for a few specific functions.

MSMK 6053. Marketing Analytics:Insights. (2 cr. ; A-F only; Every Spring)
Customer Analytics addresses how to use data to learn about and market to individual customers. Marketing is evolving from an art to a science. Many firms have extensive data about consumers' choices and how they react to marketing campaigns, but few firms have the expertise to intelligently act on such information. In this course, students will learn the scientific approaches to analyze and act on customer information. While students will employ quantitative methods in the course, the goal is not to produce experts in statistics; rather, students will gain the competency and working experience to interact with and manage a marketing analytics team. The course uses a combination of lectures, cases, and exercises to learn the material. This course takes a hands-on approach with real-world databases and equips students with tools that can be used immediately on the job.

MSMK 6055. Buyer Behavior. (2 cr. ; A-F only; Every Fall)
Application of behavioral sciences to understanding buyer behavior. Perceptions, memory, affect, learning, persuasion, motivation, behavioral decision theory, social/cultural influences, and managerial implications. Emphasizes class discussion.

MSMK 6076. Customer Relationship Management. (2 cr. ; A-F only; Every Spring)
Management of personal selling. Sales force organization, effort allocation, personnel selection, motivation, compensation, performance evaluation.

MSMK 6078. Advertising and Promotion. (2 cr. ; A-F only; Every Fall)
Managing communication. Advertising, sales promotion, public relations, direct marketing. Setting communications objectives and budgets, media selection, creative strategy, sales promotion techniques.

MSMK 6082. Brand Strategy. (2 cr. ; A-F only; Every Spring)
Management of brands/brand equity in modern business enterprises. Measuring brand equity. Building brand equity. Leveraging brand equity through brand extensions/alliances. Lectures, case studies, group brand projects.

MSMK 6086. Digital Marketing. (2 cr. ; A-F only; Every Fall)
Marketing practices have dramatically shifted with the rise of social media and the proliferation of devices, platforms, and applications. This rapidly changing environment presents new opportunities and challenges for marketers. Through a combination of case studies, best practice examples, current news items, and assignments, students learn how the elements of a digital strategy work together with traditional media to attract prospective customers. Specifically, students learn best practices for social media marketing, content marketing, organic and paid search, search engine optimization, e-mail marketing, landing pages, and display advertising. Students discuss strategies for reputation management in a world where information is disseminated virally and discover how social media monitoring and data analysis can be used to improve marketing and product development activities. The importance of establishing digital marketing goals and analytics is covered as well as how to measure return on investment for digital activities.

MSMK 6088. Strategic Marketing. (3 cr. ; A-F only; Every Spring)
Determining product-markets where organization should compete. Sustainable competitive advantage. Matching marketing strategy with environment. Coordinating marketing, other business functions. Organizing marketing function/management. [with Simulation]

MSMK 6205. Business Fundamentals for Marketing. (3 cr. ; A-F only; Every Fall)
This course focuses on fundamental business topics and knowledge central for marketers. These include understanding the fundamentals of finance, accounting, management, and operations. After taking this course students will understand business financials and the role of marketing with a larger business organization.

MSMK 6211. Marketing Management. (3 cr. [max 4 cr.] ; A-F only; Every Fall)
Management of the marketing function; understanding the basic foundational marketing concepts and skills in strategy development and planning of operational and strategic levels pertaining to product offering decisions, distribution channels, pricing and communication.

MSMK 6281. Customer Experience Management. (2 cr. ; A-F only; Every Fall)
This course focuses on qualitative marketing research. Skills include strategic observation, interviewing, focus groups, and customer journey mapping. After taking this course, students will be able to understand how to effectively gather information to understand customer experience.

MSMK 6505. Enterprise Project. (4 cr. ; A-F only; Every Spring)
This course centers on doing a real marketing project for a real company. Guided by faculty, this hands-on course is like a capstone experience that enables students to integrate all their skills into an applied deliverable project for an actual organization. After taking this course, students will be prepared to work effectively in an organization in a marketing function.

MSMK 6901. Project Management. (0-2 cr. ; A-F only; Every Fall & Spring)
This course focuses on effective project management skills. Skills include working in groups, managing tasks and timelines, and effective communication. After taking this course students will be prepared to effectively work in groups on business projects.

Master of Science in Finance (MSF)

MSF 6021. Communications for Finance. (2 cr. ; A-F only; Every Spring)
This course covers guidelines and practical skill development for writing well-organized, professional documents and delivering confident, credible, and dynamic presentations. Students will practice designing and delivering effective messages including reader-friendly documents and PowerPoint using a professional writing style and document design. Through discussion and practice, students will also learn to deliver poised, formal and informal presentations to small and large groups both individually and in teams. prereq: Summer Cohort Completion

MSF 6022. Financial Statement Analysis. (2 cr. ; A-F only; Every Fall)
This course teaches how to analyze financial statements, and it covers the following topics: overview of business activities and financial statements; profitability analysis and interpretation; credit risk analysis and interpretation; revenue recognition and operating income; asset recognition and operating assets; and inter-corporate entities. prereq: Summer Cohort Completion

MSF 6031. Financial Accounting. (3 cr. ; A-F only; Every Summer)
This course provides students with a deep understanding of financial accounting fundamentals so that they can make decisions based on reported financials. Students will learn how a firm's operating activities, its investments, and financing transactions are recorded in the income statement, balance sheet, and statement of cash flows. Students will develop some skills needed to analyze financial statements that would later be used.

MSF 6121. Fixed Income and Securities. (2 cr. ; A-F only; Every Fall)
This class provides an introduction to fixed income markets. Topics include the price/yield relation, no-arbitrage pricing of stripped coupon bonds, the duration/convexity approximation, the term structure of interest rates, defaultable bonds, mortgage-backed securities, inflation protected securities, bonds with embedded options, swap rates, the Fed Funds rate, repurchase agreements, and attribution analysis. prereq: Fall A Cohort Completion

MSF 6221. Finance I: Risk, Return, Value. (2 cr. ; A-F only; Every Summer)
This course is the first course in a three-course sequence to introduce the ideas of corporate finance. This course will focus on an overview of corporate finance in the firm, the valuation principle, the time value of money, interest rates, valuing bonds, risk and return, and estimating the cost of capital.

MSF 6222. Finance II: Cash Flows, Managerial Decisions, and Project Valuation. (2 cr. ; A-F only; Every Fall)
This course is the second course in a three-course sequence to introduce the ideas of corporate finance. Section I will introduce capital budgeting. Students will use the cost of capital learned at the end of the first course in conjunction with an introduction to the calculation of cash flows and the use of decision rules for project selection. Section II will move into stock valuation and company valuation based upon the dividend discount model and enterprise model of valuation; students will also be exposed to other valuation methods. Section III will introduce the effect of capital structure on company valuation, starting with perfect markets and introducing the opposing effects of taxation and financial distress on valuation. Students will complete a case to demonstrate understanding of the core concepts from the first three sections; the case is a continuing case with each week building on the prior week's work. Section IV will provide an introduction to financial options and option valuation.

MSF 6223. Fundamentals of Finance III. (2 cr. ; A-F only; Every Fall)
This course is the last of a three-course sequence that introduces the ideas of corporate finance. It focuses on the three major decisions of a firm: the financing decision, the capital structure decision, and the payout decision. There is also an introduction to

corporate valuation. This course uses a balanced mix of lectures and case studies, and emphasizes the use of real world data. prereq: Summer Cohort Completion

MSF 6224. Corporate Finance Analysis and Decisions. (2 cr. ; A-F only; Every Spring)
Theoretical/applied understanding of corporate financial decisions. Adjusted present value, economic value added options. Impact of financing decisions on real asset valuation, managerial incentives, corporate strategy.

MSF 6321. Quantitative Portfolio Analysis. (2 cr. ; A-F only; Every Fall)
This course develops and examines models for portfolio decisions by investors and the pricing of securities in capital markets. We will develop portfolio theory along the way and also study the extensive empirical work that characterizes movements in security prices and evaluates alternative asset pricing models. Topics include the mean variance portfolio analysis, the capital asset pricing model, arbitrage pricing theory, the empirical performance of asset pricing model (market anomalies), multi-factor asset pricing models, time varying risk and returns, and portfolio performance evaluation, including style and attribution analysis. Extensive use of the computer will be required. prereq: Fall A Cohort Completion

MSF 6322. Corporate Valuation and Modeling. (2 cr. ; A-F only; Every Fall)
This course develops the financial modeling principles and tools needed to build, operate, and understand the standard business performance, M&A, equity, and credit models that have become central to modern financial decision making. The course develops a deep understanding of financial models so they can be used to analyze a wide range of financial issues. Finance concepts introduced in other courses are reinforced by having students build them into models and by having students interpret the results produced by those models. Students build a financial model on their own, learn to use a fully developed financial model and use models repeatedly to evaluate and plan performance, to estimate value added from projects, operating strategies and financing proposals and to estimate the value of securities. This course extensively uses VBA macros, sensitivity tables and scenario analyses. prereq: Fall A Cohort Completion

MSF 6421. Computing for Finance: Excel/ VBA I & II. (2 cr. [max 4 cr.] ; A-F only; Every Summer)
This course first introduces students to specific software (e.g., Excel VBA, ModelRisk Monte Carlo simulator) and databases (e.g., Bloomberg, Factset, CRSP, Compustat) that will be used throughout the MS program. It then focuses on the use of Excel for many topics in finance, including modern portfolio theory, optimal portfolio analysis and binomial option pricing. This course often takes the material being learned in the "Fundamentals of Finance" course to motivate specific examples.

MSF 6422. Financial Econometrics and Computational Methods I. (2 cr. ; A-F only; Every Fall)
This course provides an introduction to the methods used in empirical finance. A review of statistics is followed by intensive instruction on matrix algebra that culminates in a fundamental understanding of linear regression, the basic empirical tool. Asset pricing theories are discussed and developed and then methods are derived to test them. The course will emphasize estimation and inference using computer-based applications. prereq: Summer Cohort Completion

MSF 6423. Financial Econometrics and Computational Methods II. (2 cr. ; A-F only; Every Fall)
This course builds on Financial Econometrics I and provides instruction on the econometrics used in empirical finance. Topics will include time series analysis, parametric models of volatility, evaluation of asset pricing theories, and models for risk management. The course will emphasize estimation and inference using computer-based applications. prereq: Fall A Cohort Completion

MSF 6424. Introduction to Machine Learning for Finance. (2 cr. ; A-F only; Every Spring)
Machine learning methods are now widely used in finance. This class covers fundamental methods. Particular attention will be devoted to the use in asset pricing and credit assessment. A real project has several steps: 1) data collection, 2) data management, 3) exploratory data analysis, 4) learning and predicting, 5) communicating results. The lectures focus on techniques for step 4. The homework provides hands-on practice including the other steps.

MSF 6522. Derivatives and Risk Management. (2 cr. ; A-F only; Every Spring)
This class provides an introduction to derivatives markets. This course is designed to achieve two main objectives. First, provide students with a rigorous framework used in valuing derivative contracts. This will include an in-depth treatment on the two work horses of the binomial model and the Black-Sholes-Merton model. Second, apply the framework to understand a wide variety of issues related to risk management and investment decisions. prereq: Fall A Cohort Completion

MSF 6621. Finance within the Macroeconomy. (2 cr. ; A-F only; Every Spring)
This course is intended to provide you with an understanding of modern macroeconomics. We are particularly interest in how financial markets and institutions fit into the overall macro system. By the time that the term is over you will have a much stronger sense of the ongoing macroeconomic news and policy discussion. Having a sense of this material is often helpful in job interviews as well. prereq: Fall A Cohort Completion

MSF 6801. Finance Independent Study Masters Program. (1-6 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Independent Study. prereq: instr consent

MSF 6821. Experiential Learning. (4 cr. ; A-F only; Every Spring)
This course is the first half of the experiential learning segment of this program. Students will be partitioned into groups to investigate a particular project. The students will identify the most crucial issues associated with the project, collect the necessary data that will be used to analyze the issue at hand, and determine the quantitative tools that will be required to analyze the relevant issues. prereq: completion of Fall Cohort.

MSF 6921. Introduction to Python. (2 cr. ; A-F only; Every Summer)
This course is focused on analyzing economic and financial data using Python. You will learn how to access powerful and popular libraries for data access, analysis, and visualization. We will spend most of our class time completing practical, hands-on exercises.

Masters of Appl Bus Analytics (MABA)

MABA 6121. Practical Statistics for Business Applications. (2 cr. ; A-F only; Every Fall)
Concepts/principles of business statistics, data analysis, and presentation of results. Topics include exploratory data analysis, basic inferential procedures, statistical process control, time series/regression analysis, and analysis of variance. These methods are selected for their relevance to managerial decision making and problem-solving.

MABA 6131. Mathematics Essentials for Business Analytics. (; 2 cr. ; A-F only; Every Spring)
Fundamentals of decision analysis, optimization, linear and integer programming, risk analysis, heuristics, simulation, decision technologies.

MABA 6141. Ethics, Data Privacy, and Governance. (1 cr. [max 2 cr.] ; A-F only; Every Fall)
Introduction to the legal, policy, and ethical implications of data, including privacy, surveillance, security, classification, discrimination, etc. Examines legal, policy, ethical, and governance issues throughout the full data-science life cycle - collection, storage, processing, analysis, and use.

MABA 6251. AI for Competitive Advantage. (2 cr. ; A-F only; Every Fall)
Case-, technical-, and discussion-based introduction to strategic use of artificial intelligence for firm strategy. Topics include: business value, impact, benefits, and limitations. Course is equally divided by cases, discussion, lecture, and technical demonstration.

MABA 6311. Programming for Business Analytics. (2 cr. ; A-F only; Every Fall)
Introduction to Python with a focus on steps of using data for decision making; topics include: data acquisition, parsing, handling missing data, summarization, augmenting, transformation, subsetting, sampling, aggregation, and merging. prereq: Programming experience

MABA 6321. Data Management and Big Data. (2 cr. ; A-F only; Every Spring)

Fundamentals of database modeling and design; extract, transform, and load; data pre-processing, quality, integration, and stewardship issues; advances in database and storage technologies for unstructured and big data.

MABA 6341. Data Visualization. (2 cr. ; A-F only; Every Fall)
The use of visualization for exploring (and communicating with) data: discover patterns, answer questions, convey findings, drive decisions, and provide persuasive evidence. The students will have practical, hands-on experience with interactive data visualization using modern, state-of-the-art software on real-world datasets.

MABA 6411. Exploratory Data Analytics. (2 cr. ; A-F only; Every Fall)
Fundamentals of data exploration; detecting relationships and patterns in data; cluster analysis, hierarchical and partition-based clustering techniques; rule induction from data.

MABA 6421. Predictive Analytics. (2 cr. ; A-F only; Every Fall)
Fundamentals of predictive modeling and data mining; assessing performance of predictive models; machine learning and statistical classification and prediction; logistic regression; decision trees, random forests; k-nearest neighbor techniques, na?ve Bayesian classifiers, neural networks.

MABA 6431. Advanced Topics on Business Analytics. (2 cr. ; A-F only; Every Fall)
Analysis of time series data; understanding its components including trend, seasonality, autocorrelation, and stationarity; model interpretation and forecasting; traditional statistical and modern machine-learning views of temporal dependency; combining time series analysis with other business analytical tools to discover hidden knowledge and gain competitive advantages ahead of time.

MABA 6441. Causal Inference via Econometrics and Experimentation. (2 cr. ; A-F only; Every Spring)
Controlled experiments in business settings, experiment design, A/B testing; specialized statistical methodologies; fundamentals of econometrics, instrumental variable regression, propensity score matching.

MABA 6451. Prescriptive Analytics. (2 cr. ; A-F only; Every Spring)
Fundamentals of decision analysis, optimization, linear and integer programming, risk analysis, heuristics, simulation, decision technologies.

MABA 6490. Special Topics in Applied Business Analytics. (; 1 cr. ; A-F only; Periodic Fall & Spring)
Discussion and analysis of topics and developments in applied business analytics.

MABA 6511. Experiential Learning. (4 cr. ; A-F only; Every Spring)
Hands-on, integrative application of analytics methodologies, techniques, and tools learned throughout the program in the context of a specific analytics problem. Introduction to agile project management. Experience with the entire data analytics cycle, starting from business and data understanding as well as data cleaning and integration and ending with the development and presentation of results, interpretations, insights, and recommendations.

Masters of Business Analytics (MSBA)

MSBA 6111. Business Essentials. (3 cr. ; A-F only; Every Summer)
Introduction to fundamental concepts and applications in core business disciplines such as financial accounting, marketing, operations, and strategy, with an emphasis on their connection to business analytics. The course aims to increase students? business acumen and allows them to effectively partner with key functional areas of an organization.

MSBA 6121. Introduction to Statistics for Data Scientists. (3 cr. ; A-F only; Every Summer)
This course is designed to develop statistical thinking, i.e., understanding variation and using data to identify possible sources of variation. Specific techniques include basic descriptive and inferential procedures and regression modeling. The emphasis is on understanding such analysis for their relevance to decision making.

MSBA 6131. Introduction to Business Analytics in R. (3 cr. ; A-F only; Every Summer)
Introduction to key processes, building blocks, and use cases of business analytics through R, including data acquisition, engineering, visualization, basic concepts of exploratory and predictive analytics, and lifecycle of business analytics projects.

MSBA 6141. Ethics and Data Privacy. (1 cr. [max 3 cr.] ; A-F only; Every Fall)
Explore the moral, social, ethical, and legal ramifications of the choices made at the different stages of the data analysis pipeline, from data collection and storage to analysis and use. Students will learn the basics of ethical thinking in data science, understand the history of ethical dilemmas in scientific work, study issues of fairness, transparency, and algorithmic bias associated with machine learning, and explore the distinct challenges associated with ethics and privacy in modern data science.

MSBA 6250. Analytics for Competitive Advantage II. (3 cr. ; A-F only; Every Summer)
Case/discussion-based introduction to variety of analytics-related issues/examples in business. Business value, impact, benefits/ limitations, as well as ethical, legal, privacy issues. Use of case studies, examples, guest speakers.

MSBA 6255. Analytics for Competitive Advantage I. (3 cr. ; A-F only; Every Fall & Summer)
Quantitative problem solving formulation and solving skills.

MSBA 6311. Programming for Data Science. (3 cr. ; A-F only; Every Fall)
According to recent industry surveys, Python is one of the most popular tools used by organizations data analysis. We will explore the emerging popularity of Python for tasks such as general purpose computing, data analysis, website scraping, and data visualization.
You will first learn the basics of the Python language. Participants will then learn how to apply functionality from powerful and popular data science-focused libraries. In addition, we will learn advanced programming techniques such as lambda functions and closures. We will spend most of our class time completing practical hands-on exercises.

MSBA 6321. Data Management, Databases, and Data Warehousing. (3 cr. ; A-F only; Every Fall)
Fundamentals of database modeling/design, normalization. Extract, transform, load. Data cubes/setting up data warehouse. Data pre-processing, quality, integration/stewardship issues. Advances in database/storage technologies.

MSBA 6331. Big Data Analytics. (3 cr. ; A-F only; Every Fall)
Exploring big data infrastructure and ecosystem, ingesting and managing big data, analytics with big data; Hadoop, MapReduce, Hive, Spark, scalable machine Learning, scalable real-time streaming analytics, NoSQL, cloud computing, and other recent developments in big data.

MSBA 6345. Consultative Problem-Solving & Agile Management for Analytics Projects. (1.5 cr. ; A-F only; Every Spring)
Consultative problem-solving techniques, including using collaborative frameworks to bring strategic thinking skills to analytics projects. Project management skills with a focus on the Agile mindset and the implementation of Scrum practices using tools such as Jira and Confluence. Teams will apply these skills in real-time through the Business Analytics Experiential Learning Project which will be run in conjunction with this course.
prereq: MSBA student

MSBA 6355. Building and Managing Teams. (0.5 cr. [max 1.5 cr.] ; A-F only; Every Fall, Spring & Summer)
Examine individual, group and organizational aspects of team effectiveness; learn and practice basic skills central to team management; develop appreciation for team leadership function; learn the tools for effective team decision making and conflict management; develop general diagnostic skills for assessment of team issues within and across organizations and national boundaries.

MSBA 6411. Exploratory Data Analytics. (3 cr. ; A-F only; Every Fall)
Fundamentals of exploratory business analytics. Solving real-world business problems using appropriate data analysis techniques and effective technical/managerial communication. Foundational methods allow for the detection of relationships and patterns in structured and unstructured data through clustering, dimensionality reduction, probabilistic graphical models, anomaly detection, and deep neural networks.

MSBA 6421. Predictive Analytics. (3 cr. ; A-F only; Every Fall)
Fundamentals of predictive modeling and machine learning, assessing the performance of predictive models: logistic regression, decision trees, na?ve Bayesian classifiers, support vector machine, ensemble learning, deep neural network, and their applications in structured and unstructured data.

MSBA 6431. Advanced Issues in Business Analytics. (3 cr. ; A-F only; Every Spring)
Analysis of time series data, interpretation and forecasting; fundamentals of network analysis, mining digital media and social networks, community detection and friend recommendation; personalization technologies, and recommender systems.

MSBA 6441. Causal Inference via Econometrics and Experimentation. (3 cr. ; A-F only; Every Fall)
Controlled experiments in business settings, experiment design, A/B testing. Specialized statistical methodologies. Fundamentals of econometrics, instrument variable regression, propensity score matching.

MSBA 6451. Optimization and Simulation for Decision Making. (3 cr. ; A-F only; Every Spring)
Fundamentals of decision analysis, linear optimization, mixed integer linear programming, Bayesian inference, Monte Carlo simulation, and decision technologies.

MSBA 6461. Advanced AI for Business Applications. (2 cr. ; A-F only; Every Spring)
This course covers some advanced topics in machine learning and artificial intelligence for solving analytics problems and building business applications. Topics include but are not limited to: reinforcement learning and recent advances on natural language processing. Students are introduced to the basic concepts of reinforcement learning such as Markov decision process, bandits, and regret minimization, and are trained to build simple and practical reinforcement learning systems. The course also discusses some recent progress in natural language processing / understanding, such as representation learning, sequential models, and transformer models, as well as their business applications.

MSBA 6511. Business Analytics Experiential Learning. (3-6 cr. ; A-F only; Every Spring)
This course involves hands-on application of the analytics methodologies, techniques, and tools learned throughout the program to a real-world problem (such as consulting for a real-world business client in the area of marketing, strategy, operation/supply chain, information technology, finance, accounting, or human resources) as well as the development and presentation of results, interpretations, insights, and recommendations.

MSBA 6515. Capstone Project in Analytics. (0-3 cr. ; A-F only; Every Spring)
Hands-on, integrative application of analytics methodologies, techniques, and tools learned throughout the program in the context of a specific analytics problem. Experience with the entire data analytics cycle, starting from business and data understanding as well as data cleaning and integration and ending with the development and presentation of results, interpretations, insights, and recommendations.

Materials Science (MATS)

MATS 5517. Microscopy of Materials. (; 3 cr. ; A-F or Audit; Every Spring)
A basic introduction to electron microscopy (EM) methods and techniques for materials characterization. The course is intended for junior- and senior-level undergraduates and graduate students interested in obtaining a basic understanding of characterization with EM. Topics to be covered include an introduction to instrumentation, basics of scattering theory, and a survey of imaging, diffraction, and analytical measurement techniques. Current and emerging techniques will also be covered, including machine learning and big data for EM and time-resolved measurements. Students will research a specific topic of interest over the course of the semester, culminating in a project paper and a class presentation.

MATS 5531. Electrochemical Engineering. (; 3 cr. ; Student Option; Periodic Fall)
Fundamentals of electrochemical engineering. Topics include electrochemical mass transfer electrokinetics, thermodynamics of cells, modern sensors, formation of thin films and microstructured materials. Computer-based problems will be assigned. prereq: MatS 3011 or instr consent, upper div CSE or grad

MATS 5771. Colloids and Dispersions. (; 3 cr. ; A-F or Audit; Every Fall)
Preparation, stability, coagulation kinetics, or colloidal solutions. DLVO theory, electrokinetic phenomena. Properties of micelles, other microstructures. prereq: Physical chemistry

MATS 5801. Optimization in Chemical and Energy Systems Engineering. (3 cr. ; A-F or Audit; Every Fall)
Mathematical optimization is a rigorous and systematic method for modeling and solving decision-making problems. It has become an indispensable tool in various disciplines, including economics, science, and engineering. In this course, students are introduced to the theory of mathematical optimization, systematic approaches to modeling complex optimization problems, and state-of-the-art algorithms for solving them. While the presented methods are general, we focus on applications in chemical engineering, energy systems engineering, and related disciplines. Many of the applications are directly related to the efficient design and operation of sustainable industrial systems.

MATS 5802. Machine Learning for Chemical Sciences and Engineering. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
This course is meant to be an introduction for advanced-undergraduates or graduate students to probabilistic machine learning (ML) and to recent advances at the intersection of chemical sciences/engineering and ML. The course provides an introduction to Machine Learning with a Bayesian perspective, thus placing a lot of emphasis on Bayesian reasoning and methods. After an overview of the fundamental concepts necessary to tackle the subject, namely Probability Theory, Decision Theory, Information Theory, and an exploration of simple probability distributions, the students will be introduced to Mixture Models, Linear Methods and Neural Networks (NN). These topics will lay the foundation for a discussion of molecular descriptors, Behler-Parrinello NN, Message Passing NN, and possibly, Kernel Methods for quantum chemistry.

MATS 5803. Chemical and Materials Technology Commercialization. (3 cr. ; A-F only; Every Fall)
Introduction to chemical and materials technology commercialization including a focus on products, markets, customers, and processes for brining innovations to market.

MATS 8001. Structure and Symmetry of Materials. (; 3 cr. ; Student Option; Every Fall)
Comprehensive description of structure of materials, including metals, semiconductors, organic crystals, polymers, and liquid crystals. Atomic and molecular ordering, influence of intermolecular forces on symmetry and structure. Principles of scattering and use of X-ray, neutron, and electron diffraction. prereq: MatS and ChEn majors must take this course for a grade

MATS 8002. Thermodynamics and Kinetics. (; 3 cr. ; A-F or Audit; Every Fall)
First three laws of thermodynamics, free energy, equilibrium constants, fugacity and activity relationships, solution models, order-disorder transitions, phase transitions. Elementary statistical mechanics. Applications to materials systems, including surface energies, multicomponent equilibria, reaction kinetics, mass transport, diffusion.

MATS 8003. Electronic Properties. (; 3 cr. ; A-F or Audit; Every Spring)
Basic physical theory of bonding in metals, alloys, and semiconductors. Review of modern physics, statistical physics, and solid state physics. Structure of matter emphasizing electronic processes. Techniques for predicting and understanding electronic structure of solids. Transport theory, elementary theory of magnetism, and superconductivity. prereq: instr consent

MATS 8004. Mechanical Properties. (; 3 cr. ; A-F or Audit; Every Spring)
Defects in crystalline materials, including point defects, dislocations, and grain boundaries. Structure and movement of defects related to mechanical behavior of materials. Tools used to understand crystals and crystallography.

MATS 8103. Scattering from Soft Matter. (2 cr. ; A-F only; Every Fall)
This course will treat light scattering (LS), dynamic light scattering (DLS), small angle neutron scattering (SANS), and small angle X-ray scattering (SAXS), with particular emphasis on SANS and DLS. Both fundamental theory and experimental techniques will be developed

in detail. The materials focus will be on polymer and colloidal solutions, polymer blends, and block copolymers

MATS 8201. Applied Math. (3 cr. ; A-F or Audit; Every Fall)
Integrated approach to solving linear mathematical problems. Linear algebraic equations. Linear ordinary and partial differential equations using theoretical/ numerical analysis based on linear operator theory. prereq: Materials science grad student or instructor consent.

MATS 8204. Computational Methods and Applications to Problems in Materials Science and Engineering. (; 2 cr. ; A-F or Audit; Every Spring)
Implementation of computational methods/ applications to numerical problems in materials science and engineering. Emphasizes implementation to applications. prereq: Grad student, knowledge of programming languages such as Fortran

MATS 8211. Physical Chemistry of Polymers. (; 4 cr. ; Student Option; Every Spring)
Introduction to polymer physical chemistry. Chain conformations; thermodynamics of polymer solutions, blends, and copolymers; light, neutron, and X-ray scattering; dynamics in dilute solutions and polymer characterization; dynamics of melts and viscoelasticity; rubber elasticity, networks, and gels; glass transitions; crystallization. prereq: Undergrad physical chem or instr consent

MATS 8217. Transmission Electron Microscopy. (3 cr. ; A-F or Audit; Every Fall)
This course is an introduction to transmission electron microscopy (TEM) and materials characterization using TEM. Topics include description and operation of TEMs, electron sources, basics of electron optics, interaction of electrons with specimen, diffraction, imaging techniques, and microanalysis. The goal of this course is to enable you to understand the fundamentals of TEM and microanalysis, read the scientific literature and determine which TEM-based method would be best to solve the problem you encounter in your own research. In a process you will learn about instrumentation, structure of materials, diffraction physics, optics, and condensed matter physics.

MATS 8221. Synthetic Polymer Chemistry. (; 4 cr. ; A-F or Audit; Every Fall)
Condensation, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties. prereq: [Undergrad organic chemistry course, undergrad physical chemistry course] or instr consent

MATS 8301. Physical Rate Processes I: Transport. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Survey of mass transfer, dilute, and concentrated diffusion. Brownian motion. Diffusion coefficients in polymers, of electrolytes, and at critical points. Multicomponent diffusion. Mass transfer correlations/predictions. Mass transfer coupled with chemical reaction.

MATS 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

MATS 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

MATS 8555. MatS Teaching Practicum. (1-6 cr. [max 24 cr.] ; S-N only; Every Fall, Spring & Summer)
Experience in instruction including grading of student work, holding of office hours, and in special cases, lecturing. Students will work with and receive feedback from a faculty member in CEMS. prereq: Grad MATS or ChEn major and DGS permission

MATS 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

MATS 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

MATS 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

MATS 8993. Directed Study. (; 1-12 cr. ; Student Option; Every Fall, Spring & Summer)

MATS 8994. Directed Research. (; 1-12 cr. ; Student Option; Every Fall, Spring & Summer)

MATS 8995. Special Topics. (; 1-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)
New or experimental courses offered by department or visiting faculty.

Mathematics (MATH)

MATH 5067. Actuarial Mathematics I. (; 4 cr. ; Student Option; Every Fall)
Future lifetime random variable, survival function. Insurance, life annuity, future loss random variables. Net single premium, actuarial present value, net premium, net reserves. prereq: 4065, [one sem [4xxx or 5xxx] [probability or statistics] course]

MATH 5068. Actuarial Mathematics II. (; 4 cr. ; Student Option; Every Spring)
Multiple decrement insurance, pension valuation. Expense analysis, gross premium, reserves. Problem of withdrawals. Regulatory reserving systems. Minimum cash values. Additional topics at instructor's discretion. prereq: 5067

MATH 5075. Mathematics of Options, Futures, and Derivative Securities I. (; 4 cr. ; Student Option; Every Fall)
Mathematical background (e.g., partial differential equations, Fourier series, computational methods, Black-Scholes theory, numerical methods--including Monte Carlo simulation). Interest-rate derivative securities, exotic options, risk theory. First course of two-course sequence. prereq: Two yrs calculus, basic computer skills

MATH 5076. Mathematics of Options, Futures, and Derivative Securities II. (; 4 cr. ; A-F or Audit; Every Spring)
Mathematical background such as partial differential equations, Fourier series, computational methods, Black-Scholes theory, numerical methods (including Monte Carlo simulation), interest-rate derivative securities, exotic options, risk theory. prereq: 5075

MATH 5165. Mathematical Logic I. (; 4 cr. ; Student Option; Every Fall)
Theory of computability: notion of algorithm, Turing machines, primitive recursive functions, recursive functions, Kleene normal form, recursion theorem. Propositional logic. prereq: 2283 or 3283 or Phil 5201 or CSci course in theory of algorithms or instr consent

MATH 5248. Cryptology and Number Theory. (; 4 cr. ; Student Option; Every Fall)
Classical cryptosystems. One-time pads, perfect secrecy. Public key ciphers: RSA, discrete log. Euclidean algorithm, finite fields, quadratic reciprocity. Message digest, hash functions. Protocols: key exchange, secret sharing, zero-knowledge proofs. Probablistic algorithms: pseudoprimes, prime factorization. Pseudo-random numbers. Elliptic curves. prereq: 2 sems soph math

MATH 5251. Error-Correcting Codes, Finite Fields, Algebraic Curves. (; 4 cr. ; Student Option; Every Spring)
Information theory: channel models, transmission errors. Hamming weight/ distance. Linear codes/fields, check bits. Error processing: linear codes, Hamming codes, binary Golay codes. Euclidean algorithm. Finite fields, Bose-Chaudhuri-Hocquenghem codes, polynomial codes, Goppa codes, codes from algebraic curves. prereq: 2 sems soph math

MATH 5285H. Honors: Fundamental Structures of Algebra I. (; 4 cr. ; Student Option; Every Fall)
Review of matrix theory, linear algebra. Vector spaces, linear transformations over abstract fields. Group theory, including normal subgroups, quotient groups, homomorphisms, class equation, Sylow's theorems. Specific examples: permutation groups, symmetry groups of geometric figures, matrix groups. prereq: [2243 or 2373 or 2573], [2283 or 2574 or 3283]

MATH 5286H. Honors: Fundamental Structures of Algebra II. (; 4 cr. ; Student Option; Every Fall & Spring)
Ring/module theory, including ideals, quotients, homomorphisms, domains (unique

factorization, euclidean, principal ideal), fundamental theorem for finitely generated modules over euclidean domains, Jordan canonical form. Introduction to field theory, including finite fields, algebraic/transcendental extensions, Galois theory. prereq: 5285

MATH 5335. Geometry I. (; 4 cr. ; Student Option; Every Fall)
Advanced two-dimensional Euclidean geometry from a vector viewpoint. Theorems/problems about triangles/circles, isometries, connections with Euclid's axioms. Hyperbolic geometry, how it compares with Euclidean geometry. prereq: [2243 or 2373 or 2573], [concurrent registration is required (or allowed) in 2263 or concurrent registration is required (or allowed) in 2374 or concurrent registration is required (or allowed) in 2574]

MATH 5345H. Honors: Introduction to Topology. (; 4 cr. ; A-F only; Every Fall)
Rigorous introduction to general topology. Set theory, Euclidean/metric spaces, compactness/connectedness. May include Urysohn metrization, Tychonoff theorem or fundamental group/covering spaces. prereq: [2263 or 2374 or 2573], [concurrent registration is required (or allowed) in 2283 or concurrent registration is required (or allowed) in 2574 or concurrent registration is required (or allowed) in 3283]

MATH 5378. Differential Geometry. (; 4 cr. ; Student Option; Every Spring)
Basic geometry of curves in plane and in space, including Frenet formula, theory of surfaces, differential forms, Riemannian geometry. prereq: [2263 or 2374 or 2573], [2243 or 2373 or 2574]; [2283 or 3283] recommended]

MATH 5385. Introduction to Computational Algebraic Geometry. (; 4 cr. ; Student Option; Every Fall)
Geometry of curves/surfaces defined by polynomial equations. Emphasizes concrete computations with polynomials using computer packages, interplay between algebra and geometry. Abstract algebra presented as needed. prereq: [2263 or 2374 or 2573], [2243 or 2373 or 2574]

MATH 5445. Mathematical Analysis of Biological Networks. (; 4 cr. ; Student Option; Every Spring)
Development/analysis of models for complex biological networks. Examples taken from signal transduction networks, metabolic networks, gene control networks, and ecological networks. prereq: Linear algebra, differential equations

MATH 5447. Theoretical Neuroscience. (; 4 cr. ; Student Option; Every Fall)
Nonlinear dynamical system models of neurons and neuronal networks. Computation by excitatory/inhibitory networks. Neural oscillations, adaptation, bursting, synchrony. Memory systems. prereq: 2243 or 2373 or 2574

MATH 5467. Introduction to the Mathematics of Image and Data Analysis. (; 4 cr. ; Student Option; Every Spring)
Background theory/experience in wavelets. Inner product spaces, operator theory, Fourier transforms applied to Gabor transforms, multi-scale analysis, discrete wavelets, self-similarity. Computing techniques. prereq: [2243 or 2373 or 2573], [2283 or 2574 or 3283 or instr consent]; [[2263 or 2374], 4567] recommended

MATH 5485. Introduction to Numerical Methods I. (4 cr. ; Student Option; Every Fall)
Solution of nonlinear equations in one variable. Interpolation, polynomial approximation. Methods for solving linear systems, eigenvalue problems, systems of nonlinear equations. prereq: [2243 or 2373 or 2573], familiarity with some programming language

MATH 5486. Introduction To Numerical Methods II. (4 cr. ; Student Option; Every Spring)
Numerical integration/differentiation. Numerical solution of initial-value problems, boundary value problems for ordinary differential equations, partial differential equations. prereq: 5485

MATH 5490. Topics in Applied Mathematics. (; 4 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Topics vary by instructor. See class schedule.

MATH 5525. Introduction to Ordinary Differential Equations. (; 4 cr. ; Student Option; Periodic Fall & Spring)
Ordinary differential equations, solution of linear systems, qualitative/numerical methods for nonlinear systems. Linear algebra background, fundamental matrix solutions, variation of parameters, existence/uniqueness theorems, phase space. Rest points, their stability. Periodic orbits, Poincare-Bendixson theory, strange attractors. prereq: [2243 or 2373 or 2573], [2283 or 2574 or 3283]

MATH 5535. Dynamical Systems and Chaos. (; 4 cr. ; Student Option; Every Fall & Spring)
Dynamical systems theory. Emphasizes iteration of one-dimensional mappings. Fixed points, periodic points, stability, bifurcations, symbolic dynamics, chaos, fractals, Julia/Mandelbrot sets. prereq: [2243 or 2373 or 2573], [2263 or 2374 or 2574]

MATH 5583. Complex Analysis. (; 4 cr. ; Student Option; Every Fall, Spring & Summer)
Algebra, geometry of complex numbers. Linear fractional transformations. Conformal mappings. Holomorphic functions. Theorems of Abel/Cauchy, power series. Schwarz' lemma. Complex exponential, trig functions. Entire functions, theorems of Liouville/Morera. Reflection principle. Singularities, Laurent series. Residues. prereq: 2 sems soph math [including [2263 or 2374 or 2573], [2283 or 3283]] recommended

MATH 5587. Elementary Partial Differential Equations I. (; 4 cr. ; Student Option; Every Fall)
Emphasizes partial differential equations w/physical applications, including heat, wave, Laplace's equations. Interpretations of boundary conditions. Characteristics, Fourier series, transforms, Green's functions, images, computational methods. Applications include wave propagation, diffusions, electrostatics, shocks. prereq: [2243 or 2373 or 2573], [2263 or 2374 or 2574]

MATH 5588. Elementary Partial Differential Equations II. (; 4 cr. ; A-F or Audit; Every Spring)
Heat, wave, Laplace's equations in higher dimensions. Green's functions, Fourier series, transforms. Asymptotic methods, boundary layer theory, bifurcation theory for linear/nonlinear PDEs. Variational methods. Free boundary problems. Additional topics as time permits. prereq: [[2243 or 2373 or 2573], [2263 or 2374 or 2574], 5587] or instr consent

MATH 5615H. Honors: Introduction to Analysis I. (; 4 cr. ; Student Option; Every Fall)
Axiomatic treatment of real/complex number systems. Introduction to metric spaces: convergence, connectedness, compactness. Convergence of sequences/series of real/complex numbers, Cauchy criterion, root/ratio tests. Continuity in metric spaces. Rigorous treatment of differentiation of single-variable functions, Taylor's Theorem. prereq: [[2243 or 2373], [2263 or 2374], [2283 or 3283]] or 2574

MATH 5616H. Honors: Introduction to Analysis II. (; 4 cr. ; Student Option; Every Spring)
Rigorous treatment of Riemann-Stieltjes integration. Sequences/series of functions, uniform convergence, equicontinuous families, Stone-Weierstrass Theorem, power series. Rigorous treatment of differentiation/integration of multivariable functions, Implicit Function Theorem, Stokes' Theorem. Additional topics as time permits. prereq: 5615

MATH 5651. Basic Theory of Probability and Statistics. (; 4 cr. ; Student Option; Every Fall & Spring)
Logical development of probability, basic issues in statistics. Probability spaces, random variables, their distributions/expected values. Law of large numbers, central limit theorem, generating functions, sampling, sufficiency, estimation. prereq: [2263 or 2374 or 2573], [2243 or 2373]; [2283 or 2574 or 3283] recommended.

MATH 5652. Introduction to Stochastic Processes. (; 4 cr. ; Student Option; Every Fall & Spring)
Random walks, Markov chains, branching processes, martingales, queuing theory, Brownian motion. prereq: 5651 or Stat 5101

MATH 5654. Prediction and Filtering. (; 4 cr. ; Student Option; Every Spring)
Markov chains, Wiener process, stationary sequences, Ornstein-Uhlenbeck process. Partially observable Markov processes (hidden Markov models), stationary processes. Equations for general filters, Kalman filter. Prediction of future values of partially observable processes. prereq: 5651 or Stat 5101

MATH 5705. Enumerative Combinatorics. (; 4 cr. ; Student Option; Every Fall & Spring)
Basic enumeration, bijections, inclusion-exclusion, recurrence relations, ordinary/exponential generating functions, partitions, Polya theory. Optional topics include trees, asymptotics, listing algorithms, rook theory, involutions, tableaux, permutation statistics.

prereq: [2243 or 2373 or 2573], [2263 or 2283 or 2374 or 2574 or 3283]

MATH 5707. Graph Theory and Non-enumerative Combinatorics. (; 4 cr. ; Student Option; Every Fall & Spring)
Basic topics in graph theory: connectedness, Eulerian/Hamiltonian properties, trees, colorings, planar graphs, matchings, flows in networks. Optional topics include graph algorithms, Latin squares, block designs, Ramsey theory. prereq: [2243 or 2373 or 2573], [2263 or 2374 or 2574]; [2283 or 3283 or experience in writing proofs] highly recommended; Credit will not be granted if credit has been received for: 4707

MATH 5711. Linear Programming and Combinatorial Optimization. (; 4 cr. ; Student Option; Every Fall & Spring)
Simplex method, connections to geometry, duality theory, sensitivity analysis. Applications to cutting stock, allocation of resources, scheduling problems. Flows, matching/transportation problems, spanning trees, distance in graphs, integer programs, branch/bound, cutting planes, heuristics. Applications to traveling salesman, knapsack problems. prereq: 2 sems soph math [including 2243 or 2373 or 2573]

MATH 5900. Tutorial in Advanced Mathematics. (; 1-6 cr. [max 120 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Individually directed study.

MATH 5990. Topics in Mathematics. (; 3-4 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Topics vary by instructor. See class schedule.

MATH 8001. Preparation for College Teaching. (1 cr. ; S-N or Audit; Every Fall & Spring)
New approaches to teaching/learning, issues in mathematics education, components/expectations of a college mathematics professor. prereq: Math grad student in good standing or instr consent

MATH 8141. Applied Logic. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Applying techniques of mathematical logic to other areas of mathematics and computer science. Sample topics: complexity of computation, computable analysis, unsolvability of diophantine problems, program verification, database theory.

MATH 8142. Applied Logic. (; 3 cr. ; A-F or Audit; Periodic Spring)
Applying techniques of mathematical logic to other areas of mathematics, computer science. Complexity of computation, computable analysis, unsolvability of diophantine problems, program verification, database theory.

MATH 8151. Axiomatic Set Theory. (; 3 cr. ; A-F or Audit; Periodic Fall)
Axiomatic development of basic properties of ordinal/cardinal numbers, infinitary combinatorics, well founded sets, consistency of axiom of foundation, constructible sets, consistency of axiom of choice and of generalized continuum hypothesis. prereq: 5166 or instr consent

MATH 8152. Axiomatic Set Theory. (; 3 cr. ; A-F or Audit; Periodic Fall)
Notion of forcing, generic extensions, forcing with finite partial functions, independence of continuum hypothesis, forcing with partial functions of infinite cardinalities, relationship between partial orderings and Boolean algebras, Boolean-valued models, independence of axiom of choice. prereq: 8151 or instr consent

MATH 8166. Recursion Theory. (; 3 cr. ; A-F or Audit; Periodic Fall)
Analysis of concept of computability, including various equivalent definitions. Primitive recursive, recursive, partial recursive functions. Oracle Turing machines. Kleene Normal Form Theorem. Recursive, recursively enumerable sets. Degrees of unsolvability. Arithmetic hierarchy. prereq: Math grad student or instr consent

MATH 8167. Recursion Theory. (; 3 cr. ; A-F or Audit; Periodic Spring)
Sample topics: complexity theory, recursive analysis, generalized recursion theory, analytical hierarchy, constructive ordinals. prereq: 8166

MATH 8172. Model Theory. (; 3 cr. ; A-F or Audit; Periodic Fall)
Interplay of formal theories, their models. Elementary equivalence, elementary extensions, partial isomorphisms. Lowenheim-Skolem theorems, compactness theorems, preservation theorems. Ultraproducts. prereq: Math grad student or instr consent

MATH 8173. Model Theory. (; 3 cr. ; A-F or Audit; Periodic Fall)
Types of elements. Prime models, homogeneity, saturation, categoricity in power. Forking. prereq: 8172 or instr consent

MATH 8190. Topics in Logic. (; 1-3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Offered for one year or one semester as circumstances warrant.

MATH 8201. General Algebra. (; 3 cr. ; A-F or Audit; Every Fall)
Groups through Sylow, Jordan-H[o]lder theorems, structure of finitely generated Abelian groups. Rings and algebras, including Gauss theory of factorization. Modules, including projective and injective modules, chain conditions, Hilbert basis theorem, and structure of modules over principal ideal domains.

MATH 8202. General Algebra. (; 3 cr. ; A-F or Audit; Every Spring)
Classical field theory through Galois theory, including solvable equations. Symmetric, Hermitian, orthogonal, and unitary form. Tensor and exterior algebras. Basic Wedderburn theory of rings; basic representation theory of groups. prereq: 8201 or instr consent

MATH 8207. Theory of Modular Forms and L-Functions. (; 3 cr. ; A-F or Audit;)
Zeta and L-functions, prime number theorem, Dirichlet's theorem on primes in arithmetic progressions, class number formulas; Riemann hypothesis; modular forms and associated L-function; Eisenstein series; Hecke operators, Poincar[e] series, Euler products; Ramanujan conjectures; Theta series and quadratic forms; waveforms and L-functions.

MATH 8208. Theory of Modular Forms and L-Functions. (; 3 cr. ; A-F or Audit; Periodic Fall)
Applications of Eisenstein series: special values and analytic continuation and functional equations of L-functions. Trace formulas. Applications of representation theory. Computations. prereq: 8207 or instr consent

MATH 8211. Commutative and Homological Algebra. (; 3 cr. ; A-F or Audit; Periodic Fall)
Selected topics. prereq: 8202 or instr consent

MATH 8212. Commutative and Homological Algebra. (; 3 cr. ; A-F or Audit;)
Selected topics. prereq: 8211 or instr consent

MATH 8245. Group Theory. (; 3 cr. ; A-F or Audit; Every Fall)
Permutations, Sylow's theorems, representations of groups on groups, semi-direct products, solvable and nilpotent groups, generalized Fitting subgroups, p-groups, co-prime action on p-groups. prereq: 8202 or instr consent

MATH 8246. Group Theory. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Representation and character theory, simple groups, free groups and products, presentations, extensions, Schur multipliers. prereq: 8245 or instr consent

MATH 8251. Algebraic Number Theory. (; 3 cr. ; A-F or Audit; Periodic Fall)
Algebraic number fields and algebraic curves. Basic commutative algebra. Completions: p-adic fields, formal power series, Puiseux series. Ramification, discriminant, different. Finiteness of class number and units theorem. prereq: 8202 or instr consent

MATH 8252. Algebraic Number Theory. (; 3 cr. ; A-F or Audit; Periodic Fall)
Zeta and L-functions of global fields. Artin L-functions. Hasse-Weil L-functions. Tchebotarev density. Local and global class field theory. Reciprocity laws. Finer theory of cyclotomic fields. prereq: 8251 or instr consent

MATH 8253. Algebraic Geometry. (; 3 cr. ; A-F or Audit; Periodic Fall)
Curves, surfaces, projective space, affine and projective varieties. Rational maps. Blowing-up points. Zariski topology. Irreducible varieties, divisors.

MATH 8254. Algebraic Geometry. (; 3 cr. ; A-F or Audit; Periodic Spring)
Sheaves, ringed spaces, and schemes. Morphisms. Derived functors and cohomology, Serre duality. Riemann-Roch theorem for curves, Hurwitz's theorem. Surfaces: monoidal transformations, birational transformations. prereq: 8253 or instr consent

MATH 8270. Topics in Algebraic Geometry. (; 1-3 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
N/A prereq: Math 8201, Math 8202; offered for one year or one semester as circumstances warrant

MATH 8271. Lie Groups and Lie Algebras. (; 3 cr. ; A-F or Audit; Periodic Fall)
Definitions and basic properties of Lie groups and Lie algebras; classical matrix Lie groups; Lie subgroups and their corresponding Lie subalgebras; covering groups; Maurer-Cartan forms; exponential map; correspondence between Lie algebras and simply connected Lie groups; Baker-Campbell-Hausdorff formula; homogeneous spaces. prereq: 8302 or instr consent

MATH 8272. Lie Groups and Lie Algebras. (; 3 cr. ; A-F or Audit; Periodic Spring)
Solvable and nilpotent Lie algebras and Lie groups; Lie's and Engels's theorems; semisimple Lie algebras; cohomology of Lie algebras; Whitehead's lemmas and Levi's theorem; classification of complex semisimple Lie algebras and compact Lie groups; representation theory. prereq: 8271 or instr consent

MATH 8280. Topics in Number Theory. (; 1-3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Various topics in Number Theory.

MATH 8300. Topics in Algebra. (; 1-3 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
Selected topics. prereq: Grad math major or instr consent; offered as one yr or one sem crse as circumstances warrant

MATH 8301. Manifolds and Topology. (; 3 cr. ; A-F or Audit; Every Fall)
Classification of compact surfaces, fundamental group/covering spaces. Homology group, basic cohomology. Application to degree of a map, invariance of domain/dimension. prereq: [Some point-set topology, algebra] or instr consent

MATH 8302. Manifolds and Topology. (; 3 cr. ; A-F or Audit; Every Spring)
Smooth manifolds, tangent spaces, embedding/immersion, Sard's theorem, Frobenius theorem. Differential forms, integration. Curvature, Gauss-Bonnet theorem. Time permitting: de Rham, duality in manifolds. prereq: 8301 or instr consent

MATH 8306. Algebraic Topology. (; 3 cr. ; A-F or Audit; Periodic Fall)
Singular homology, cohomology theory with coefficients. Eilenberg-Stenrod axioms, Mayer-Vietoris theorem. prereq: 8301 or instr consent

MATH 8307. Algebraic Topology. (; 3 cr. ; A-F or Audit;)
Basic homotopy theory, cohomology rings with applications. Time permitting: fibre spaces, cohomology operations, extra-ordinary cohomology theories. prereq: 8306 or instr consent

MATH 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

MATH 8360. Topics in Topology. (; 1-3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Selected topics. prereq: 8301 or instr consent; offered as one yr or one sem crse as circumstances warrant

MATH 8365. Riemannian Geometry. (; 3 cr. ; A-F or Audit; Every Fall)
Riemannian metrics, curvature. Bianchi identities, Gauss-Bonnet theorem, Meyers's theorem, Cartan-Hadamard theorem. prereq: 8301 or basic point-set topology or instr consent

MATH 8366. Riemannian Geometry. (; 3 cr. ; A-F or Audit; Every Spring)
Gauss, Codazzi equations. Tensor calculus, Hodge theory, spinors, global differential geometry, applications. prereq: 8365 or instr consent

MATH 8370. Topics in Differential Geometry. (; 1-3 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
Current research in Differential Geometry. prereq: 8301 or 8365; offered for one yr or one sem as circumstances warrant

MATH 8380. Topics in Advanced Geometry. (; 1-3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Current research. prereq: 8301, 8365

MATH 8385. Calculus of Variations and Minimal Surfaces. (; 3 cr. ; A-F or Audit; Periodic Fall)
Comprehensive exposition of calculus of variations and its applications. Theory for one-dimensional problems. Survey of typical problems. Necessary conditions. Sufficient conditions. Second variation, accessory eigenvalue problem. Variational problems with subsidiary conditions. Direct methods. prereq: 4xxx partial differential equations or instr consent

MATH 8386. Calculus of Variations and Minimal Surfaces. (; 3 cr. ; A-F or Audit; Periodic Fall)
Theory of multiple integrals. Geometrical differential equations, i.e., theory of minimal surfaces and related structures (surfaces of constant or prescribed mean curvature, solutions to variational integrals involving surface curvatures), all extremals for variational problems of current interest as models for interfaces in real materials. prereq: 8595 or instr consent

MATH 8387. Mathematical Modeling of Industrial Problems. (; 3 cr. ; A-F or Audit; Every Fall)
Mathematical models from physical, biological, social systems. Emphasizes industrial applications. Modeling of deterministic/probabilistic, discrete/continuous processes; methods for analysis/computation. prereq: [5xxx numerical analysis, some computer experience] or instr consent

MATH 8388. Mathematical Modeling of Industrial Problems. (; 3 cr. ; A-F or Audit; Periodic Fall)
Techniques for analysis of mathematical models. Asymptotic methods; design of simulation and visualization techniques. Specific computation for models arising in industrial problems. prereq: 8597 or instr consent

MATH 8390. Topics in Mathematical Physics. (; 1-3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall)
Current research. prereq: 8601; offered for one yr or one sem as circumstances warrant

MATH 8401. Mathematical Modeling and Methods of Applied Mathematics. (; 3 cr. ; A-F or Audit; Every Fall)
Dimension analysis, similarity solutions, linearization, stability theory, well-posedness, and characterization of type. Fourier series and integrals, wavelets, Green's functions, weak solutions and distributions. prereq: 4xxx numerical analysis and applied linear algebra or instr consent

MATH 8402. Mathematical Modeling and Methods of Applied Mathematics. (; 3 cr. ; A-F or Audit; Every Spring)
Calculus of variations, integral equations, eigenvalue problems, spectral theory. Perturbation, asymptotic methods. Artificial boundary conditions, conformal mapping, coordinate transformations. Applications to specific modeling problems. prereq: 8401 or instr consent

MATH 8431. Mathematical Fluid Mechanics. (; 3 cr. ; A-F or Audit; Periodic Fall)
Equations of continuity/motion. Kinematics. Bernoulli's theorem, stream function, velocity potential. Applications of conformal mapping. prereq: 5xxx numerical analysis of partial differential equations or instr consent

MATH 8432. Mathematical Fluid Mechanics. (; 3 cr. ; Student Option; Periodic Fall)
Plane flow of gas, characteristic method, hodograph method. Singular surfaces, shock waves, shock layers. Viscous flow, Navier-Stokes equations, exact solutions. Uniqueness, stability, existence theorems. prereq: 8431 or instr consent

MATH 8441. Numerical Analysis and Scientific Computing. (; 3 cr. ; Student Option; Every Fall)
Approximation of functions, numerical integration. Numerical methods for elliptic partial differential equations, including finite element methods, finite difference methods, and spectral methods. Grid generation.

MATH 8442. Numerical Analysis and Scientific Computing. (; 3 cr. ; Student Option; Every Spring)
Numerical methods for integral equations, parabolic partial differential equations, hyperbolic partial differential equations. Monte Carlo methods. prereq: 8441 or instr consent; 5477-5478 recommended for engineering and science grad students

MATH 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

MATH 8445. Numerical Analysis of Differential Equations. (; 3 cr. ; A-F or Audit; Every Fall)
Finite element and finite difference methods for elliptic boundary value problems (e.g.,

Laplace's equation) and solution of resulting linear systems by direct and iterative methods. prereq: 4xxx numerical analysis, 4xxx partial differential equations or instr consent

MATH 8446. Numerical Analysis of Differential Equations. (; 3 cr. ; A-F or Audit; Every Spring)
Numerical methods for parabolic equations (e.g., heat equations). Methods for elasticity, fluid mechanics, electromagnetics. Applications to specific computations. prereq: 8445 or instr consent

MATH 8450. Topics in Numerical Analysis. (; 1-3 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
Selected topics. prereq: Grad math major or instr consent; offered as one year or one semester course as circumstances warrant

MATH 8470. Topics in Mathematical Theory of Continuum Mechanics. (; 1-3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Offered for one year or one semester as circumstances warrant.

MATH 8501. Differential Equations and Dynamical Systems I. (; 3 cr. ; A-F or Audit; Every Fall)
Existence, uniqueness, continuity, and differentiability of solutions. Linear theory and hyperbolicity. Basics of dynamical systems. Local behavior near a fixed point, a periodic orbit, and a homoclinic or heteroclinic orbit. Perturbation theory. prereq: 4xxx ODE or instr consent

MATH 8502. Differential Equations and Dynamical Systems II. (; 3 cr. ; A-F or Audit; Every Spring)
Stable, unstable, and center manifolds. Normal hyperbolicity. Nonautonomous dynamics and skew product flows. Invariant manifolds and quasiperiodicity. Transversality and Melnikov method. Approximation dynamics. Morse-Smale systems. Coupled oscillators and network dynamics. prereq: 8501 or instr consent

MATH 8503. Bifurcation Theory in Ordinary Differential Equations. (; 3 cr. ; A-F or Audit; Periodic Fall)
Basic bifurcation theory, Hopf bifurcation, and method averaging. Silnikov bifurcations. Singular perturbations. Higher order bifurcations. Applications. prereq: 8501 or instr consent

MATH 8505. Applied Dynamical Systems and Bifurcation Theory I. (; 3 cr. ; A-F or Audit; Periodic Fall)
Static/Hopf bifurcations, invariant manifold theory, normal forms, averaging, Hopf bifurcation in maps, forced oscillations, coupled oscillators, chaotic dynamics, co-dimension 2 bifurcations. Emphasizes computational aspects/applications from biology, chemistry, engineering, physics. prereq: 5525 or 8502 or instr consent

MATH 8506. Applied Dynamical Systems and Bifurcation Theory II. (; 3 cr. ; A-F or Audit; Periodic Fall)
Background on analysis in Banach spaces, linear operator theory. Lyapunov-Schmidt reduction, static bifurcation, stability at a simple eigenvalue, Hopf bifurcation in infinite dimensions invariant manifold theory. Applications to hydrodynamic stability problems, reaction-diffusion equations, pattern formation, and elasticity. prereq: 5587 or instr consent

MATH 8520. Topics in Dynamical Systems. (; 1-3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Current research. prereq: 8502

MATH 8530. Topics in Ordinary Differential Equations. (; 1-3 cr. ; A-F or Audit; Periodic Fall & Spring)
Offered for one year or one semester as circumstances warrant. prereq: 8502

MATH 8540. Topics in Mathematical Biology. (; 1-3 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
Offered for one year or one semester as circumstances warrant.

MATH 8571. Theory of Evolutionary Equations. (; 3 cr. ; A-F or Audit; Every Fall)
Infinite dimensional dynamical systems, global attractors, existence and robustness. Linear semigroups, analytic semigroups. Linear and nonlinear reaction diffusion equations, strong and weak solutions, well-posedness of solutions. prereq: 8502 or instr consent

MATH 8572. Theory of Evolutionary Equations. (; 3 cr. ; A-F or Audit; Periodic Spring)
Dynamics of Navier-Stokes equations, strong/weak solutions, global attractors. Chemically reacting fluid flows. Dynamics in infinite dimensions, unstable manifolds, center manifolds perturbation theory. Inertial manifolds, finite dimensional structures. Dynamical theories of turbulence. prereq: 8571 or instr consent

MATH 8580. Topics in Evolutionary Equations. (; 1-3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall)
N/A prereq: 8572 or instr consent; offered for one yr or one semester as circumstances warrant

MATH 8581. Applications of Linear Operator Theory. (; 3 cr. ; A-F or Audit; Periodic Fall)
Metric spaces, continuity, completeness, contraction mappings, compactness. Normed linear spaces, continuous linear transformations. Hilbert spaces, orthogonality, projections. prereq: 4xxx applied mathematics or instr consent

MATH 8582. Applications of Linear Operator Theory. (; 3 cr. ; A-F or Audit; Periodic Fall)
Fourier theory. Self-adjoint, compact, unbounded linear operators. Spectral analysis, eigenvalue-eigenvector problem, spectral theorem, operational calculus. prereq: 8581 or instr consent

MATH 8583. Theory of Partial Differential Equations. (; 3 cr. ; A-F or Audit; Every Fall)
Classification of partial differential equations/ characteristics. Laplace, wave, heat equations. Some mixed problems. prereq: [Some 5xxx PDE, 8601] or instr consent

MATH 8584. Theory of Partial Differential Equations. (; 3 cr. ; A-F or Audit; Every Spring)
Fundamental solutions/distributions, Sobolev spaces, regularity. Advanced elliptic theory (Schauder estimates, Garding's inequality). Hyperbolic systems. prereq: 8583 or instr consent

MATH 8590. Topics in Partial Differential Equations. (; 1-3 cr. ; A-F or Audit; Every Fall & Spring)
Research topics. prereq: 8602; offered for one yr or one sem as circumstances warrant

MATH 8600. Topics in Advanced Applied Mathematics. (; 1-3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Offered for one yr or one semester as circumstances warrant. Topics vary. For details, contact instructor.

MATH 8601. Real Analysis. (; 3 cr. ; A-F or Audit; Every Fall)
Set theory/fundamentals. Axiom of choice, measures, measure spaces, Borel/ Lebesgue measure, integration, fundamental convergence theorems, Riesz representation.

MATH 8602. Real Analysis. (; 3 cr. ; A-F or Audit; Every Spring)
Radon-Nikodym, Fubini theorems. C(X). Lp spaces (introduction to metric, Banach, Hilbert spaces). Stone-Weierstrass theorem. Basic Fourier analysis. Theory of differentiation. prereq: 8601 or instr consent

MATH 8640. Topics in Real Analysis. (; 3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall)
Current research. prereq: 8602 or instr consent; offered for one year or one semester as circumstances warrant

MATH 8641. Spatial Ecology. (; 3 cr. ; S-N or Audit; Periodic Fall)
Introduction: role of space in population dynamics and interspecific interaction; includes single species and multispecies models, deterministic and stochastic theory, different modeling approaches, effects of implicit/explicit space on competition, pattern formation, stability diversity and invasion. Recent literature. Computer lab. prereq: Two semesters calculus, theoretical population ecology or four semesters more robust calculus, course in statistics or probability or instr consent

MATH 8651. Theory of Probability Including Measure Theory. (; 3 cr. ; Student Option; Every Fall)
Probability spaces. Distributions/expectations of random variables. Basic theorems of Lebesque theory. Stochastic independence, sums of independent random variables, random walks, filtrations. Probability, moment generating functions, characteristic functions. Laws of large numbers.

MATH 8652. Theory of Probability Including Measure Theory. (; 3 cr. ; Student Option; Every Spring)
Conditional distributions and expectations, convergence of sequences of distributions on real line and on Polish spaces, central limit

theorem and related limit theorems, Brownian motion, martingales and introduction to other stochastic sequences. prereq: 8651 or instr consent

MATH 8654. Fundamentals of Probability Theory and Stochastic Processes. (; 3 cr. ; Student Option; Periodic Spring)
Review of basic theorems of probability for independent random variables; introductions to Brownian motion process, Poisson process, conditioning, Markov processes, stationary processes, martingales, super- and sub-martingales, Doob-Meyer decomposition. prereq: 8651 or 8602 or instr consent

MATH 8655. Stochastic Calculus with Applications. (; 3 cr. ; Student Option; Every Fall)
Stochastic integration with respect to martingales, Ito's formula, applications to business models, filtering, and stochastic control theory. prereq: 8654 or 8659 or instr consent

MATH 8659. Stochastic Processes. (; 3 cr. ; Student Option; Every Fall)
In-depth coverage of various stochastic processes and related concepts, such as Markov sequences and processes, renewal sequences, exchangeable sequences, stationary sequences, Poisson point processes, Levy processes, interacting particle systems, diffusions, and stochastic integrals. prereq: 8652 or instr consent

MATH 8660. Topics in Probability. (; 1-3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Offered for one year or one semester as circumstances warrant.

MATH 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

MATH 8668. Combinatorial Theory. (; 3 cr. ; A-F or Audit; Periodic Fall)
Basic enumeration, including sets and multisets, permutation statistics, inclusion-exclusion, integer/set partitions, involutions and Polya theory. Partially ordered sets, including lattices, incidence algebras, and Mobius inversion. Generating functions.

MATH 8669. Combinatorial Theory. (; 3 cr. ; A-F or Audit; Spring Even Year)
Further topics in enumeration, including symmetric functions, Schensted correspondence, and standard tableaux; non-enumerative combinatorics, including graph theory and coloring, matching theory, connectivity, flows in networks, codes, and extremal set theory. prereq: 8668 or instr consent

MATH 8680. Topics in Combinatorics. (; 1-3 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
Selected topics. prereq: Grad math major or instr consent; offered as one yr or one sem crse as circumstances warrant

MATH 8701. Complex Analysis. (; 3 cr. ; A-F or Audit; Every Fall)
Foundations of holomorphic functions of one variable; relation to potential theory, complex manifolds, algebraic geometry, number theory. Cauchy's theorems, Poisson integral. Singularities, series, product representations. Hyperbolic geometry, isometries. Covering surfaces, Riemann-Hurwitz formula. Schwarz-Christoffel polygonal functions. Residues.

MATH 8702. Complex Analysis. (; 3 cr. ; A-F or Audit; Every Spring)
Riemann mapping, uniformization, Dirichlet problem. Dirichlet principle, Green's functions, harmonic measures. Approximation theory. Complex analysis on tori (elliptic functions, modular functions, conformal moduli). Complex dynamical systems (Julia sets, Mandelbrot set). prereq: 8701 or instr consent

MATH 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

MATH 8790. Topics in Complex Analysis. (; 1-3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall)
Current research. prereq: 8702 or instr consent; offered for one yr or one sem as circumstances warrant

MATH 8801. Functional Analysis. (; 3 cr. ; A-F or Audit; Every Fall)
Motivation in terms of specific problems (e.g., Fourier series, eigenfunctions). Theory of compact operators. Basic theory of Banach spaces (Hahn-Banach, open mapping, closed graph theorems). Frechet spaces. prereq: 8602 or instr consent

MATH 8802. Functional Analysis. (; 3 cr. ; A-F or Audit; Periodic Spring)
Spectral theory of operators, theory of distributions (generalized functions), Fourier transformations and applications. Sobolev spaces and pseudo-differential operators. C-star algebras (Gelfand-Naimark theory) and introduction to von Neumann algebras. prereq: 8801 or instr consent

MATH 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

MATH 8990. Topics in Mathematics. (; 1-6 cr. [max 24 cr.] ; S-N or Audit; Every Fall & Spring)
Readings, research. prereq: instr consent

MATH 8991. Independent Study. (1-6 cr. [max 24 cr.] ; Student Option; Every Fall, Spring & Summer)
Individually directed study. prereq: instr consent

MATH 8992. Directed Reading. (; 1-6 cr. [max 24 cr.] ; S-N or Audit; Every Fall & Spring)
Individually directed reading. prereq: instr consent

MATH 8993. Directed Study. (; 1-6 cr. [max 24 cr.] ; S-N or Audit; Every Spring)
Individually directed study. prereq: instr consent

MATH 8994. Topics at the IMA. (; 1-3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Current research at IMA.

Mathematics Education (MTHE)

MTHE 5011. Arithmetic Structures in School Mathematics. (; 3 cr. ; Student Option; Every Summer)
Pedagogy, content, and instructional strategies for teaching arithmetic. Content and issues relevant to the K-8 mathematics curriculum. Instructional materials and technology appropriate for elementary or middle school arithmetic. Credit hours and targeted level vary with particular classes. prereq: Enrollment in math initial licensure program or tchg exper

MTHE 5021. Algebraic Structures in School Mathematics. (; 3 cr. ; Student Option; Every Fall)
Pedagogy, content, and instructional strategies for teaching arithmetic. Content and issues relevant to the algebra curriculum. Instructional materials and technology appropriate for arithmetic. Each offering of the course will focus on either elementary/middle or middle/secondary grade levels. prereq: Tchg exper or isntr consent

MTHE 5031. Geometric Structures in School Mathematics. (; 3 cr. ; Student Option; Every Spring)
Pedagogy, content, and instructional strategies for teaching school geometry. Content and issues relevant to the geometry curriculum. Instructional materials and technology appropriate for geometry. Each offering will focus on either elementary/middle or middle/secondary grade levels. prereq: Enrollment in math initial licensure program

MTHE 5115. Applications of Teaching Mathematics. (3 cr. ; A-F only; Every Fall)
The purpose of this course is to examine mathematics teaching in diverse school settings and help you inquire and reflect about your own teaching practice and its impact on you, and the students you will meet. Throughout this course we will collaboratively inquire about teaching and learning, observe and analyze instruction, and reflect on your own and each other?s teaching. We will develop and integrate technological knowledge that works together with pedagogical and content knowledge to make math teaching more effective. prereq: You must be enrolled in the Mathematics initial licensure program to take this course.

MTHE 5155. Rational Number Concepts and Proportionality. (; 3 cr. ; Student Option; Fall Even Year)
The relationship between the development of rational number concepts and proportional reasoning skills. Examination of how newer school curricula treat these concepts. Application of materials in the classroom and

analysis of results. Reading and responding to current research. prereq: Educ student or instr consent

MTHE 5171. Teaching Problem Solving. (; 3 cr. ; Student Option; Periodic Spring & Summer)
Investigation of fundamental concepts and principles of problem solving, reasoning, and proof. Emphasis on activities and applications appropriate for junior and senior high classes. Pedagogical experiences to prepare teachers to teach problem solving, reasoning, and proof in classrooms.

MTHE 5172. Teaching Probability and Statistics. (; 3 cr. ; Student Option; Fall Odd Year)
Investigation of fundamental concepts and principles of probability and statistics. Emphasis on activities and applications appropriate for junior and senior high school classes. Pedagogical experiences to prepare teachers to integrate quantitative literacy accurately and effectively in classrooms.

MTHE 5305. Middle School Mathematics Methods. (; 2 cr. ; A-F only; Every Fall)
The unique needs of middle school students in the mathematics classroom. Mathematics content and pedagogical skills. Adolescent development/psychology. Field placement in a middle school mathematics classroom. prereq: Elem ed licensure student

MTHE 5314. Teaching and Learning Mathematics. (; 3 cr. ; Student Option; Every Fall)
Methods, materials, and curriculum development. Principles of learning. Review of research. Preparation/evaluation of tests, units, and materials of instruction. Recent developments in mathematics curriculum and in instructional alternatives. Issues in teaching/learning. Program planning/evaluation. prereq: Math Ed or MEd or CI MEd or grad student or instr consent

MTHE 5355. Mathematics for Diverse Learners. (; 3 cr. ; Student Option; Every Fall & Spring)
Mathematical concepts and methods for exceptional students, both low achieving and gifted. Experimental materials and methods designed for underachieving students. prereq: Teaching license or student in elem ed or special ed or instr consent

MTHE 5366. Technology-Assisted Mathematics Instruction. (; 3 cr. ; Student Option; Every Spring)
Technology--including computers, programmable and graphing calculators, and video--as instructional tools in mathematics; design and evaluation of technology-based mathematics lessons; the effect of technology on the mathematics curriculum; managing the technology-enriched classroom.

MTHE 5696. Student Teaching in Mathematics. (; 1-8 cr. ; S-N only; Every Spring)
Student teaching in secondary school mathematics classes. prereq: MEd/initial licensure student or instr consent

MTHE 5993. Directed Studies in Mathematics Education. (; 2 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Secondary school classroom teaching project to improve specific teaching skills, planned by student, approved/directed by student's adviser. prereq: Math ed MEd student, instr consent

MTHE 8561. School Mathematics Curricula - 1850 to Present. (; 1-3 cr. ; A-F only; Every Fall)
Historical antecedents of present day school mathematics curricula. Examine primary source materials by reviewing early mathematics texts from curriculum library.

MTHE 8571. Research in Mathematics Education. (; 3 cr. ; Student Option; Periodic Fall)
Designed for advanced graduate students in mathematics education. Presentation and discussion of Ph.D. thesis proposals and other contemporary research. prereq: 5313, 8501

MTHE 8591. Seminar: Mathematics Education. (; 1-3 cr. ; Student Option; Fall Even Year)
Problems of mathematics instruction from kindergarten through junior college; opportunity to develop proposals and design models for empirical research. prereq: Math educ PhD student

MTHE 8995. Problems: Mathematics Education. (; 1-6 cr. [max 18 cr.] ; Student Option; Every Fall, Spring & Summer)
Students survey most recent literature and design and prepare research reports on special topics.

Mechanical Engineering (ME)

ME 5070. Topics in Mechanical Engineering. (; 1-4 cr. [max 8 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Specialized topics within areas of mechanical engineering. Emphasis on topics of current interest. Topics vary each semester. prereq: CSE upper div or grad student

ME 5101. Vapor Power Cycles. (; 4 cr. ; A-F or Audit; Periodic Spring)
Vapor power cycle analysis, regeneration, reheat, compound cycle modifications, combined gas turbine--vapor cycle systems, components, fuels and combustion, heat sources -- solar, nuclear, geothermal, low T cycles, bottoming cycles, environmental concerns. EES software used extensively for cycle analysis. prereq: CSE upper div or grad student

ME 5103. Thermal Environmental Engineering. (; 4 cr. ; A-F or Audit; Every Fall)
Thermodynamic properties of moist air; psychrometric charts; HVAC systems; solar energy; human thermal comfort; indoor air quality; heating and cooling loads in buildings. prereq: 3331 or 3332, 3333, CSE upper div or grad

ME 5113. Aerosol/Particle Engineering. (; 4 cr. ; A-F or Audit; Every Fall)
Kinetic theory, definition, theory and measurement of particle properties, elementary particle mechanics, particle statistics; Brownian motion and diffusion, coagulation, evaporation and condensation, sampling and transport. prereq: CSE upper div or grad student

ME 5133. Aerosol Measurement Laboratory. (; 4 cr. ; A-F or Audit; Periodic Spring)
Principles of aerosol measurement. Single particle analysis by optical and electron microscopy. Aerosol samplers and inertial collectors. Integral mass concentration and number concentration detectors. Size distribution by laser particle counter and differential mobility particle sizer. Aerosol generation and instrument calibration. prereq: CSE upper div or graduate student

ME 5221. Computer-Assisted Product Realization. (; 4 cr. ; A-F or Audit; Every Fall & Spring)
Injection molding with emphasis on design of manufacturing processes. Tooling design and specification of processing conditions using computer-based tools; process simulation software and computer-controlled machine tools. Simultaneous process and part design. Production of tooling and parts. Part evaluation. prereq: 3221, AEM 3031, CSci 1113, MatS 2001

ME 5223. Materials in Design. (; 4 cr. ; Student Option; Every Fall)
Fundamental properties of engineering materials. Fabrication, treatment. Physical/corrosive properties. Failure mechanism, cost/value analysis as related to material selection/specification. prereq: 3221, ME upper division or grad student

ME 5228. Introduction to Finite Element Modeling, Analysis, and Design. (; 4 cr. ; A-F or Audit; Every Fall)
Finite elements as principal analysis tool in computer-aided design (CAD); theoretical issues and implementation aspects for modeling and analyzing engineering problems encompassing stress analysis, heat transfer, and flow problems for linear situations. One-, two-, and three-dimensional practical engineering applications. prereq: CSE upper div or grad, 3221, AEM 3031, CSci 1113, MatS 2001

ME 5229. Finite Element Method for Computational Mechanics: Transient/Dynamic Applications. (4 cr. ; A-F or Audit; Spring Odd Year)
Computational mechanics involving transient/dynamic situations for solids and structures, heat transfer, fluid flow, nano-mechanics and the like. Development and analysis of numerical methods and computational algorithms. Stability and accuracy of algorithms, convergence issues; linear/nonlinear situations. Implicit, explicit, mixed, and variable time discretization approaches; modal-based methods for engineering problems. CSE upper div or grad, CSCI 1113, ME 3221, ME 3333, ME 5228 or equiv

ME 5241. Computer-Aided Engineering. (; 4 cr. ; A-F or Audit; Every Fall & Spring)
Apply computer-aided engineering to mechanical design. Engineering design projects and case studies using computer-

aided design and finite element analysis software; design optimization and computer graphical presentation of results. prereq: 3222, CSci 1113 or equiv, CSE upper div or grad

ME 5243. Advanced Mechanism Design. (; 4 cr. ; A-F or Audit; Periodic Summer)
Analytical methods of kinematic, dynamic, and kinetoelastodynamic analysis and synthesis of mechanisms. Computerized design for function, path, and motion generation based on Burmeister theory. prereq: CSE upper div or grad, 3222 or equiv, basic kinematics and dynamics of machines; knowledge of CAD packages such as Pro-E recommended

ME 5247. Applied Stress Analysis. (; 4 cr. ; A-F or Audit; Spring Odd Year)
Intermediate-level solid mechanics with application to common machine elements such as unsymmetrical beams, non-circular shafts and plates. Stress functions. Introduction to energy methods for stress analysis. Experimental methods for measuring strains and determining related stresses, with lab. prereq: AEM 3031, MatS 2001, ME 3221

ME 5248. Vibration Engineering. (; 4 cr. ; Student Option; Periodic Summer)
Apply vibration theory to design; optimize isolators, detuning mechanisms, viscoelastic suspensions and structures. Use modal analysis methods to describe free vibration of complex systems, relating to both theoretical and test procedures. prereq: CSE upper div or grad, 3281

ME 5281. Feedback Control Systems. (; 4 cr. ; Student Option; Every Fall)
Continuous and discrete time feedback control systems. Frequency response, stability, poles and zeros; transient responses; Nyquist and Bode diagrams; root locus; lead-lag and PID compensators, Nichols-Ziegler design method. State-space modeling/control. Digital implementation. Computer-aided design and analysis of control systems. prereq: 3281

ME 5286. Robotics. (; 4 cr. ; A-F or Audit; Every Spring)
The course deals with two major components: robot manipulators (more commonly known as the robot arm) and image processing. Lecture topics covered under robot manipulators include their forward and inverse kinematics, the mathematics of homogeneous transformations and coordinate frames, the Jacobian and velocity control, task programming, computational issues related to robot control, determining path trajectories, reaction forces, manipulator dynamics and control. Topics under computer vision include: image sensors, digitization, preprocessing, thresholding, edge detection, segmentation, feature extraction, and classification techniques. A weekly 2 hr. laboratory lasting for 8-9 weeks, will provide students with practical experience using and programming robots; students will work in pairs and perform a series of experiments using a collaborative robot. prereq: [3281 or equiv], [upper div ME or AEM or CSci or grad student]

ME 5312. Solar Thermal Technologies. (; 4 cr. ; A-F or Audit; Spring Odd Year)
Solar radiation fundamentals. Measurement/processing needed to predict solar irradiance dependence on time, location, and orientation. Characteristics of components in solar thermal systems: collectors, heat exchangers, thermal storage. System performance, low-temperature applications. Concentrating solar energy, including solar thermo-chemical processes, to produce hydrogen/solar power systems and photovoltaics. Solar design project. prereq: [3333, CSE upper Div] or grad student

ME 5332. Intermediate Fluid Mechanics. (4 cr. ; A-F or Audit; Every Fall)
Bridge between introductory fluid mechanics and advanced graduate level course. Principles of incompressible and compressible flows, boundary layer theory, and analysis using differential formulations of the governing conservation equations. Analysis of phenomena relevant to the practice of engineering is emphasized through problem solving. prereq: ME 3332, Admitted to upper division/ME major or graduate student

ME 5341. Case Studies in Thermal Engineering and Design. (; 4 cr. ; A-F or Audit; Every Fall & Spring)
Characteristics of applied heat transfer problems. Nature of problem specification, incompleteness of needed knowledge base, accuracy issues. Categories of applied heat transfer problems. prereq: 3333, CSE upper div or grad student

ME 5344. Thermodynamics of Fluid Flow With Applications. (; 4 cr. ; A-F or Audit; Every Fall & Spring)
Conservation of mass, momentum, energy. Relevant thermodynamic properties. Nozzles, diffusers, thrust producers, shocks. Fluid-wall frictional interactions. Wall heat transfer, internal heat release. Temperature recovery. Mass addition. Chemical thermodynamics/applications. prereq: 3333, CSE upper div or grad student

ME 5351. Computational Heat Transfer. (; 4 cr. ; A-F or Audit; Every Fall & Spring)
Numerical solution of heat conduction/analogous physical processes. Develop/use computer program to solve complex problems involving steady/unsteady heat conduction, flow/heat transfer in ducts, flow in porous media. prereq: 3333, CSE upper div or grad student

ME 5446. Introduction to Combustion. (; 4 cr. ; A-F or Audit; Every Fall)
Thermodynamics, kinetics, energy and mass transport, pollutants in reacting systems. Reactors, laminar and turbulent flames. Ignition, quenching, and flame stability. Diffusion flames. Combustion in reciprocating engines, furnaces, and turbines, with emphasis on internal combustion engine performance and emissions. prereq: 3331, 3332, 3333, CSE upper div or grad student

ME 5461. Internal Combustion Engines. (; 4 cr. ; A-F or Audit; Every Spring)
Basic spark ignition and diesel engine principles, air, fuel-air and actual engine cycles, cycle modeling, combustion and emissions, knock phenomena, air flow and volumetric efficiency, mixture requirements, ignition requirements and performance. Lectures/complementary labs. prereq: CSE upper div or grad student, C or better in [3332, 3333] or 3324

ME 5462. Gas Turbines. (; 4 cr. ; A-F or Audit; Periodic Fall & Spring)
Gas turbine cycles, regeneration, recuperation, reheat, intercooling, combined cycle plants, and thermochemical regeneration. Axial and radial flow compressors and turbines; combustor designs, energy analysis, emissions, and noise. Turbojet, fanjet, turboprop engine performance. Stationary power plants, vehicular propulsion, hybrid vehicles. prereq: 3331, 3332, 3333, CSE upper div or grad student

ME 5666. Modern Thermodynamics. (; 4 cr. ; A-F only; Every Fall & Spring)
Applications of thermodynamics to natural phenomena. Multiscale approach. Student group projects, with undergrads and grad students in same group. Three hours/week classroom instruction, one hour/week project discussion. Project presentations at weeks 8 and 14 are webcast. prereq: 3331 or equiv

ME 8001. Research Ethics and Professional Practice. (; 0 cr. ; No Grade Associated; Every Fall, Spring & Summer)
Intellectual property, data management, social responsibility, authorship, and plagiarism, conflict of interest, and reporting misconduct. Case studies. Recent newspaper articles.

ME 8111. Multiphase Systems Analysis. (3 cr. ; A-F only; Every Spring)
This course provides an introduction to the physical behavior of multiphase systems, including aerosols, granular systems, colloids, sprays, foams, dusty plasmas, and emulsions. The course emphasis is on developing fundamental relationships that describe how the behavior of one phase is influenced by its interaction with the other phase. The course will be divided into four sections. In the first, transport of dilute systems of rigid particles in a gaseous or liquid medium is examined at the single particle level. Students will be taught how to construct and numerically solve Lagrangian particle tracking models with one-way coupling and will be provided with codes to compute the free molecular drag force on particles of arbitrary shape (IMoS). In the second section, the course will discuss dense dispersed media, including effective medium approximations to describe thermal and electrical transport in complex systems, an introduction to foams and unit cells, flow in porous media, and granular systems (four-way coupled systems). In the third section, the course will return to dilute systems, but wherein the dispersed phase is deformable (droplets). Topics will include droplet behavior on a surface (wetting and line tension), an introduction to emulsions, droplet-droplet coalescence, and atomization processes. The fourth and final section of the course, phase change and multiphase system formation will be introduced, including the kinetics of nucleation of condensed phase material in

a gas, as well as solid (ice) formation in a liquid. The overarching goal of the course is to prepare PhD and MS students to be able to address research level questions experimentally, numerically, and theoretically in their studies beyond the course.

ME 8113. Advanced Aerosol/Particle Engineering. (; 3 cr. ; A-F or Audit; Periodic Spring)
Introduction to kinetic theory, definition, theory, and measurement of particle properties; elementary particle mechanics, particle statistics; Brownian motion and diffusion, coagulation, evaporation and condensation, sampling, and transport. prereq: CSE grad student or instr consent

ME 8221. New Product Design and Business Development I. (; 4 cr. ; A-F or Audit; Every Fall)
Students and faculty work with company representatives to develop a product concept, a working physical prototype, and an extensive business plan. Concept design, detail design, manufacturing, marketing, introduction strategy, and profit forecasting. Sponsoring company intends to bring product to market. ME 8222 must be taken in sequence the same year. prereq: CSE grad student, some design experience

ME 8222. New Product Design and Business Development II. (; 4 cr. ; A-F or Audit; Every Spring)
Students and faculty work with company representatives to develop a product concept, a working physical prototype, and an extensive business plan. Concept design, detail design, manufacturing, marketing, introduction strategy, and profit forecasting. Sponsoring company intends to bring product to market. Must be taken in sequence with 8221 the same year. prereq: 8221

ME 8228. Finite Elements in Multidisciplinary Flow/Thermal/Stress and Manufacturing Applications. (; 4 cr. ; A-F or Audit; Periodic Fall & Spring)
Multidisciplinary and coupled effects involving flow/heat transfer/stress. In-depth understanding of modeling and analysis in each discipline. Coupling multi-disciplines for engineering problems. Applications to manufacturing and process modeling of, e.g., metals, alloys, polymers. prereq: 3222, 5341, AEM 3031, CSci 1113

ME 8229. Finite Element Methods for Computational Mechanics: Transient/ Dynamic Problems. (; 4 cr. ; A-F or Audit; Every Spring)
Computational mechanics involving transient or dynamic situations; development and analysis of computational algorithms. Stability and accuracy of algorithms, convergence issues; linear/nonlinear situations. Implicit, explicit, mixed, and variable time discretization approaches; modal-based methods for engineering problems prereq: 5228 or equiv, 5341, AEM 3031, CSci 1113

ME 8243. Topics in Design: Advanced Fluid Power. (; 4 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Topics vary with each offering.

ME 8253. Computational Nanomechanics. (3 cr. ; Student Option; Every Spring)
Fundamentals of mechanical properties in nanometer scale. Role of discrete structure and underlying atomic, molecular, and interfacial forces are illustrated with modern examples. Overview of computational atomistic methods. Lectures, hands-on computing using publicly available or personally developed scientific software packages. prereq: CSE grad student

ME 8254. Fundamentals of Microelectromechanical Systems (MEMS). (; 4 cr. ; A-F only; Every Spring)
Major classes, components, and applications of MEMS. Principles behind operation of MEMS devices/ systems. Standard microfabrication techniques. Unique requirements, environments, and applications of MEMS. Students apply microfabrication techniques/applications to design/manufacture of a MEMS device or microsystem.

ME 8255. Introduction to Nanotechnology. (3 cr. ; A-F or Audit; Every Fall)
This course covers a broad range of subjects introducing students to the science and technology of nanoscale materials. This includes from fundamental principles, to synthesizing and characterizing nanomaterials, to incorporating them into advanced manufacturing processes and hybrid nano-bio systems. Indeed, establishing a critical scientific understanding of properties at the nanoscale will ultimately enable a variety of next-generation devices. The focus of this course thus is on the fundamental techniques necessary for investigations at small dimensions, and the very latest research developments in this rapidly evolving field.

ME 8262. Topics in Modeling and Analysis of Manufacturing Processes. (; 4 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Advanced topics in Manufacturing. Analytical/ numerical modeling of manufacturing processes. Use of computer-based modeling tools and computer controlled manufacturing machines. Comparison of predictions/ measurements of process variables and part characteristics. Part production/testing. Processes, technologies, and topics vary with each offering. prereq: 3221, AEM 3016

ME 8281. Advanced Control System Design-1. (; 3 cr. [max 4 cr.] ; A-F or Audit; Every Fall)
Loop Shaping. Review of controllability/ observability. LQR/LQG/LTR. Repetitive control. Input shaping. Tracking control (feedforward, precompensation). Lyapunov stability. System identification. prereq: 5281

ME 8282. Advanced Control Systems Design-2. (; 3 cr. [max 4 cr.] ; A-F or Audit; Periodic Fall)
Introduction to nonlinear systems, bifurcations, chaos, Lyapunov stability. Input-output stability (circle theorem, passivity, Lure'). Input-output and input-state feedback linearization. Lyapunov-based design. Sliding surface control, dynamic surface control. Parameter identification (least squares, gradient, etc). Lyapunov-based adaptive control, integrator back-stepping, singular perturbations. prereq: 5281

ME 8283. Design of Mechatronic Products. (4 cr. ; A-F or Audit; Fall Odd Year)
The purpose of this course is for advanced mechanical engineering students to gain additional mechatronic skills by learning how to use microcontrollers to implement control systems in the context of a practical product or device. Embedded microcontrollers are ubiquitous in modern products from washing machines to cell phones to automobiles to space rockets. Knowing how to design and program microcontrollers, how to interface microcontrollers to sensors and actuators, and how to implement control algorithms on a microcontroller is an important skill for the modern control system design engineer. The course is hands-on and follows a learn by doing approach. Students spend 1/3 the course in a microcontroller boot camp and 2/3 on a substantial microcontroller project. The lectures cover didactic material related to microcontrollers, sensors, actuators, electronics circuit design and fabrication and control algorithm implementation. prereq: An introductory system dynamics and controls course or permission of instructor.

ME 8285. Control Systems for Intelligent Vehicle Applications. (; 3 cr. ; A-F or Audit; Every Fall)
This course focuses on a study of several advanced control design techniques and their applications to smart vehicles. The control system topics studied include lead and lag compensator design, loop shaping, analysis of system norms, H2-optimal control, feedback linearization, sliding surface control, and observer design. The vehicle application topics studied include cruise control, adaptive cruise control, automated lane keeping, automated highway systems, yaw stability control, active rollover prevention, engine control, and active and semi-active suspensions. In each application, a dynamic model is first developed that is simple enough for control system design, but at the same time, rich enough for capturing the essential features of the dynamics. The control design for each application is studied in-depth during lecture and further analyzed during hands-on homework. prereq: 5281 or EE 5231 or equiv

ME 8287. Topics in Dynamics and Control. (; 2-4 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Topics Course in Dynamics and Control

ME 8332. Advanced Fluid Dynamics in Mechanical Engineering. (3 cr. ; A-F or Audit; Every Spring)
Advanced fluid dynamics course addressing the theory and applications of fluid flows pertinent to mechanical engineering. The course focuses on the physical phenomena, mathematical formulations, and advanced problem-solving techniques for flows ranging from microscale flows to turbulence, with examples from mechanical engineering practice. Prerequisite an intermediate fluid mechanics course or permission of instructor.

ME 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

ME 8337. Experimental Methods in the Thermal Sciences. (; 3 cr. ; A-F or Audit; Periodic Fall)
The course will provide fundamentals on optics theory and optical instruments for students to understand and implement cutting-edge optical diagnostic tools, and to design optical methods for measurements in fluid and thermal sciences. The course will cover commonly used optical measurement techniques including particle image/tracking velocimetry, laser induced fluorescence, Schlieren photography, and digital holography.

ME 8341. Conduction. (; 3 cr. ; A-F or Audit; Every Fall)
Advanced understanding/application of conduction/diffusion to heat/mass transfer problems. Solving ordinary/partial differential equations related to physics of diffusion. Special topics in numerical microscale heat transfer. prereq: Undergrad class in heat transfer or instr consent

ME 8342. Convection. (; 3 cr. ; A-F or Audit; Every Spring)
Heat transfer in fluids flowing around bodies and in tubes/ducts. Forced/natural convection. Laminar/turbulent flow regimes. Turbulent transport and modeling. High-speed flows, viscous dissipation, variable property effects. Application to heat exchange devices. Convective mass transfer. prereq: Grad level course on fundamentals of fluid mechanics that has a substantial component on viscous flows or instr consent

ME 8343. Radiation. (; 3 cr. ; A-F or Audit; Every Spring)
Advanced radiation heat transfer problems. Physics foundation for radiation. Materials properties. Radiation transfer problems. Solution methods for integro-differential equations. Statistical methods. Multi-mode heat transfer. prereq: Undergrad class in heat transfer or instr consent

ME 8345. Computational Heat Transfer and Fluid Flow. (; 3 cr. ; Student Option; Every Fall & Spring)
Finite volume method for solution of governing equations for heat transfer and fluid flow. Mathematical models of turbulence. Construction of general computer program. Practical applications. prereq: CSE grad student

ME 8350. Heat Transfer Physics. (3 cr. ; A-F only; Spring Odd Year)
Physical fundamentals of storage, transport, transformation of thermal energy by energy carriers. Phonons, electrons, fluid particles, photons. Physical mechanisms, multiple time scales. Heat transfer processes. Atomic-molecular dynamics, solid state physics, electromagnetism, quantum optics. prereq: CSE grad student

ME 8361. Molecular Gas Dynamics. (; 3 cr. ; A-F or Audit; Periodic Fall)
Kinetic theory of gases, Boltzmann equation, Maxwell-Boltzmann distribution, collisions, transport properties. Introduction to quantum mechanics. Statistical thermodynamics, classical/quantum statistics. partition functions and thermodynamic properties. Irreversible thermodynamics. prereq: CSE grad student

ME 8362. Introduction to Plasma Technology. (; 3 cr. ; A-F or Audit; Periodic Spring)
Fundamentals of gaseous plasmas. Thermal/nonequilibrium plasmas. Types of plasma generation. Electron energy distribution function. Sheaths, glow discharges, electric arcs, RF plasmas. Steady/unsteady plasmas. Plasma heat transfer. Plasma diagnostics. prereq: 8361

ME 8363. Introduction to Reactive Flow Systems. (3 cr. ; A-F or Audit; Every Spring)
This is an advanced graduate level course that covers the basics of reactive flow systems pertinent to mechanical engineering. After the introduction/review of the fundamentals of collisions, chemical kinetics, reactions and relevant aspects of basic physical chemistry, the course focuses on reaction kinetics and transport phenomena in reactive flow systems. It will introduce modeling approaches of zero and one dimensional reaction kinetics systems and diagnostics to measure the chemical and transport properties of reactive flow systems. The fundamentals and approaches introduced in this course will be applied to examples of reactive flow systems from mechanical engineering practice including both gas phase and multiphase systems (solid-gas and liquid-gas).

ME 8381. Bioheat and Mass Transfer. (; 3 cr. ; Student Option; Periodic Summer)
Analytical/numerical tools to analyze heat/mass transfer phenomenon in cryobiological, hyperthermic, other biomedically relevant applications. prereq: CSE grad student, upper-division transport/fluids course; [physics, biology] recommended

ME 8390. Advanced Topics in the Thermal Sciences : Biostabilization in Biomedicine, and Biotechnology. (; 1-3 cr. [max 18 cr.] ; A-F or Audit; Every Spring)
Topics vary according to instructor.

ME 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

ME 8446. Advanced Combustion. (3 cr. ; A-F or Audit; Periodic Fall)
Fundamental understanding of linkage between thermodynamics, chemical kinetics, and transport phenomena in combustion systems. Heat release rate, flame stability, and emissions. How those issues arise in furnaces, internal combustion engines, and rockets. prereq: Undergrad courses in thermodynamics, fluid mechanics, heat transfer, IT grad student; 5446 or 8641 highly recommended

ME 8462. Turbomachinery. (; 3 cr. ; A-F or Audit; Periodic Summer)
Thermodynamic analysis of energy transfer between fluid and rotor; dimensional analysis; principles of axial, mixed, and radial flow pumps, fans, compressors, and turbines; cascade performance; computer flow simulations; applications to propulsion systems and power plants. prereq: CSE grad student, 3321, 3322 or equiv or instr consent

ME 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

ME 8772. Advanced Transportation Technologies Seminar. (; 1 cr. ; S-N or Audit; Every Fall)
Advanced technologies specifically related to transportation. Topics draw from core science/technology areas of human factors, intelligent vehicles, traffic modeling/management, sensing, communications, and controls.

ME 8773. Graduate Seminar. (; 1 cr. ; S-N or Audit; Every Fall & Spring)
Recent developments. prereq: CSE grad student

ME 8774. Graduate Seminar. (; 1 cr. ; S-N or Audit; Every Fall & Spring)
Recent developments. prereq: 8773

ME 8775. Technical Communication. (; 1 cr. ; S-N or Audit; Periodic Fall)
One-day workshop on presenting a seminar. Students deliver one-hour seminar on technical topic and attend nine other technical seminars.

ME 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

ME 8794. Mechanical Engineering Research. (; 1-4 cr. ; S-N only; Every Fall, Spring & Summer)
Directed research. prereq: instr consent

ME 8800. Modern Developments in Mechanical Engineering. (; 1 cr. [max 2 cr.] ; S-N or Audit; Periodic Fall & Spring)
Seminars on topics in engineering science of importance to mechanical engineers. Invited scholars deliver five-lecture series on each topic; two to five topics each semester. prereq: CSE grad student

ME 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

ME 8990. Curricular Practical Training. (; 1-2 cr. [max 6 cr.] ; S-N only; Every Fall, Spring & Summer)
Industrial work assignment involving advanced mechanical engineering. Review/approval by faculty member and director of graduate studies. Final report covering work assignment.

Medical Device Innovation (MDI)

MDI 5001. Technical Writing Essentials. (0.5 cr. [max 1 cr.] ; A-F only; Every Fall)
This course lays the groundwork for the Medical Device Innovation capstone as well as aspects of technical writing critical for success in the Medical Device Innovation MS program. prereq: grad MDI major

MDI 5002. Technology Foresight and Forecasting. (2 cr. [max 3 cr.] ; A-F only; Every Fall, Spring & Summer)
Tools and techniques for technology forecasting, assessment, foresight for decision making in medical device industry. Topics include technology dynamics, research and development, portfolio management, and resource allocation. prereq: grad MDI major

MDI 5003. Technology Foresight & Forecasting Analytical Lab. (1 cr. ; A-F only; Every Fall)
This course is a continuation of MDI 5002: Technology Foresight & Forecasting and will afford students with an opportunity to complete the therapeutic area analysis they began in the summer semester, prepare a Powerpoint presentation in consultation with the instructor, and then present the results of their analysis to a group of MDI faculty. prereq: grad MDI major

MDI 5004. Clinical Foundations of Medical Device Innovation. (3 cr. ; A-F only; Every Fall, Spring & Summer)
Master essential topics to deepen knowledge of Clinical Environment in which products will be conceived, tested, used. Topics include surgical protocols, physician, surgeon, nursing, technical support functions. Medical terminology, anatomy/physiology, ethnology research, Healthcare Law, Medicare/Medicaid, HIPAA requirements. prereq: MDI grad student. Non-MDI graduate students and non-degree graduate students may register for this course with permission of the MDI program.

MDI 5006. Finance, Valuation, and Entrepreneurship. (3 cr. ; A-F only; Every Summer)
Course provides students the opportunity to develop the entrepreneurial skills important in managing design, development, and commercialization of medical devices. Focuses on creating value within the organization, financial methods important to managers in technology-based organizations, and business plan development. Topics include budgeting capital, projecting financial needs, and managing working capital. Registration is limited to MDI students only.

MDI 5008. Quality, Regulatory and Operations Management. (3 cr. ; A-F only; Every Fall, Spring & Summer)
Course provides students with understanding of the global regulatory environment in which the medical device industry operates. Students gain a fundamental understanding of critical quality systems regulations including ISO13485/ISO14971 and their relationship to the FDA's cGMP regulations. Students gain practical experience using tools that are essential to both product development and continuation/sustaining engineering including; design control procedures, FMEA, verification and validation, internal and external (supplier) management and audit methods. prereq: MDI graduate student only

MDI 5010. Product Innovation & Development Management. (2 cr. [max 3 cr.] ; A-F only; Every Spring)
Framework for conceptualization, design, development, commercialization process for medical products. Survey of key steps in innovation, from engineering/business perspective. Cross-functional development of concepts/processes. prereq: Grad MDI student. Non-MDI graduate students and non-degree graduate students may register for this course with permission of the MDI program.

MDI 5012. Medical Industry Strategic Analysis. (3 cr. ; A-F only; Every Fall, Spring & Summer)
Application of macro environmental analysis to medical device industry. Methods reviewed. Industry-relevant case studies/macro environmental analysis of firms of interest. Political, economic, social, technological, legal, ecological factors that impact medical innovation. Prereq: MDI grad student. Non-MDI graduate students and non-degree graduate students may register for this course with permission of the MDI program.

MDI 5013. Biodesign Practicum I. (2 cr. ; A-F only; Every Fall, Spring & Summer)
First of three part series of practicum courses for MDI program. Focus on teaching innovation steps/process using known/pre-assigned clinical needs as examples in collaboration with Medical Device Center. Essential steps in BioDesign process. Apply knowledge to specific real-world examples. prereq: Grad MDI student

MDI 5014. Biodesign Practicum II. (2 cr. ; A-F only; Every Fall, Spring & Summer)
Second of three part series of practicum courses for MDI program. Clinical environment, including research tools/methods, filtering/ translating needs, ideation/prototype development, communication with functional managers, corporate executives/investors. prereq: Grad MDI student

MDI 5015. Biodesign Practicum III. (2 cr. ; A-F only; Every Spring)
Medical Device Innovation Practicum III is the third of a three part series. Students will gain a high-level understanding of essential steps in the BioDesign process related to ideation. The steps of the ideation process will include brainstorming and prototyping of potential solutions, risk assessment, and business strategy development. Students will prepare and present a technical evaluation that articulates the value of their new technology or device to functional managers, corporate executives, and/or investors. prereq: Grad MDI student

MDI 5020. Medical Device Innovation Capstone. (1-2 cr. ; A-F only; Every Spring & Summer)
The MDI capstone is an independent, original, and applied investigation on a relevant subject, problem, or issue in areas of medical device technologies, policy, business, and innovation. All students in the MDI program are required to complete a capstone project as part of the program. Registration is open to MDI students only.

MDI 5050. Interpersonal & Team Effectiveness. (1 cr. ; A-F only; Every Summer)
MDI 5050 builds the context and capability innovation leaders need to manage effective interpersonal relationships and develop high performance teams. Emphasis is placed on foundational principles and practices that help leaders self-manage, engage and influence key stakeholders, and generate shared commitment for team and project success. Students will increase their self-awareness through self and peer feedback and develop an action plan to enhance their leadership effectiveness in both their current work role and their MDI practicum teams. prereq: Grad MDI student

MDI 5051. Leading Innovation & Change. (1 cr. ; A-F only; Every Fall)
MDI 5051 explores the role and differentiating capabilities of outstanding innovation leaders in complex and dynamic environments. Emphasis is placed on principles and practices that help leaders focus on the right strategies, build the organizational capability required to execute a strategy, lead change initiatives and sustain commitment versus compliance among diverse stakeholders. Students will practice improving their team effectiveness and develop a change leadership plan to support implementation of either a current work initiative or their upcoming Capstone Project. prereq: Grad MDI Student and completion of MDI 5050.

MDI 5060. MDI Independent Study. (1-3 cr. ; A-F only; Periodic Fall, Spring & Summer)
Independent study in MDI-related topic. prereq: MDI grad student

Medical Industry Leadrshp Inst (MILI)

MILI 5995. Medical Industry Valuation Laboratory. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Interdisciplinary student teams create rapid production market analysis of promising medical technologies/services to determine potential for success in market. Exposure to University innovations, venture firms, inventors. prereq: instr consent

MILI 5999. Independent Study. (; 1-8 cr. [max 16 cr.] ; A-F only; Every Fall, Spring & Summer)
Independent study.

MILI 6235. Pharmaceutical Industry: Business and Policy. (; 2 cr. ; A-F only; Every Spring)
Business/policy issues specific to pharmaceutical industry. Interdisciplinary perspectives, active involvement by industry leaders.

MILI 6421. Healthcare Law: Stratrategic and Business Implications. (; 2 cr. ; A-F only; Every Fall)
This course will survey fundamental healthcare laws that apply to a wide variety of healthcare businesses, and will examine their impact on business strategy and operations. The goal is to enable current and prospective managers and leaders in the healthcare space to understand compliance requirements and how healthcare law impacts business strategy and decisions. In the end, healthcare law can be a competitive advantage. In addition, the course will address key current healthcare policy challenges and how these impact business environment and strategy.

MILI 6562. Information Technology in Health Care. (; 2 cr. ; A-F only; Every Fall)
Theoretical/conceptual base for health care information technology. Applications of current/developing health IT. Approaches to evaluate effectiveness of health IT systems. Information technology, computer technology, and data structures commonly found in health care information systems. Information system design/evaluation. prereq: MBA student

MILI 6589. Medical Technology Evaluation and Market Research. (; 2 cr. ; A-F only; Every Spring)
This course aims to provide knowledge of the skills, data, and methodology required to critically evaluate new medical technologies in order to meet financial investment as well as regulatory compliance objectives, such as FDA approval. The course is designed to provide an introduction to the analytic tool kit needed to critically evaluate new medical technology, such as cost-benefit analysis, cost effectiveness analysis as well as other decision-analytic models and markov-models.

MILI 6726. Medical Device Industry: Business and Public Policy. (; 2 cr. ; A-F only; Every Fall)
This course, with the insight of industry leaders, addresses public-private sector interactions and the business, public policy, regulatory, and technology management issues that concern medical device and biotechnology companies.

MILI 6920. MILI Topic Course. (; 2 cr. [max 8 cr.] ; A-F only; Periodic Fall & Spring)
Discussion and analysis of current topics and developments in the medical industry.

MILI 6963. Healthcare Analytics. (; 2 cr. ; A-F only; Every Spring)
This course prepares students to analyze large health care databases with a focus on advanced applications with health insurance claims data. The course is designed to be a STEM offering with the use of statistical programming languages including R, Tableau, and SAS. This course is designed to appeal to students with an interest in developing data science as a core skill and already have knowledge of some programming tools, and experience with data manipulation in Excel, SQL, or Access. The course utilizes a novel synthetic health insurance claims database representing 300 million covered lives of the major private and publicly insured insured populations in the United States. Major topics include market sizing, actuarial projection, quality of care metrics, and national health account calculation.

MILI 6985. The Health Care Marketplace. (; 2 cr. ; A-F only; Every Fall & Spring)
Survey of trillion dollar medical industry. Physician/hospital services, insurance, pharmaceuticals, medical devices, information technology. Scale, interactions, inter-relationships, market opportunities, barriers. prereq: MBA student

MILI 6991. Anatomy and Physiology for Managers. (; 2 cr. ; A-F only; Every Spring)
Overview of medical vocabulary/physiology of major body systems. Understanding current clinical practice. Market opportunities of major body systems, Medical technology innovation.

MILI 6992. Healthcare Delivery Innovations:Optimizing Cost and Quality. (; 2 cr. ; A-F only; Every Fall)
Understand stakeholders that impact healthcare delivery including providers, payers, employers and patients and how they are trying to transform this unique value chain to improve care while reducing cost.

MILI 6995. Medical Industry Valuation Laboratory. (; 2 cr. [max 6 cr.] ; A-F only; Every Fall, Spring & Summer)
Interdisciplinary student teams create rapid production market analysis of promising medical technologies/services to determine potential for success in market. Exposure to University innovations, venture firms, inventors. prereq: Grad student

MILI 6996. Medical Industry Valuation Laboratory II. (; 2-4 cr. [max 10 cr.] ; A-F only; Every Fall & Spring)
Interdisciplinary student teams create rapid production market analysis of promising medical technologies/services to determine potential for success in market. Exposure to University innovations, venture firms, inventors. prereq: Approved application

MILI 6997. MILI Global Valuation Lab. (4 cr. [max 12 cr.] ; A-F only; Periodic Summer)
Global version of medical industry leadership institute valuation lab. Assess value of proprietary inventions.

MILI 6998. MILI Fellows. (0-2 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
Fellows will apply the knowledge they have acquired in the MILI Valuation Lab course to assess the commercial viability of innovations developed by the Medical Device Center?s Innovation Fellows.

MILI 6999. Independent Study. (; 0-8 cr. [max 16 cr.] ; A-F only; Every Fall, Spring & Summer)
Independent study.

Medical Industry MBA (MIMB)

MIMB 6881. Marketing. (3 cr. ; A-F only; Every Spring)
Management of the marketing function; understanding the basic foundational marketing concepts and skills in strategy development and planning of operational and strategic levels pertaining to product offering decisions, distribution channels, pricing and communication.

MIMB 6882. Ethics and Leadership. (; 2 cr. ; A-F only; Every Fall)
This course has twin objectives: challenge participants to think about the ethical implications of the day-to-day conduct of business organizations; and explore how the relationship between corporate leaders and their followers can become mutually stimulating?raising them both to higher levels. It will focus on: ethics of corporate decisions; corporate social responsibility; corporate governance; sources of leadership power & influence; and leadership styles.

MIMB 6883. The Global Healthcare Marketplace. (2 cr. ; A-F only; Every Fall)
Survey of multitrillion dollar medical industry, this course covers physician and hospital services, insurance, pharmaceuticals, medical devices, information technology, and industry scale, interactions, opportunities, and barriers.

MIMB 6884. Pharmaceutical Industry. (2 cr. ; A-F only; Every Fall)
Focusing on the unique characteristics of the pharmaceutical industry, including its market, regulation, and policy issues, this course leverages interdisciplinary perspectives and industry leader involvement to develop student skill sets. This course is a joint venture of the Carlson School of Management and the College of Pharmacy at the University of Minnesota. In addition to academic faculty from these schools, the course also engages the participation of key leaders in the pharmaceutical industry and the health sector in general.

MIMB 6885. Information Technology in Health Care. (2 cr. ; A-F only; Every Fall)
This course prepares future health service managers to harness the resources of the emerging health information age. The course will focus on 1) the theory and conceptual base for healthcare information technology (IT), 2) applications of current and developing health IT applications and 3) approaches to evaluate the effectiveness of health IT systems. This course provides a theoretical and conceptual base for managers, creators, and evaluators of healthcare information technology, including the application of current and evolving technology systems. Special attention is paid to the design and evaluation of common data structures.

MIMB 6886. Medical Technology Evaluation and Market Research. (2 cr. ; A-F only; Every Spring)
Leaders from medical industry companies participate in this hands-on experience in creating a value proposition for new medical technologies.

MIMB 6887. Medical Device Industry. (2 cr. ; A-F only; Every Spring)
This course, with the insight of industry leaders, addresses public-private sector interactions and the business, public policy, regulatory,

and technology management issues that concern medical device and biotechnology companies. This course covers the unique business, market, public policy, regulatory, and technology management issues of the medical device industry--including growing interaction and overlap with the pharmaceutical industry, biotechnology industry, information technology industry, and (more recently) wearable technology. Students successfully completing this course will understand: the historical development, importance, and future direction of the medical device industry; FDA issues, policies and strategies, public and private sector insurance coverage and reimbursement; interaction between public policies and private sector actions; intellectual property (IP) and liability issues concerning medical technology; and key issues relating to the start-up and management of new medical technology firms.

MIMB 6888. Research and Development of Medical Technology. (2 cr. ; A-F only; Every Spring)
Understand the production healthcare research and development that exist to analyze how the components along the care continuum, currently fit together and more importantly explore how they can be reconfigured and re-engineered to create value.

MIMB 6889. Health Law and Intellectual Property Strategy. (2 cr. ; A-F only; Every Spring)
This course will survey fundamental healthcare laws that apply to a wide variety of healthcare businesses, and will assess their impact on those business?s strategy and operations. The goal is to enable current and prospective managers and leaders in the healthcare space to be aware of and thus able to proactively manage potential legal issues. Intellectual property as a core tenant of medical innovation will be a focus of the class.

MIMB 6890. Data Driven Project Work. (2 cr. ; A-F only; Every Spring)
This course is designed to provide students with an understanding of and an ability to apply exploratory data analysis, basic inferential procedures, and regression in a generic industry as well as medical industry and healthcare management setting.

MIMB 6891. Medical Industry Valuation Laboratory. (; 4 cr. ; A-F only; Every Fall)
Hands on experience in succinctly evaluating the value of a new technology by considering market size and potential, intellectual property, and return on investment. Intercollegiate teams create rapid production market analysis of promising medical technologies and services to determine potential for success in market. Exposure to University innovations, venture firms, inventors. The Medical Industry Valuation Laboratory will produce medical innovation valuations for clients for high value economic development and professional training purposes using an interdisciplinary team of faculty, students, and industry leaders.

MIMB 6892. MIMBA Tuition - 1st Half. (0 cr. ; No Grade Associated; Every Fall)
Course created for purpose of charging tuition. Half of the cost of tuition is charged upfront and nonrefundable before the first year, and half before the second year.

MIMB 6893. MIMBA Tuition 2nd Half. (0 cr. ; No Grade Associated; Every Fall)
Course created for purpose of charging tuition. Half of the cost of tuition is charged upfront and nonrefundable before the first year, and half before the second year.

Medical Laboratory Sciences Pr (MLSP)

MLSP 5011W. Professional Issues in the Health Care Community. (WI; 2 cr. ; A-F only; Every Spring & Summer)
Current literature and written discussion to explore the laboratory profession: healthcare systems, professional scope of practice, regulatory and licensure issues, medical ethics, Interprofessional practice models and current topics impacting health care delivery. Focus is on the medical laboratory?s crucial role in patient care.

MLSP 5012. Educational Methods and Interprofessional Practice. (; 1 cr. ; A-F only; Every Fall)
Introduction to basic education theory, instructional design, development of lesson goals, objectives, content delivery methods, and assessments. Course also includes exploration of Interprofessional approach to health care. Professional identity and integrity, relationships between professions and those they serve, and teamwork.

MLSP 5013. Scholarly Inquiry and Analysis in Medical Laboratory Sciences. (; 1 cr. ; A-F only; Every Fall & Summer)
Review concepts of scientific inquiry. Major steps of research project. How to select topics, evaluate literature, and construct and test working hypothesis. Analyze and interpret data, report results. Quantitative, qualitative, and mixed methods research designs.

MLSP 5013H. Scholarly Inquiry and Analysis in Medical Laboratory Sciences - Honors. (; 2 cr. ; A-F only; Every Fall & Summer)
Introduction to scientific inquiry. Steps of research projects. Topic selection, literature evaluation, construct and test hypotheses. Analyze and interpret data, report results. Quantitative, qualitative, and mixed methods designs. Students select a clinical case study, research relevant literature, and write a publication quality article.

MLSP 5014W. Laboratory Operations and Management in Health Care Systems. (WI; 2 cr. ; A-F only; Every Fall & Summer)
Operational aspects of medical laboratory fiscal and personnel management laboratory information systems, total quality management, legal aspects of test reporting, government regulatory issues, certification, licensure, accreditation policies. This course meets the campus requirement for an upper division, writing intensive course, in the major.

MLSP 5111. Concepts of Diagnostic Microbiology. (; 3 cr. ; A-F only; Every Fall)
Investigation of pathophysiologic mechanisms of disease for medically significant human bacteria and yeast including epidemiology, pathogenesis, spectrum of disease, antimicrobial susceptibility testing and therapy. Current analytical methods and applications are discussed.

MLSP 5112. Application of Diagnostic Microbiology Principles. (2 cr. ; A-F only; Every Fall)
Application of laboratory methods to identify and treat commonly encountered and clinically significant bacterial and yeast pathogens including specimen processing, culture workup, conventional microscopy, susceptibility testing, and molecular and immunological techniques. Emphasis on aerobic and anaerobic bacteria, mycobacteria, and yeast from various body sites.

MLSP 5113. Advanced Concepts in Diagnostic Microbiology. (3 cr. ; A-F only; Every Spring)
Physiology and pathogenic interactions between man and clinically significant fungal, parasitic, viral, and miscellaneous bacterial agents including the epidemiology, prevention, detection, and treatment of these agents. Current analytical methods and applications are discussed.

MLSP 5211. Fundamentals in Hematology and Hemostasis. (3 cr. ; A-F only; Every Fall)
Anatomy and physiology of hematopoietic and coagulation systems including cell morphology, theory of routine and specialized hematology and hemostasis tests, non-malignant alterations and their etiologies, current therapeutic regimens, and clinical implications. Current analytical methods and applications are discussed.

MLSP 5212. Application of Hematology & Hemostasis Principles. (1 cr. ; A-F only; Every Fall)
Theory, performance, and application of routine and specialized diagnostic procedures. Practice in venipuncture, cell counting, white blood cell differential, red cell, white cell and platelet morphology and interpretation, and coagulation studies. Quality control in diagnostic procedures. Interpretation and correlation of laboratory findings.

MLSP 5213. Diagnostic Hematology. (3 cr. ; A-F only; Every Spring)
Blood and bone marrow in assessment of hematologic function and disease. Focus on normal development, differentiation, and abnormal changes in disease. Group integration of case data including bone marrow collection, interpretation of cytochemical stains, flow cytometry, cytogenetics, molecular diagnostics in hematologic neoplasms and disorders.

MLSP 5214. Advanced Hematology Morphology. (; 1 cr. ; A-F only; Every Spring)
Blood and bone marrow in assessment of hematologic function and presence of disease. Focus on normal development and

differentiation, abnormal changes in pathologic conditions. Practice in bone marrow differential. Mastery in peripheral blood differential and morphology. Integration and interpretation of case history and specialized test data.

MLSP 5311. Fundamental Biomedical Laboratory Techniques. (4 cr. ; A-F only; Every Spring & Summer)
Foundations of biomedical laboratory methods, development of technical skills: safety, lab math, total testing process, method validation, Quality Control and Assurance. Emphasis on documentation and analysis, analytical techniques, microscopy, spectrophotometry, chromatography, electrochemical, immunologic, nucleic acid (molecular) techniques.

MLSP 5312. Body Fluid Analysis. (2 cr. ; A-F only; Every Spring)
Formation and analysis of urine, cerebrospinal, pleural, peritoneal, amniotic, synovial, seminal, and other body fluids, and the correlation to pathological conditions are discussed. Laboratory skills for analysis of the physical, chemical, and microscopic characteristics of body fluids will be developed.

MLSP 5313. Chemical Analysis in Health and Disease. (; 3 cr. ; A-F only; Every Fall)
Correlation of medically significant organic and inorganic substances found in body fluids to pathophysiology of organ systems and metabolic disorders. Topics include electrolytes, blood gases, carbohydrates, lipoproteins, bone disorders, tumor markers, therapeutic drug monitoring, cardiac, hepatic, renal, endocrine, and gastrointestinal disorders. Current analytical methods and applications are discussed.

MLSP 5511. Principles of Immunobiology. (3 cr. ; A-F only; Every Fall & Summer)
Comprehensive exploration of the immune system and functions. Fundamental principles of humoral and cellular immunity. Adaptive immunity, clinical outcomes, hypersensitivity, autoimmunity, cancer, transplantation, immunotherapy, and immunity against infectious diseases. Immunologic testing methods and immune function assessment are discussed.

MLSP 5513. Transfusion Medicine Principles and Methods. (3 cr. ; A-F only; Every Spring)
Investigation of genetics, structure and detection of clinically significant blood group antigens/antibodies. Principles of donor requirements, component therapy, transfusion reactions, hemolytic disease of the fetus and newborn, immune hemolytic anemias, quality systems, and automation in the blood bank.

MLSP 5514. Application of Transfusion Medicine Principles. (2 cr. ; A-F only; Every Spring)
Application of standard serologic techniques to the detection/identification of blood group antigens/antibodies and hemolytic disease of the fetus and newborn. Evaluation of clinically significant serum titers. Performance of direct antiglobulin, compatibility, gel and molecular testing. Utilization protocols. Recognizing/resolving common problems.

MLSP 5701. Clinical Experience in Microbiology. (2 cr. ; S-N only; Every Fall, Spring & Summer)
Practical hands-on experience, application of theory, technical, and affective competencies learned on campus in a microbiology laboratory. Designed to assist students in making transition to clinical practitioner.

MLSP 5702. Clinical Experience in Hematology and Hemostasis. (2 cr. ; S-N only; Every Fall, Spring & Summer)
Practical hands-on experience, apply technical and affective competencies learned on campus in a hematology and coagulation laboratory. Designed to assist students in making transition to clinical practitioner.

MLSP 5703. Clinical Experience in Clinical Chemistry and Urinalysis. (2 cr. ; S-N only; Every Fall, Spring & Summer)
Practical hands-on experience, apply technical and affective competencies learned on campus to a chemistry, urinalysis, and body fluids laboratory. Designed to assist students in making transition to clinical practitioner.

MLSP 5704. Clinical Experience in Transfusion Medicine. (2 cr. ; S-N only; Every Fall, Spring & Summer)
Practical hands-on experience, apply technical and affective competencies learned on campus to a transfusion services laboratory. Designed to assist students in making transition to clinical practitioner.

MLSP 5801. Advanced Practicum Experience in Specialty Disciplines. (1 cr. [max 2 cr.] ; S-N only; Every Fall, Spring & Summer)
Students select an advanced specialty discipline of MLS: cytogenetics, flow cytometry, bone marrow, molecular diagnostics, toxicology, education, management, research, public health, etc.

MLSP 6000. Introduction to Graduate Studies and Professionalism in BLS. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
This online interactive course provides an introduction to the BLS masters degree plan and career pathways in the field. Includes strategies for leadership assessment, professional development, and career advancement.

MLSP 6012. Educational Methods, Learning and Technology for Laboratory Practitioners. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
This course provides a foundation to develop instructional units for students and professionals in a variety of settings. Course also explores issues impacting the delivery of medical education including adult learners, active engagement, cultural awareness, and technology enhanced delivery. Students will also participate in teaching activity.

MLSP 6013. Accreditation Processes for Laboratory Science Programs. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Introduction to the accreditation process for laboratory science education programs. Includes discussion on standards, documentation requirements, and outcomes assessments for academic programs and clinical sites. Preparation of self-studies and the site visit review process are included. 3 credits

MLSP 6024. Advanced Laboratory Operations and Management. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Principles of quality management, process improvement in laboratory and health care systems. Project based application of human resources and financial management, informatics, leadership, marketing and quality improvement. Includes professional development, ethics, and strategic planning.

MLSP 6044. Clinical Laboratory Regulatory Issues. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
An overview of the management and regulatory operations of a clinical diagnostic and reference laboratories. Topics include licensure requirements for laboratories and personnel; regulations of testing and instrumentation; financial and personnel compliance, PHI and data management; regulations for special applications.

MLSP 6111. Concepts in Diagnostic Microbiology. (; 3 cr. ; A-F only; Every Fall)
Investigation of pathophysiological mechanisms of disease for medically significant human bacteria and yeast including epidemiology, pathogenesis, spectrum of disease, antimicrobial susceptibility testing, and therapy. Current instrumentation and techniques used in the clinical laboratory are discussed. Analysis of current and emerging topics in Microbiology.

MLSP 6113. Advanced Diagnostic Microbiology. (3 cr. ; A-F only; Every Spring)
Physiology and pathogenic interactions between man and clinically significant fungal, parasitic, viral, and miscellaneous bacterial agents including the epidemiology, prevention, detection, and treatment of these agents. Current analytical methods and applications are discussed. Analysis of current and emerging topics in Microbiology.

MLSP 6140. Advanced Clinical Microbiology Seminar I. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Current topics and advanced case studies in clinical bacteriology, parasitology, mycology or virology. Emerging pathogens, antimicrobial resistance, microbiomes, global health issues, and new technologies will be discussed. Presentations given by students, faculty, and visitors on topics drawn from current practice.

MLSP 6160. Advanced Clinical Microbiology Seminar II. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Continuation of MLSP 6140 discussion of current topics and advanced case studies in clinical bacteriology, parasitology, mycology or virology. Presentations given by students, faculty, and visitors on topics drawn from current practice.

MLSP 6211. Advanced Principles in Hematology and Hemostasis. (3 cr. ; A-F only; Every Fall)
Anatomy and physiology of the hematopoietic and coagulation systems including normal morphology, non-malignant alterations and etiologies, routine and specialized tests, current therapeutic regimens, and clinical implications. Instrumentation and techniques are discussed. Discussion of current issues facing the hematology laboratory.

MLSP 6213. Advanced Diagnostic Hematology. (3 cr. ; A-F only; Every Spring)
Blood and bone marrow in assessment of hematologic function. Normal development and differentiation, abnormal change found in disease. Group integration of case data including bone marrow collection, cytochemical stains, flow cytometry, cytogenetics, molecular diagnostics in neoplasm or disorders. Focused discussion of current topics in hematology.

MLSP 6240. Advanced Clinical Hematology Seminar I. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Current topics and advanced case studies in clinical hematology and hemostasis. Advanced diagnostic testing, the impact of new therapeutic regimens on current testing technology, global health issues, and new technologies will be discussed. Presentations given by students, faculty, and visitors on topics drawn from current practice.

MLSP 6260. Advanced Clinical Hematology Seminar II. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Current topics and advanced case studies in clinical hematology. Newly identified molecular genetic markers for disease, diagnostic approaches to detecting the disease, global health issues, and new technologies will be discussed. Presentations given by students, faculty, and visitors on topics drawn from current practice.

MLSP 6313. Advanced Chemical Analysis in Health and Disease. (; 3 cr. ; A-F only; Every Fall)
Correlation of medically significant organic and inorganic substances found in body fluids to pathophysiology of organ systems and metabolic disorders. Analysis of case studies will be discussed to support the development of critical thinking and leadership skills needed for the medical laboratory.

MLSP 6340. Advanced Clinical Chemistry Seminar I. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Current topics and advanced case studies in clinical chemistry, quality management, quality improvement, and new and emerging clinical laboratory technologies. Presentations given by students, faculty, and visitors on topics drawn from current practice.

MLSP 6360. Advanced Clinical Chemistry Seminar II. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Continuation of MLSP 6340 discussion of current topics and advanced case studies in clinical chemistry, quality management, and new technologies. Presentations given by students, faculty, and visitors on topics drawn from current practice.

MLSP 6401. Fundamentals of Molecular Diagnostics. (; 3 cr. ; A-F only; Every Fall)
Fundamental concepts of molecular science as it relates to molecular diagnostics. Principles of molecular technologies used for diagnostic purposes. Students will be introduced to the unique operation considerations applicable to molecular diagnostic methods and laboratories including design, quality assurance and regulatory issues.

MLSP 6402. Application of Molecular Diagnostics Techniques. (2 cr. ; A-F only; Every Fall, Spring & Summer)
Fundamental techniques in molecular science related to molecular diagnostics. Principles of molecular technologies used for diagnostic purposes and obtain the technical skills to perform those techniques. Unique operational considerations applicable to a molecular diagnostics laboratory including design, quality assurance and regulatory issues.

MLSP 6410. Diagnostic Molecular Science. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
This course presents the role of genetics in medicine and related molecular testing methodologies, and highlights the importance of genetics by linking disease diagnosis, prognosis, prevention and treatment with molecular testing applications. Specimen procurement, patient education, quality assurance, ethics and consent are discussed.

MLSP 6411. Diagnostic Molecular Science Laboratory. (2 cr. ; A-F only; Every Fall, Spring & Summer)
Presentation of the role of genetics in medicine with emphasis on related molecular testing methodologies. Addresses performance of laboratory techniques in genetics, cancer medicine and microbiology. Focus on topics unique to molecular diagnostics in specimen procurement, patient education, quality assurance, ethics and consent.

MLSP 6513. Advanced Principles in Transfusion Medicine. (3 cr. ; A-F only; Every Spring)
Investigation of genetics, structure and detection of blood group antigens/antibodies. Principles of donor requirements, component therapy, transfusion reactions, hemolytic disease of the fetus and newborn, hemolytic anemias, quality systems, and automation in the blood bank. Analysis of current and emerging topics in transfusion medicine.

MLSP 6540. Advanced Clinical Transfusion Medicine Seminar I. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Discussion of current topics and advanced case studies in transfusion medicine. Presentations given by students, faculty, and visitors on topics drawn from current practice.

MLSP 6560. Advanced Clinical Transfusion Medicine Seminar II. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Continuation of MLSP 6540, discussion of current topics and advanced case studies in transfusion medicine. Presentations given by students, faculty, and visitors on topics drawn from current practice.

MLSP 6610. Integrated Concepts in Medical Laboratory Science. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Interpretation of routine laboratory testing ordered for patient care. Case study discussions, reference ranges and common laboratory tests performed for health assessment, diabetes, cholesterol, anemia, urinalysis, cardiac function, blood typing, common infections and more. Course supports preparation for the Board of Certification exam.

MLSP 6620. Advanced Concepts in Medical Laboratory Science. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Case studies and journal exploration of advanced diagnostic testing, method development and validation, pathophysiology, and future directions of the field of laboratory medicine. Relationships among research, theory/theoretical formulations, and practice.

MLSP 6801. Advanced Practicum in Medical Laboratory Science. (2 cr. [max 6 cr.] ; S-N only; Every Fall, Spring & Summer)
Students select an advanced specialty discipline of MLS: cytogenetics, flow cytometry, molecular diagnostics, toxicology, virology, education, management, research, public health, bone marrow, tissue transplantation, etc. Includes career exploration.

MLSP 6905. Research Methods and Capstone Project. (3 cr. [max 6 cr.] ; A-F only; Every Fall, Spring & Summer)
Overview of important concepts of research design, data collection, statistical and interpretative analysis, and final report presentation. The course will develop ability to use the following tasks: Development of a hypothesis, outlining the research problem, related questions, quantitative, qualitative, and mixed methods designs.

MLSP 7005. Advanced Research Methods in Laboratory Sciences. (; 2 cr. [max 3 cr.] ; A-F only; Every Fall, Spring & Summer)
Concepts of scientific inquiry and research design, scientific inquiry, literature review and topic selection. Includes quantitative, qualitative, and mixed methods designs. Students will develop a research proposal appropriate for their area of thesis focus

MLSP 7010. Research Seminar in Medical Laboratory Sciences. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Concepts of scientific inquiry and research design, scientific inquiry, literature review and topic selection. Includes quantitative, qualitative, and mixed methods designs. Students will develop a research proposal appropriate for their area of thesis focus.

MLSP 7999. Capstone Project in Biomedical Laboratory Sciences. (; 2 cr. [max 6 cr.] ; A-F only; Every Fall, Spring & Summer)
Capstone Project. The project can be literature-based or lab-based with a testable hypothesis and a final paper and poster, which is an in-depth examination and analysis of a particular area, problem, technique, in laboratory science.

Medical Physics (MPHY)

MPHY 5040. Introduction to Medical Physics. (3 cr. ; A-F only; Every Spring)
Interactions and energy deposition by ionizing radiation in matter; medical imaging; radiation therapy physics and related radiation safety topics.

MPHY 5138. Research Seminar. (; 1-5 cr. ; S-N or Audit; Every Fall)

MPHY 5139. Seminar and Journal Club. (; 1 cr. [max 2 cr.] ; S-N or Audit; Every Spring)
Current research/topics related to goals/ methods of biophysical sciences and medical physics. Lectures/discussions.

MPHY 5160. Advanced Radiation Physics and Dosimetry. (3 cr. ; A-F only; Every Fall)
Interactions and energy deposition by ionizing radiation in matter; concepts, quantities and units in radiological physics; principles and methods of radiation dosimetry.

MPHY 5170. Radiation Therapy Physics I. (; 3 cr. ; Student Option; Every Fall)
Theoretical/experimental aspects of radiological physics. Physical properties of various ionizing radiations, interactions of ionizing radiations with matter, methods of radiation dose measurement. prereq: instr consent

MPHY 5171. Medical and Health Physics of Imaging I. (; 3 cr. ; Student Option; Every Fall)
Physics of diagnostic imaging: specification/ quantification of image quality, X-ray production, image receptors, magnetic resonance imaging, radiation exposure and protection. Special imaging techniques, including mammography, computed tomography, and direct digital image capture. prereq: 5170 or instr consent

MPHY 5172. Radiation Biology. (; 3 cr. ; Student Option; Every Fall & Spring)
Effects of ionizing radiation on cells, tissues, and organisms. Biochemical/physiological bases of radiation effects. Biological rationale for radiation therapy practices. prereq: 5170 or instr consent

MPHY 5173. Radiation Therapy Physics II. (; 3 cr. ; Student Option; Every Spring)
Measurements of radiation quality, output, and depth dose distributions for clinical use. Treatment parameter calculation. Beam modification and shaping. Treatment planning for fixed field and rotational therapy in external beam, intracavitary, and interstitial therapy. Computer applications in treatment planning. Principles/criteria for radiation protection. prereq: 5170 or instr consent

MPHY 5174. Medical and Health Physics of Imaging II. (; 3 cr. ; Student Option; Every Spring)
Physics of diagnostic imaging. Ultrasound, theoretical/experimental applications of radionuclides in medicine and biology. Counting statistics and imaging systems associated with radiopharmaceuticals, radiation dosimetry, and safety in nuclear medicine. prereq: 5170 or instr consent

MPHY 5177. Radiation Therapy Physics Lab: Radiation Physics Basics. (; 3 cr. ; A-F only; Every Spring)
This course provides students hands-on experience with Hardware/software used in radiation therapy clinic for physics measurements. prereq: 5170 or concurrent registration is required (or allowed) in 5173 or instr consent

MPHY 5178. Physical Principles of Magnetic Resonance Imaging. (3 cr. ; Student Option; Spring Even Year)
Magnetic resonance imaging physics, spatial selection and encoding, imaging hardware and system engineering. Imaging sequences, signal-to-noise, and contrast.

MPHY 8147. Advanced Physics of Magnetic Resonance Imaging (MRI). (; 3 cr. ; Student Option; Every Spring)
NMR (nuclear magnetic resonance) and MRI physics, spatial selection and encoding, imaging hardware and system engineering. Imaging sequences, associated contrast/ resolution. Recent developments in MRI. prereq: 5174 or instr consent

MPHY 8148. Advanced Digital Imaging Science. (; 3 cr. ; Student Option; Every Fall & Spring)
Role of digital image science in medical imaging. Measurement of image quality, digital radiography. Image reconstruction for CT, SPECT, PET, and MRI. 3D image processing, image registration/visualization. Picture archiving, communications systems. prereq: 5171 or instr consent

MPHY 8149. Advanced Topics in Radiation Therapy Physics. (; 2 cr. ; A-F only; Every Fall)
Special procedures. Total body irradiation, intensity-modulated radiation therapy, stereotactic radiosurgery/radiotherapy, image-guided radiation therapy. Treatment planning algorithms/techniques. Brachytherapy. prereq: [5170, 5173] or instr consent

MPHY 8293. Directed Study in Medical Physics. (; 1-12 cr. ; S-N only; Every Fall, Spring & Summer)
Individualized study under faculty direction. prereq: instr consent

MPHY 8294. Directed Research in Medical Physics. (; 1-12 cr. ; S-N only; Every Fall, Spring & Summer)
Individualized research under faculty direction. prereq: instr consent

MPHY 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

MPHY 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

MPHY 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

MPHY 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

MPHY 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Medicinal Chemistry (MEDC)

MEDC 5185. Principles of Biomolecular Simulation. (; 3 cr. ; Student Option; Periodic Fall)
Molecular simulation for students in medicinal chemistry, pharmaceutics, biochemistry, and chemical physics prereq: Chem 3502 or instr consent

MEDC 5245. Introduction to Drug Design. (; 3 cr. ; A-F or Audit; Every Fall)
Concepts that govern design/discovery of drugs. Physical, bioorganic, medicinal chemical principles applied to explain rational design, mechanism of action drugs. prereq: Chem

MEDC 5485. Drug Metabolism and Pharmacokinetics. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Drug Metabolism and Pharmacokinetics is a stand-alone elective that is intended for Medicinal Chemistry graduate students or other students interested in the drug development process. Absorption and pharmacokinetic principles will be supplemented with problem sets. The primary method of instruction is lecture-based with the use of textbook readings and review articles as support for class notes and discussions. A total of 2 non-cumulative exams will be given during the semester. Prerequisites: Organic Chemistry, Med Chem 8001 (may be waived for students from other programs). This course adheres to the items listed in the College of Pharmacy Central Syllabus: https://docs.google.com/a/umn.edu/document/d/1artQ5e1rbzxe8lEtWo7BE8k8snZAEgMMz_QcW8yJ-II/edit?pli=1

MEDC 5494. Advanced Methods in Quantitative Drug Analysis. (2 cr. ; A-F or Audit; Periodic Fall & Spring)
Quantitative methods (HPLC, GC, TLC, immunoassays) for analysis of drugs/ metabolites in biological fluids. Advanced techniques such as capillary electrophoresis, supercritical fluid chromatography, GC-MS, LC-MS, tandem mass spectrometry. Chromatographic theory/statistical approaches to method validation.

MEDC 5495. Vistas in Medicinal Chemistry Research. (; 1 cr. ; S-N or Audit; Every Fall)

Selected topics of contemporary interest in medicinal chemistry

MEDC 8001. General Principles of Medicinal Chemistry. (; 3 cr. ; A-F or Audit; Every Fall)
Fundamental principles of molecular recognition, physiochemical properties of drugs, drug metabolism and disposition, interaction of molecules with DNA/RNA. prereq: Med chem grad student or instr consent

MEDC 8002. General Principles of Medicinal Chemistry. (; 3 cr. ; A-F or Audit; Every Spring)
Fundamental principles of molecular recognition, physicochemical properties of drugs, drug metabolism and disposition, interaction of molecules with DNA/RNA. prereq: Med chem grad student or instr consent

MEDC 8050. Physical and Mechanistic Organic Chemistry. (2 cr. ; A-F only; Every Fall)
Didactic instruction in foundational principles of physical and mechanistic organic chemistry. Recitation component in which students actively solve organic chemistry reaction mechanisms and related problems in organic and medicinal chemistry during course meeting times with faculty guidance. prereq: First-year Medicinal Chemistry grad students or by permission.

MEDC 8070. The Chemistry and Biology of Infectious Diseases. (3 cr. ; A-F only; Periodic Fall & Spring)
The objectives of this course are to provide a comprehensive overview of antimicrobial agents used in infectious diseases with an emphasis on the underlying foundational principles in chemistry and biology. Antibiotic, antifungal, and antiprotozoal agents will be covered. For each antimicrobial agent, the history, discovery, synthesis, structure-activity relationships, spectrum of activity, clinical uses, mechanism(s) of action, resistance, drug disposition properties, and adverse reactions will be discussed in great detail.

MEDC 8100. Medicinal Chemistry Seminar. (1 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
Current topics. prereq: Grad major or instr consent

MEDC 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

MEDC 8396. Practical Training in Medicinal Chemistry. (; 1 cr. [max 3 cr.] ; S-N only; Every Fall, Spring & Summer)
Industrial or other external work experience involving medicinal chemistry and/or related disciplines. Reviewed/approved by faculty advisor and director of graduate studies. Grade based on report prepared by the student summarizing the completed work experience.

MEDC 8401. Chemistry of Counterterrorism: Chemical, Biological, Radiological, Nuclear & High Explosive Threats. (2 cr. ; A-F only; Spring Odd Year)
Students will acquire fundamental knowledge of the mechanisms of action, risks, and potential effects of the major CBRNE (chemical, biological, radiological, nuclear, and high explosive) agents that pose a threat in terrorist attacks. Students will also develop familiarity with current countermeasures (pre- and post-exposure) and relevant medical treatments, focusing on effectiveness, limitations, unmet needs, challenges, and roadblocks to countermeasure development. Detection, protection, and decontamination techniques will also be discussed. This course is designed for scientists and engineers: graduate students in Medicinal Chemistry, Chemistry, Biochemistry, Chemical Engineering, Biomedical Engineering, or Physics. Advanced undergraduates in the above programs, and professional students in PharmD, MD, MD/PhD, DVM, or MPH programs, who meet all required prerequisites, may enroll with the course director?s permission. Note that the emphasis of this course is on the chemistry, biology, and physics of CBRNE agents and their countermeasures, not policy, policymaking, or sociocultural issues (although these may come up for discussion).

MEDC 8413. Chemistry of Nucleic Acids. (; 4 cr. ; A-F only; Spring Even Year)
Chemical aspects of nucleic acid structure and function, synthesis, and functional variants. prereq: [Medicinal chem or chem or biochem] grad student

MEDC 8420. Natural Products Chemistry. (; 3 cr. ; A-F only; Spring Odd Year)
Biosynthesis of natural products with an emphasis on how these biochemical principles can be used in drug discovery and design through metabolic engineering and combinatorial biosynthesis. Natural product isolation, structure determination, target identification, and the role of synthetic organic chemistry. prereq: [CHEM 8321, biochemistry] or equiv or course director approval

MEDC 8435. BioAssay & Data Analysis. (1 cr. ; A-F or Audit; Spring Even Year)
Emphasis is an intro to bioassay & rodent experimental design approaches, data analysis & basic statistical analysis of corresponding data. Concepts of what instrumentation resources are available within the Department of Medicinal Chemistry & the Institute for Therapeutics Discovery & Development (ITDD), what the corresponding bioassays that can be measured on those resources, considerations & criteria for the development of a new bioassay, how to design basic rodent (mouse & rat) animal experiments including power-analysis (how to predict the number of animals needed for the experiment), as well as data analysis [mean, standard error of the mean (SEM), standard deviation of the mean (SD)] & statistical analysis [student t-test, one-way Anova, two-way Anova, & appropriate post-hoc tests). prereq: MEDC 8001 or instructor permission.

MEDC 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

MEDC 8461. Design of Cancer Therapeutics. (3 cr. ; A-F only; Spring Even Year)
Cancer Drug Therapy is a relatively new field of medicine that has undergone many medical and societal changes over the course of the last 100 years and in particular the last 60 years. The emphasis in this course will be to familiarize the student with the basic concepts of cancer biology and to survey current advanced approaches for the development and design of small molecule, protein and cell based therapeutics for the treatment of cancer.

MEDC 8471. High Throughput Drug Discovery. (3 cr. ; A-F only; Spring Even Year)
Combinatorial chemistry, multi-compound based technologies, their use in screening bioassays to discover lead compounds. Solidphase synthesis, designing compound libraries, pharmacological assay design, data interpretation, biological target selection, compound lead optimization. prereq: Undergraduate [chemistry or biochemistry] or instr consent

MEDC 8500. Design of Chemotherapeutic Agents. (; 2 cr. ; A-F or Audit; Periodic Fall)
Modern aspects of designing chemotherapeutic agents. Strategies for enzyme inhibition and metabolic blocks in development of anticancer, antimicrobial, and antiviral agents. prereq: 5600 or instr consent

MEDC 8600. Chemical Aspects of Drug Metabolism and Bioactivation. (; 2 cr. ; A-F or Audit; Periodic Fall)
Chemical and enzymatic mechanisms of biotransformation and bioactivation of drugs and other xenobiotics. Reactivity and fate of bioactivated metabolites. prereq: 5600 or instr consent

MEDC 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

MEDC 8700. Advanced Concepts in Drug Design. (; 2 cr. ; A-F or Audit; Periodic Spring)
Current approaches to rational design of drugs. prereq: 5600 or instr consent

MEDC 8753. MOLECULAR TARGETS OF DRUG DISCOVERY. (; 3 cr. ; A-F only; Fall Even Year)
Structure of biological macromolecules that are targets of drugs. Techniques to accelerate directed drug discovery. Protein structure/interactions. Popular target classes. Computational tools for visualizing/analyzing protein-ligand and protein-protein interactions. Structural characterization at a level sufficient to underpin critical data evaluation. Biophysical techniques to assess weak ligand binding and suitable for fragment-based lead discovery.

prereq: 5710 or 8002 or CHEM 5412 or structural biochemistry or instr consent

MEDC 8760. Design of Peptidomimetics. (; 2 cr. ; A-F or Audit; Periodic Fall)
Current approaches to design and synthesis of mimetics of biologically active peptides. Structural and conformational rationale used in peptidomimetic design. prereq: 5600 or instr consent

MEDC 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

MEDC 8800. Medicinal Chemistry Laboratory Techniques. (; 1-2 cr. [max 4 cr.] ; S-N or Audit; Every Fall & Spring)
Experiential rotations in medicinal chemistry research laboratories. prereq: Grad med chem major or instr consent

MEDC 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

MEDC 8900. Directed Studies in Medicinal Chemistry. (; 1-10 cr. ; A-F only; Every Fall & Spring)
Directed Studies in Medicinal Chemistry facilitates advisor directed study in a special topic for credit, affording students the opportunity to acquire a level of expertise in a specific specialty of laboratory work or scholarship beyond that which can obtained in other didactic coursework. It is required that all students obtaining a Plan B Master of Science in Medicinal Chemistry (Plan B MS) complete at least one project in Directed Studies. Other graduate students with an interest in Medicinal Chemistry research are also eligible to enroll. The course may be taken more than once, and even concurrently. If taken concurrently, different research advisors must guide each project. The course will be open for enrollment during all academic terms (Fall, Spring and Summer). Prior to enrollment, the student will work to identify a MedChem graduate faculty member to serve as project advisor, who will help the student outline project goals and expectations. A short outline of the project should be presented to the Course Director for approval prior to enrollment. prereq: Grad med chem major or instr consent

Medicine (MED)

MED 7018. The Wisdom of Literature in a Time of Plague. (; 4 cr. ; P-N only; Periodic Fall, Spring & Summer)
For as long as we have roamed the earth, plagues have bedeviled humanity. And their consequences have been nearly immeasurable. From emotional upheaval to economic hardship, from unwanted illness to untimely death, infections have shattered and molded what it means to be human. Plagues have also shaped our literature. While it is essential that we consult the latest research in infection control and treatment, we are wise to read classic and modern literature for the profound insight it has to offer. From Camus? The Plague to Crichton? s The Andromeda Strain, from Shakespeare? s King Lear to Dante?s Divine Comedy, this rotation offers timeless readings from classic and modern literature. Not only will we study and discuss literary reflections on plagues, but more importantly we will broadly consider our reaction to times of great trial. As physicians and human beings, what is our duty (or vocation) in deeply uncertain times? How are we to comprehend and cope with suffering? Where will we find the profound and subtle graces amidst public and personal calamity? In the end, what does great literature have to teach us? For medical students and clinicians navigating the COVID-19 pandemic, to answer these questions is to better prepare ourselves to serve our patients while sustaining ourselves with the deeper reasons behind our work. Over four weeks, readings in great literature (books, essays, and excerpts) will be assigned weekly. Readings should be read and students should be prepared to discuss them in advance of each small group discussion. Weekly small group Zoom discussion (assigned group of 4-5) will happen on Thursdays from ---- to -----. Weekly large group Zoom discussion (entire class) will happen on Friday from ---- to ----. Friday?s class will more deeply consider the course material and be one part didactic and another, conversational. Week One - The Literature of Plagues Week Two - On Duty Week Three - On Suffering Week Four - On Grace prereq: Completion of MS3 required clerkships, exceptions at discretion of course director

MED 7019. Global Pediatric Education Series for Medical Students. (; 2 cr. ; P-N only; Every Fall, Spring & Summer)
Global health has long been a priority at the University of Minnesota. This online course is designed to equip providers interested specifically in pediatrics with the knowledge that they need to practice in an under-resourced setting. This course, updated in 2019, consists of 29 pre-recorded lectures, each approximately 1 hour or less focusing on pediatric specific topics comprising 4 modules: Fundamentals of Global Child Health, Disease Identification and Management, Clinical Pearls and Preparing for work Abroad, and Global Pediatrics at home.

MED 7300. Global Health. (; 0.5-8 cr. [max 16 cr.] ; A-F only; Every Summer)
Global nature of health and health care. Global health by systems (cardiology, GI, oncology, etc.). Tropical infectious diseases, public health. Refugee/migrant health, cross cultural health care, travel medicine. All core required topics for ASTMH certification. Case-based lectures. Lab component during modules 4-7. prereq: instr consent

MED 7500. Medicine Clerkship. (; 8 cr. ; P-N only; Every Fall, Spring & Summer)
Med 7500 emphasizes diagnostic approach to patient problems and acquisition of core knowledge and skills. The student is part of a patient care team and evaluates and follows at least two new patients per week. Required conferences and tutorial sessions related to the student's patients and to basic problems in internal medicine are organized for the student at each site.

MED 7507. Research in Oncology. (; 6 cr. ; H-N or Audit; Periodic Fall)
The student is involved in ongoing laboratory studies in an area under active investigation by a faculty member in oncology. Topics may include, but are not limited to, studies of cell differentiation, cell signaling and G-proteins, neutrophil membrane biochemistry and function, molecular biology of gene expression in hematopoietic and tumor cells, regulation of cellular genes by CMV, mechanisms of action by interferons, biology of breast carcinoma, chromatin structure, and regulation of histo-compatibility antigen gene expression in tumor cells. In addition to hands-on laboratory research, the student participates in research of relevant scientific literature and is encouraged to participate in regular research conferences.

MED 7511. Gastroenterology Research. (; 4-8 cr. [max 16 cr.] ; H-N only; Every Fall, Spring & Summer)
The student works with a staff member in the gastroenterology section and carries on an active research program under the direction of the staff. Time will be available to attend various clinical functions of the GI section.

MED 7512. Hematology/Oncology/ Transplantation Research (H.O.T. Research). (4-8 cr. [max 16 cr.] ; H-N only; Every Fall, Spring & Summer)
The student will plan and execute a project under the supervision of a faculty member in H.O.T. Division of Medicine. Cancer biology, stem cell, endothelial cell cancer, and sickle cell biology, coagulation abnormalities, and gene regulation are areas of opportunity. This course may also include shadowing a faculty member in clinic and production of a case report.

MED 7518. Diabetes & Endocrinology Research. (; 8 cr. [max 16 cr.] ; H-N only; Every Fall, Spring & Summer)
The student plans and executes a research project under the supervision of a faculty member in the section of diabetes, endocrinology, and metabolism.

MED 7521. Infectious Disease. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
The student functions as integral member of the clinical infectious diseases team during this elective. They will evaluate patients, participate in all discussions, and explore the literature on problems relating to patients they have seen.

MED 7522. Gastroenterology. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
The student, as a member of the G.I. consult team, does work ups and attends teaching rounds on patients with gastrointestinal disease, attends gastrointestinal conferences (clinic, x-ray, pathology), gain outpatient clinical

experience, and becomes familiar with special diagnostic techniques, such as endoscopy, liver biopsy, and small intestinal biopsy. Night call is not required.

MED 7523. Diabetes, Endocrinology, & Metabolism. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
This elective rotation is a four (4) week introductory, structured clinical experience under direct supervision designed to provide the student experience diagnosing, treating, and caring for patients with endocrine disorders.

MED 7525. Cardiovascular Medicine. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
The student participates in the evaluation and management of the acute and chronic cardiovascular disease problems as they occur in both the inpatient consultation service and the outpatient setting. Supervised electrocardiographic interpretation sessions are available to allow development of skills in electrocardiography. The student attends cardiovascular clinical conferences as well as informal didactic teaching conferences. prereq: Med Student Yr 3 or 4/at least one other medicine elective

MED 7526. Oncology. (; 4 cr. ; H-N or Audit; Every Fall, Spring & Summer)
As members of the oncology clinic team, students will do patient evaluations and followups in the oncology clinics, and participate in oncology conferences. Emphasis is on the clinical evaluation and management of new cancer patients.

MED 7528. Hematology. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
This rotation will involve the opportunity to directly learn about diagnosis and management of classical and malignant hematology disorders in both inpatient and outpatient setting. The student will act as a subintern with initial responsibility to conduct history and physical exams on hospitalized patients for whom hematology consultations have been requested.

MED 7531. Rheumatology. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
Musculoskeletal complaints are among the most common problems that present to primary care physicians and arthritis and related diseases are a major cause of disability and loss of work in our society. It is thus essential that physicians involved in primary care develop skill in recognition and treatment of common rheumatologic diseases and ability to recognize and refer rare or more complicated problems.

MED 7532. Pulmonary Disease. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
This elective is designed to expand students' understanding of respiratory pathophysiology as they acquire new skills in the diagnosis and management of pulmonary diseases.

MED 7533. Clinical Allergy. (; 3-6 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Practical aspects of allergic/immunologic work ups, treatments. Content modified depending upon individual student needs; special programs (e.g., laboratory methods) arranged depending upon student needs. Clinical material provided through Fairview-University, Regions, VA Hospitals, inpatient consultations, offices of practicing allergists in Twin Cities area. Lectures, seminars, discussions.

MED 7534. Research in Allergy. (; 6 cr. ; H-N or Audit; Every Fall & Spring)
The student works with a staff member. He/she may choose to participate in ongoing research within our program or in an original investigative project of the student's design. He/she is expected to review the subject area of the investigation as well as plan, perform, interpret his/her studies, and make a presentation as well as a written report on the project.

MED 7535. Clinical Allergy, Asthma and Immunology Elective Rotation. (; 3 cr. ; H-N or Audit; Every Fall & Summer)
Manage adults/children with atopic dermatitis, contact dermatitis, urticaria, angioedema, food allergies, asthma, chronic cough, dysfunctional breathing, hypersensitivity pneumonias, allergic bronchopulmonary aspergillosis allergic rhinoconjunctivitis, nonallergic rhinitis, nasal polyps, sinusitis, eosinophilic esophagitis/gastritis, food protein intolerances, anaphylaxis, recurrent infections, venom allergy. prereq: It is recommended but not required that third and fourth year medical students should have at least one primary care rotation finished. Knowledge of how to perform full medical history and exam is required.

MED 7540. Internal Medicine Research Elective. (4-8 cr. [max 16 cr.] ; P-N only; Every Fall, Spring & Summer)
Academic credit (1 credit per week "non-hands-on") will be awarded for satisfactory completion of a research project at the University of Minnesota Medical Center or one of our affiliate sites within the Department of Medicine. Year 3 and 4 medical students can take up to 12 weeks of research credit total throughout their 3rd and 4th year, although the preferred total amount of time is 8 weeks or less. If more than 8 weeks of credit are requested, both the advisor and the Director of Integrated Education - Clinical must approve. The student must have a research mentor prearranged, submit a short (limited to several paragraphs in length) description of the research through the application; and must have signature of the mentor at least 6 weeks in advance of taking the course. No retroactive credit will be approved.

MED 7548. Clinical Genetics. (; 6 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Designed for students interested in clinical pediatrics and medicine as well as academic genetics. The student builds basic genetic skills by participating as a member of the combined medicine/pediatrics clinical genetics group at the Fairview-University Medical Center. The activities include weekly hospital rounds, genetics clinic and genetics conference, and hospital consultations when requested. The student evaluates patients with different types of genetic problems and discusses these cases fully. During the second three weeks of the rotation, the student is expected to prepare one topic for genetics conference.

MED 7555. Medicine Rural Ambulatory Elective. (; 3-4 cr. [max 8 cr.] ; H-N only; Every Fall, Spring & Summer)
Out-patient practice of primary care internal medicine.

MED 7556. Nephrology. (; 2-4 cr. ; H-N only; Every Fall, Spring & Summer)
This course is an exposure to Nephrology for medical students. Activities may include performing consultations in the inpatient setting, seeing patients in nephrology clinic, observing renal biopsies and attending case conferences and teaching conferences.

MED 7561. Outpatient & Clinical Nephrology. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
Focus is on renal problems common to a community clinic and hospital practice. Renal clinics are held four days a week. Inpatient consultation is done daily. Didactic lectures are given. This experience is appropriate for the student interested in primary care.

MED 7562. Nephrology. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
The student spends four weeks on the renal consult service. They attend the departmental teaching conferences, including the renal pathology and clinical nephrology conferences held every week. They work closely with the medicine residents and fellows. They are expected to present the cases for their patients, including clinical and lab data, and assessment of problems to the attending physician on rounds.

MED 7573. Acute Care Internal Medicine. (; 2-4 cr. ; H-N or Audit; Every Fall & Spring)
This course provides an opportunity to acquire skills in the diagnosis and treatment of acute conditions encountered in internal medicine. The student works with attending physicians and medical residents to evaluate patients (including many with undiagnosed illnesses) in both the ER and urgent care on Monday through Friday (8:30 A.M. to 5:00 PM). Learning is enhanced by a daily didactic curriculum. prereq: 7500, Med 7501

MED 7579. Critical Care/MICU. (; 4 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Evaluation of performance is based on abilities in eliciting a history, conducting an appropriate physical exam, use of lab and imaging studies, breadth and depth of knowledge base, differential diagnosis, formulation of a treatment program, verbal and written presentation, patient relationship, interaction with colleagues and other hospital staff, and on overall professionalism. prereq: 7501 or instr consent

MED 7582. Medical Intensive Care Unit--Regions Medical Center. (; 3-4 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Key principles of diagnosis/management of critical illness. Emphasizes cardiopulmonary assessment/management. Using mechanical

ventilation, hemodynamic monitoring as focal points. One-month clinical rotation.

MED 7583. Fundamentals of Clinical Oncology. (; 4 cr. ; H-N or Audit; Every Fall, Spring & Summer)
This multidisciplinary course provides an introduction to the fundamentals of clinical oncology (adult and pediatric) and is designed for the medical student interested in entering any specialty. Emphasis is placed on understanding important concepts of oncology, acquiring practical skills relevant to the diagnosis and treatment of the common malignancies, and gaining confidence in providing psychosocial support to patients and families. The student follows newly diagnosed patients as they go through their initial evaluation/staging tests for malignancy and participate in planning treatments. Approximately two hours a day is devoted to conferences and tutorial sessions developed specifically for the student enrolled in this course. prereq: 7500 or Ped 7501

MED 7595. Musculoskeletal Problems in Primary Care Practice. (; 3 cr. ; H-N or Audit; Every Fall, Spring & Summer)
The focus of this course is on the evaluation of various common musculoskeletal problems likely to be encountered in a primary care practice. Emphasis is placed on the proper musculoskeletal examination, basic joint aspiration and injection techniques, as well as developing better interpretive skills in reviewing laboratory values and bone/joint radiographs. In addition to attending patient clinics daily, the student is part of interactive conferences and didactic sessions covering various rheumatologic/medical orthopedic topics. Teaching methods include the use of patient instructors, videotapes, polarized microscopy, labeled skeleton, and computer teaching programs. The student works with full-time staff including Drs. Thomas Bloss, David Rhude, Peter Schlesinger, and the course director, Tom Stillman. prereq: 7500

MED 7596. Occupational Health. (; 3-6 cr. ; H-N or Audit; Every Fall, Spring & Summer)
This course consists of conferences, clinical experience in occupational health, and optional visits to local workplaces. The conferences include a review of common occupational diseases and an introduction to occupational health law and policy through case presentations by students, and discussion with faculty and residents in occupational medicine.

MED 7599. Bioethics Theory. (; 3-6 cr. ; H-N or Audit; Every Fall & Spring)
In this independent study course, the student is expected to attend interdisciplinary seminars on basic issues in bioethics, and to write one substantive paper on a bioethical problem. prereq: Students must meet with instructor prior to enrolling in course

MED 7602. Advanced Physical Diagnosis and Medical Decision Making. (; 4 cr. ; H-N only; Every Spring)
This course focuses on building upon the clinical skills learned in the first three years of medical school and incorporating an evidence-based approach to making high-value, patient-centered medical decisions. Students work with a variety of expert faculty to hone physical examination skills and learn critical article appraisal and presentation skills through small group work. Students will also gain an introduction to the use of point-of-care ultrasound as part of the physical examination.

MED 7603. Palliative Medicine. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
This hospital-based elective offers the opportunity to learn the scope of practice of Internal Medicine's newest subspecialty: palliative medicine. The student will function as a sub-intern under the direct supervision of board-certified hospice and palliative medicine physicians, caring for the broad range of problems managed by palliative medicine consultants.

MED 7605. Regions Hospital Hospital Medicine Elective. (; 4-8 cr. ; H-N only; Every Fall, Spring & Summer)
Students work alongside staff. Students choose from medicine inpatient service, surgical co-management service, hospital medicine palliative care team, progressive care unit, and evening admission team. prereq: 7500

MED 7608. Global Health Course. (; 1-8 cr. [max 16 cr.] ; H-N only; Every Summer)
Global health by systems (cardiology, GI, oncology). Tropical infectious diseases and public health. Refugee/migrant health. Cross cultural health care. Travel medicine. Topics for ASTMH certification. Case-based lectures, lab. prereq: instr consent

MED 7666. Medicine Pediatrics Ambulatory Elective. (; 3-4 cr. [max 8 cr.] ; H-N or Audit; Every Fall, Spring & Summer)
Out-patient practice of primary care internal medicine and pediatrics.

MED 7701. Primary Care Selective - Medicine/Pediatrics. (; 4 cr. ; P-N only; Every Fall, Spring & Summer)
Four-week ambulatory experience. Focuses on both specialty-specific areas and process-of-care in ambulatory setting.

MED 7800. Acting Internship Internal Medicine - Primary Care and Beyond. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This course centers around 4 main areas: Patient Care, ?Hot Topics?, Advocacy and Self-Reflection. PCB offers students the opportunity to hone their clinical skills via direct patient encounters in the outpatient setting.

MED 7850. Acting Intern Internal Medicine. (4 cr. ; H-N only; Periodic Fall, Spring & Summer)
The Acting Internship in Internal Medicine is an opportunity for students to serve patients in a general inpatient setting. Acting internship students will take on the responsibility of an acting intern on the internal medicine inpatients team. They will collaborate with and medicine interns and medical students in their foundational training. They will be supervised by medicine senior residents and faculty attendings. prereq: Med 7500 or Med 7502 and Med 7503

MED 7900. Sub-internship in Critical Care. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
Second part of the required 12 weeks of experience in internal medicine started in Medicine 7500. Medicine 7900 is a "sub-internship" in which the student takes direct responsibility for patient care. Therapeutic decision making and care planning are emphasized. The student is part of a patient care team and assumes responsibility for the evaluation and care of three new patients per week. Acute care tutorials with learning objectives and suggested readings are an important part of the course. Self-directed learning tools are available.

MED 7910. Internal Medicine Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Internal medicine residency.

MED 7920. Medicine-Pediatric Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Medicine-pediatric residency.

MED 7930. Internal Medicine Fellowship. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Internal medicine fellowship.

Medieval Studies (MEST)

MEST 5271. The Viking World: Story, History, and Archaeology. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Viking society and expansion of Viking influence abroad. Viking impact on Western Europe, interactions with Slavic lands, settlement of North Atlantic islands, Western Europe's impact on Scandinavian lands. Analyzes archaeological, historical, linguistic, and numismatic evidence.

MEST 5610. Advanced Topics in Medieval Studies. (; 3-4 cr. [max 15 cr.] ; Student Option; Every Fall & Spring)
From late antiquity through end of Middle Ages (circa 300-1500 A.D.). Topics specified in Class Schedule. prereq: One yr work in some area of Middle Ages, reading knowledge of appropriate language.

MEST 5701. Old Norse Language and Literature. (3 cr. ; Student Option; Every Fall)
Acquisition of a reading knowledge of Old Norse; linguistic, philological, and literary study of Old Norse language and literature.

MEST 5993. Directed Studies in Medieval Studies. (; 1-3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Directed study with one of the core faculty of medieval studies program. prereq: One yr work in some area of Middle Ages, reading knowledge of appropriate language, instr consent

MEST 8010. Medieval Studies Colloquium. (; 3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Lectures by and discussions with faculty and visiting speakers.

MEST 8110. Seminar in Medieval Studies. (; 3-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall & Spring)
Offered when feasible. prereq: Appropriate languages

Microbial Engineering (MICE)

MICE 5035. Personal Microbiome Analysis. (3 cr. ; Student Option; Every Spring)
Personal Microbiome Analysis, an introduction to the computational exploration and analysis of your inner microbial community, also known as your microbiome. In this course, you will have the opportunity to explore your own microbiome using visualization and analysis tools. Sequencing your own microbiome is encouraged but not required for the course. Introductory biology or genetics is recommended: BIOL 1009, GCD 3022 or BIOL 4003.

MICE 5355. Advanced Fermentation and Biocatalysis Laboratory. (1 cr. ; S-N only; Every Spring)
Methods in industrial microbiology, lab, and pilot scale fermentation/biocatalysis engineering. Lab experiments carried out in fermentation pilot plant. Operation of bench/ pilot scale bioreactors. Designing bioreactors. Process optimization, monitoring, and control. Scale-up experiments, data analysis. prereq: [3301 or BIOL 3301], [grad student in microbial engineering or upper-div major in [microbiology or chem engineering or biochemistry]], instr consent

MICE 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

MICE 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

MICE 8920. Teaching Practicum. (; 1 cr. [max 4 cr.] ; Student Option; Every Fall, Spring & Summer)
Supervised experience in classroom, laboratory, and/or recitation instruction; develops skills in effective use of instructional techniques, materials, tests, and measurements. prereq: Grad MicE major

MICE 8990. Biotechnology Seminar. (1-3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Student presentations of thesis research and presentations by invited speakers. prereq: Prereq-First-yr MiCEstudents enroll S-N, as they do not make a presentation. Second-yr MiCE students enroll A-F, as they present a seminar; fall, spring, every year). Student presentations of thesis research and presentations by invited speakers or designated lecturers.

Microbiol/Immun/Cancer Biology (MICA)

MICA 5000. Practicum: Teaching. (; 0 cr. ; No Grade Associated; Every Fall & Spring)
Supervised experience in lab instruction. Use of instructional materials, tests/measurement.

MICA 8002. Structure, Function, and Genetics of Bacteria and Viruses. (; 4 cr. ; A-F or Audit; Every Fall)
Structure, function, and metabolism of microorganisms. Microbial genetics. Molecular virology. prereq: [One undergrad or grad course each in [microbiology, genetics, biochemistry]] or instr consent

MICA 8003. Immunity and Immunopathology. (; 4 cr. ; Student Option; Every Fall)
Lymphocyte activation, signal transduction in lymphocytes, antigen receptor genetics, antigen presentation, lymphoid anatomy, adaptive immune responses to microbes, immunodeficiency, immunopathology, cytokines, transplantation, autoimmunity. prereq: Upper level undergrad immunology course or instr consent

MICA 8004. Cellular and Cancer Biology. (; 4 cr. ; A-F or Audit; Every Spring)
Fundamental concepts in cellular, molecular, and genetic basis of disease. Molecular basis of inflammation and cancer metastasis. Genetic basis for inherited disorders and gene therapy. Molecular mechanisms of pathogenesis. prereq: [One undergrad or grad course each in [biochemistry, cell biology]] or instr consent

MICA 8005. Topics in Microbiology, Immunology, and Cancer Biology. (; 1-4 cr. ; A-F or Audit; Every Fall & Spring)
Colloquium format. Readings/discussion on specialized topic. prereq: 8012, [8002 or 8003 or 8004] or instr consent

MICA 8006. Protein Sequence Analysis. (; 3 cr. ; Student Option; Fall Even Year)
DNA and protein sequence and protein structure databases; protein sequence analysis; methods for display of sequence comparison and prediction results; Genetics Computer Group (GCG) sequence analysis programs; and current literature and research problems. prereq: Biochem course, knowledge of UNIX operating system recommended

MICA 8007. Cell Biology and Biochemistry of the Extracellular Matrix. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Concepts in cell adhesion and tissue composition and importance of cell adhesion in tissue function and disease. Topics range from structure/function/assembly of tissue components to cellular adhesion mechanisms. prereq: 8002 or 8004 or instr consent

MICA 8009. Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death. (; 2 cr. ; Student Option; Every Spring)
Aspects of mechanisms involved in growth control at level of nuclear function. Neoplasia in hormonal cancers (such as prostate cancer) and role of protein phosphorylation in normal and abnormal growth. Mechanisms of cell death via apoptosis and its implications in normal and abnormal proliferation. prereq: 8004 or [BioC 3021, Biol 4004] or instr consent

MICA 8010. Microbial Pathogenesis. (; 3 cr. ; A-F or Audit; Fall Even Year)
Molecular mechanisms of bacterial/viral pathogenesis. Strategies of disease causation/ interaction with host, regulation of virulence factors, mechanism of virulence factor transmission to other microbes. prereq: MICa grad student or instr

MICA 8011. Current Topics in Immunology. (; 3 cr. ; A-F or Audit; Every Spring)
Colloquium format. In-depth reading, discussion prereq: MICA 8003 or instr consent

MICA 8012. Writing and Reviewing a Research Proposal. (; 2 cr. ; A-F only; Every Fall)
Assist first/second year graduate students to prepare research proposals for funding. prereq: First or second year MICaB grad student

MICA 8013. Translational Cancer Research. (; 2 cr. ; A-F or Audit; Every Spring)
Clinical issues in cancer research. Discuss translational research projects as they pertain to a variety of cancers. prereq: 8004 or instr consent

MICA 8014. Small RNA Biology. (; 2 cr. ; A-F or Audit; Every Spring)
Small RNAs as major regulators of gene/ protein expression. MicroRNAs and their potential use in diagnosis/prognosis of various disease conditions, including cancers. Biology of small RNAs and their role in health and disease. prereq: BIOC 8002 or MICA 8004 or equiv or instr consent

MICA 8094. Research in Microbiology, Immunology, and Cancer Biology. (; 1 cr. [max 5 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
One-on-one research training from faculty adviser during laboratory rotation. prereq: 1st yr MICa grad student

MICA 8320. Readings in Neurobiology. (; 1-4 cr. ; Student Option; Every Fall)
Topics in neurobiology and neurophysiology.

MICA 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

MICA 8371. Mucosal Immunobiology. (; 3 cr. ; A-F or Audit; Fall Odd Year)
Host immune processes at body surfaces. Innate/adaptive immunity at mucosal surfaces, interactions/responses of various mucosal tissues to pathogens, current approaches being used to target protective vaccination to mucosal tissues. Lectures, journal club format. prereq: 8001 or instr consent

MICA 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

MICA 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24

combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

MICA 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

MICA 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Thesis credit: doctoral. prereq: MICaB PhD student, adviser consent

MICA 8910. Seminar: Faculty Research Topics. (; 0 cr. ; No Grade Associated; Every Fall & Spring)
State-of-the-art information presented by scientific experts within/outside the University. prereq: MICaB grad student

MICA 8920. Seminar: Student Research Topics. (; 0 cr. ; No Grade Associated; Every Fall & Spring)
Current thesis topics and other aspects of microbiology, immunology, and cancer biology. prereq: MICaB grad student or instr consent

Mol Cell Devlpmental Biol/Gene (MCDG)

MCDG 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

MCDG 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

MCDG 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

MCDG 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

MCDG 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

MCDG 8900. Student Research Seminar. (; 1 cr. [max 10 cr.] ; S-N or Audit; Every Fall & Spring)
Presentation/discussion of student thesis research. prereq: Grad MCDG or BMBB major dept consent

MCDG 8910. Journal Presentations. (; 1 cr. [max 2 cr.] ; S-N or Audit; Every Fall & Spring)
Discussion of original scientific literature. prereq: Grad MCDG or BMBB major or dept consent

MCDG 8920. Special Topics. (; 1-4 cr. [max 8 cr.] ; S-N only; Every Fall)
Special Topics Course in the Molecular, Cellular, Developmental Biology and Genetics Program, including Itasca Research. prereq: Grad MCDG or BMBB major or dept consent

MCDG 8950. Teaching Practicum. (; 1 cr. [max 2 cr.] ; S-N or Audit; Every Fall & Spring)
Supervised experience in classroom, laboratory, and/or recitation instruction; development of skills in effective use of instructional techniques, materials, tests, and measurements. prereq: Grad MCDG major or dept consent

MCDG 8993. Directed Studies. (; 1-5 cr. [max 15 cr.] ; Student Option; Every Fall & Spring)
Directed Studies. prereq: MCDG grad student or instr consent

MCDG 8994. Research. (; 1-5 cr. [max 10 cr.] ; S-N or Audit; Every Fall & Spring)
Independent research determined by student's interests, in consultation with faculty mentor. prereq: MCDG grad student or dept consent

Moving Image Studies (MIMS)

MIMS 5910. Topics in Moving Image Studies. (; 2-4 cr. [max 8 cr.] ; A-F only; Every Fall & Spring)
Special topics in moving image studies.

MIMS 8001. Theories of the Moving Image. (3 cr. ; A-F only; Every Fall)
Study of the moving image as the intersection between critical media studies and film studies. Not a historical overview, but rather current discussions in these areas contextualized with relevant readings in classical film and media theory.

MIMS 8003. Historiography of the Moving Image. (; 3 cr. ; A-F only; Every Spring)
Genealogies of the moving image. "Crisis" of film in debates about "old" and "new" media; Hollywood's role in defining commercial and oppositional forms of moving images; approaches to the writing of history in relation to media historiography.

Museum Studies (MST)

MST 5011. Museum History and Philosophy. (3 cr. ; A-F or Audit; Every Fall)
Historical and philosophical roots of museums and emerging philosophical issues faced by museums today - from art, history, science, and youth to living collections, living history sites, and historic houses. Field trips to area museums.

MST 5012. Museum Practices. (3 cr. ; A-F or Audit; Every Spring)
Practical aspects of museum work. Standards, practices, responsibilities, issues, all set in greater museum context. Curatorial/educational duties, collections management, security, funding, boards, public relations, installation, budgeting. prereq: Grad student or instr consent

MST 5020. Internship. (; 1-6 cr. [max 32 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Students arrange to perform a professional-level task in a museum of good standing under close supervision of a member of the museum's professional staff. Instructor must approve a work plan and report. prereq: 5011, 5012, dept consent

MST 5170. Topics in Museum Studies. (; 1-4 cr. ; A-F only; Periodic Fall & Spring)
In-depth investigation of specific topic, announced in advance. prereq: grad student

MST 8993. Directed Study in Museum Studies. (; 1-4 cr. [max 16 cr.] ; A-F or Audit; Every Spring & Summer)
Study by a student, largely self directed with consultation of a faculty member, on a topic not covered (or not covered in depth) by another course. Program of study is determined jointly by student and advising faculty member. prereq: [5012 or concurrent registration is required (or allowed) in 5012], instr consent, dept consent

Music (MUS)

MUS 5101. Piano Pedagogy I. (; 2 cr. ; Student Option; Periodic Fall)
Demonstration and discussion of teaching techniques, methods, and materials for group and individual instruction at the elementary, early intermediate, and late intermediate levels. prereq: 8 cr in MusA 1301 or MusA 1401 or instr consent

MUS 5150. Body Awareness in Activity: The Alexander Technique for Musicians. (2 cr. [max 8 cr.] ; Student Option; Every Fall & Spring)
The Alexander Technique is a century-old technique used by musicians and others as a means of solving performance problems. Its principles address how the daily habits in the use of the self (such as sitting, standing, folding/bending, and walking) affect seemingly disparate problems such as stage fright, musculoskeletal pain, playing induced injuries, and computer use injuries. For musicians, the interplay of unconscious habits and the body mechanics of daily use of the self strongly affect tone production and technique. The Alexander Technique provides tools to enhance fundamental coordination leading to greater performance ease and a reduction of chronic aches and pains. More information can be found at: https://www.amsatonline.org

MUS 5151. Organ Literature I. (; 3 cr. ; A-F or Audit; Periodic Fall)
Organ literature from the 14th century to the mid-18th century. Influence of organ design of various periods and national schools on the literature and its performance. prereq: 3502, 3603, sr or grad or instr consent

MUS 5152. Organ Literature II. (; 3 cr. ; A-F or Audit; Periodic Fall)
Organ literature of J. S. Bach and of other 19th- and 20th-century composers. Influence

of organ design of various periods and national schools on the literature and its performance. prereq: 3502, 3603, sr or grad or instr consent

MUS 5153. Organ Pedagogy. (2 cr. ; A-F or Audit; Spring Odd Year)
Familiarization with materials and techniques for teaching playing the pipe organ. Through their study, students are to gain knowledge of organ methods and various aspects of teaching and learning to play the King of Instruments.

MUS 5181. Advanced Piano Literature I. (; 2 cr. ; A-F or Audit; Fall Even, Spring Odd Year)
Literature for piano from late Baroque period to mid-20th century. prereq: grad piano major or instr consent

MUS 5182. Advanced Piano Literature II. (; 2 cr. ; A-F or Audit; Periodic Spring)
Literature for piano from late Baroque period to mid-20th century. prereq: grad piano major or instr consent

MUS 5230. Chorus. (; 1-2 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
University Women's Chorus, Men's Chorus, Concert Choir and Choral Union. Choirs participate in a variety of programs exploring both Western and non-Western repertoire from the Middle Ages through the 20th century. Concerts include touring, and collaborative campus and community performances. prereq: Choral and/or instrumental music background; audition, instr consent

MUS 5240. University Singers. (; 1 cr. [max 8 cr.] ; A-F or Audit; Every Fall & Spring)
Mixed chorus with members of former chamber singers and concert choir. Programs exploring Western/non-Western repertoire from Middle Ages through 20th century. Concerts include touring and collaborative campus/community performances. prereq: Audition, instr consent

MUS 5241. Vocal Literature I. (; 3 cr. ; A-F or Audit; Periodic Fall)
Vocal literature of major/minor composers from 17th century to present. Structure, style, performance practice. prereq: [12 cr in MusA 1304, grad music student] or instr consent

MUS 5242. Vocal Literature II. (; 3 cr. ; A-F or Audit; Periodic Spring)
Vocal literature of major and minor composers from 17th century to present; structure, style, and performance practice. prereq: 12 cr in MusA 1104 or MusA 1304, grad music major or instr consent

MUS 5250. Opera Workshop and Ensemble. (; 2 cr. [max 16 cr.] ; A-F or Audit; Every Fall & Spring)
Preparation and performance of operatic arias, choruses, and scenes. Participation in fully staged or workshop productions of music theatre repertoire. prereq: audition, instr consent

MUS 5271. Diction for Singers I. (; 2 cr. ; A-F or Audit; Every Fall)
Principles and techniques of singing in English, Italian, Spanish, German, and French. International Phonetic Association alphabet used. prereq: 12 cr MusA 1304 or grad music major or instr consent

MUS 5272. Diction for Singers II. (; 2 cr. ; A-F or Audit; Periodic Spring)
Principles and techniques of singing in English, Italian, Spanish, German, and French. International Phonetic Association alphabet used. prereq: 12 cr MusA 1304 or grad music major or instr consent

MUS 5275. Vocal Pedagogy I. (; 3 cr. ; Student Option; Every Spring)
Advanced study of mind/body preparations for singing, anatomy, and physiology of the vocal mechanism. Voice use and care, historical and comparative pedagogy, learning theories, models and guidelines for teaching, instructional techniques, and diagnosing and solving vocal problems. prereq: Sr vocal major or instr consent

MUS 5276. Vocal Pedagogy II. (; 3 cr. ; A-F or Audit; Periodic Spring)
History of solo vocal performance; selection and preparation of beginning level solo vocal repertoire; development of vocal performance skills (interpretation, expression, artistry), recital programming, and vocal career counseling. prereq: Sr vocal major or instr consent

MUS 5280. Opera Theatre. (; 2 cr. [max 16 cr.] ; A-F or Audit; Every Fall & Spring)
Preparation and performance of fully-staged operatic production. Major involvement in singing, acting, and technical aspects of opera. prereq: audition, instr consent

MUS 5331. Jazz Improvisation I. (; 2 cr. ; A-F or Audit; Periodic Summer)
Rudiments, analysis. Improvisation on blues in three major keys and on standard American popular jazz compositions from swing era to early bebop. Applications of major/minor scales. Ear training. prereq: Music major or instr consent

MUS 5333. Music After 1945. (3 cr. ; A-F only; Fall Even Year)
This course will explore theoretical and analytical techniques in mid-twentieth and twenty-first-century music. After an initial unit of review of early twentieth-century techniques, the semester will be divided into units that encapsulate a musical domain (e.g. "rhythm"), rather than exploring chronologically. Students will be responsible for completing readings as well as analytical assignments for each class, as outlined on the course schedule. prereq: MUS 4504 or Graduate music major

MUS 5336. Jazz Arranging. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Beginning techniques of arranging for jazz combo and jazz ensemble; vocal and instrumental. prereq: 3502 or instr consent

MUS 5340. Jazz Ensemble. (; 1 cr. [max 6 cr.] ; A-F or Audit; Every Fall & Spring)
A 20-member performing organization covering significant jazz compositions and arrangements written specifically for this medium. prereq: audition, instr consent

MUS 5400. University and Campus Bands. (; 1 cr. [max 10 cr.] ; Student Option; Every Fall & Spring)
Lab course.

MUS 5410. University Wind Bands. (; 1 cr. [max 14 cr.] ; A-F or Audit; Every Fall & Spring)
The University Wind Ensemble is comprised of the university?s finest graduate and undergraduate woodwind, brass, and percussion musicians. This ensemble prepares a wide variety of repertoire composed from the early Renaissance through today and performs concerts on and off campus throughout the year. The ensemble participates in special activities, events, projects, and collaborations with featured guest artists. The University Wind Ensemble and University Symphony Orchestra share musicians and rehearse on alternating block schedules during the semester (a project-focused schedule). Please consult with the Ensemble Library in Ferguson Hall for more details on the rehearsal and performance schedule. Placement in the ensemble is determined through an audition; all university students are eligible to audition. The University Symphonic Band is comprised of woodwind, brass, and percussion musicians in music disciplines as well as other disciplines across the university. This ensemble studies and prepares standard and contemporary wind band repertoire and performs concerts on and off campus throughout the year. Many performances are shared with guest ensembles and/or featured guest artists. Please consult with the Ensemble Library in Ferguson Hall for more details on the rehearsal and performance schedule. Placement in the ensemble is determined through an audition; all university students are eligible to audition. prereq: audition, instr consent

MUS 5420. Orchestra. (; 1 cr. [max 8 cr.] ; A-F or Audit; Every Fall & Spring)
Symphony orchestra performs standard repertory and major works with chorus; concerts and tour appearances. Players from all colleges may participate. prereq: audition, instr consent

MUS 5427. Violin Pedagogy I. (; 2 cr. ; A-F or Audit; Periodic Fall)
Private teaching of violin students at beginning, intermediate, and advanced levels. Discussion and demonstrations of pedagogical techniques. prereq: Violin or viola major or instr consent

MUS 5440. Chamber Ensemble. (; 1 cr. [max 8 cr.] ; A-F or Audit; Every Fall & Spring)
Performance of chamber music; duos, trios, quartets, quintets, and other ensemble combinations for instruments and/or voices. prereq: audition, instr consent

MUS 5450. Orchestral Repertoire. (; 1-3 cr. [max 9 cr.] ; A-F or Audit; Every Fall & Spring)
Investigation of practical and performance problems in standard orchestral repertoire with regard to style and interpretation. prereq: instr consent

MUS 5451. Applied Studio Resources and Administration. (; 2 cr. ; A-F only; Every Spring)
The courses focuses on preparing graduate students for successful entry into the college-level applied teaching profession, and

developing strategies for a tenurable record of teaching, performance, research, and service.

MUS 5460. World Music Ensemble. (1-2 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
Afro-Brazilian/Afro-Caribbean popular repertories. Samba, bossa nova, salsa, merengue, mambo. Planned master classes/ clinics with local artists to complement regularly scheduled rehearsals/performances. No audition required.

MUS 5461. Guitar Literature. (2 cr. ; Student Option; Fall Odd Year)
This course is principally intended for guitar majors (graduate and undergraduate students). The main focus of this course is to introduce students to guitar literature, through the historical overview of the repertoire, classical guitar composers, and performers. It will also introduce students to method books, in chronological order (through an examination of specific styles and "performance practices") and teaching methods through the history of guitar and guitar literature intended for technique development (studies, exercises, etc.).

MUS 5464. Cello Pedagogy. (; 2 cr. ; A-F or Audit;)
Concentrated study of cello teaching methods. Provides students with the strategies for teaching cello privately, develops analytical skills, and increases knowledge of cello repertoire. Designed for practical application in conjunction with the string technique class.

MUS 5466. Guitar Pedagogy. (; 2 cr. ; A-F or Audit; Fall Even Year)
Intended for guitar performance majors. This course will introduce basic teaching concepts/ methods/philosophies and examine method books, studies, and methodology through the history of classical guitar. Other topics (e.g., starting a studio, developing promotional material/website, contemporary teaching methods) will be addressed. prereq: Guitar performance major or instr consent

MUS 5481. Trumpet Pedagogy. (; 2 cr. ; Student Option; Fall Odd, Spring Even Year)
Principles of trumpet pedagogy. Discussion of literature, history, and current teaching aids. prereq: Sr or grad in music or instr consent

MUS 5490. Percussion Ensemble. (; 1 cr. [max 10 cr.] ; A-F or Audit; Every Fall & Spring)
Practice and performance of standard and contemporary compositions for percussion instruments in various combinations. prereq: instr consent

MUS 5491. Percussion Literature I. (; 2 cr. ; A-F or Audit; Periodic Fall)
Repertoire derived from orchestral and band literature for snare drum, timpani, mallet instruments, and various percussion accessories. Major works of the 20th century written for solo percussion, percussion ensemble, and chamber groups of percussion and non-percussion instruments. prereq: Jr or sr or grad or instr consent

MUS 5492. Percussion Literature II. (; 2 cr. ; A-F or Audit; Periodic Fall & Spring)
Repertoire derived from orchestral and band literature for snare drum, timpani, mallet instruments, and various percussion accessories. Major works of the 20th century written for solo percussion, percussion ensemble, and chamber groups of percussion and non-percussion instruments. prereq: Jr or sr or grad or instr consent

MUS 5493. Javanese Gamelan Music Ensemble. (1 cr. [max 8 cr.] ; Student Option; Periodic Fall & Spring)
Hands-on experience in learning to play Javanese gamelan music, one of the great non-western musical traditions that is readily accessible to beginners. Related insights into the role of this tradition in Javanese culture. Open to all students - no musical background needed!

MUS 5494. West African Music Ensemble. (1 cr. [max 8 cr.] ; Student Option; Periodic Fall & Spring)
Hands-on experience in learning to play West African music, one of the great non-western musical traditions that is readily accessible to beginners. Also, insights into function, context, structure, gender roles, politics, instruments, life-cycle rites, genres, musical organizations, traditional musicians, and contemporary popular music. Open to all students - no musical background needed!

MUS 5534. Musical Minimalisms. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
This course provides an introduction to the various musics associated with the label "minimalism," including musical trajectories emerging from them. Numerous artists and compositions will be covered, spanning from 1958 to the present, though the focus is on music composed during the 1960s and 1970s, including that by Young, Riley, Reich, Glass, Monk, the Velvet Underground, Andriessen, P?rt, Eno, Feldman, and others. The class blends analysis, historical and analytical secondary readings, and in-class performance. Students must contribute informed comments to discussion, which in turn requires the completion of reading and listening assignments. prereq: Undergraduates-Mus 4504/4514 or equivalent; Graduates-Music 3508/3518 or passing of the Theory Entrance Exam

MUS 5541. 16th-Century Counterpoint. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Polyphonic counterpoint in modal style of Renaissance. Writing exercises in species counterpoint and in two, three, and four parts. Cantus firmus techniques, mixed values, invertible counterpoint, canon. Representative works by Josquin, Lassus, Palestrina, Victoria, and others. Renaissance treatises by Artusi, Banchieri, Diruta, Morley, Zarlino, and others. prereq: [3501, 3508] or pass basic skills exam

MUS 5550. Class Composition for Performers. (; 3 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
Original works in various forms. Development of individual compositional style in a post-tonal idiom. Various forms, performing forces, techniques. prereq: [4504, 4514 [with C- or better]] or instr consent

MUS 5561. Orchestration I. (; 3 cr. ; A-F or Audit; Every Fall)
Scoring techniques for ensembles in combination and full orchestra; year-long sequence. Score study of representative works from 18th through 20th centuries. prereq: 3502

MUS 5571. Schenkerian Analysis for Performers. (; 3 cr. ; A-F or Audit; Periodic Fall & Summer)
Theory/analysis of tonal music using principles developed by Henrich Schenker. Basic concepts/notation, their application to excerpts/ short pieces from 18th/19th centuries. prereq: 3502

MUS 5572. Chromatic Harmony. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Exploration of chromatic tonal practices through analysis of selected repertoire, completion of written exercises (figured bass, harmonization of melodies, model composition), ear-training, and keyboard exercises.

MUS 5573. Analysis of Late-Romantic Orchestral Literature. (; 3 cr. ; A-F or Audit; Periodic Spring)
Advanced tonal analysis. Dramatic orchestral music by Wagner, Strauss, Tchaikovsky, Rimsky-Korsakov, Moussorgsky, and Rachmaninoff as focus for projects/discussions related to chromatic harmony, form, and orchestration. prereq: 3502 or Theory IV Exam or instr consent; [4504 or equiv] recommended

MUS 5591. Introduction to Music Information Technology. (3 cr. ; A-F or Audit; Every Fall)
Principles of acoustics, electronic sound generation/manipulation, digital signal processing techniques. Programming languages for digital sound synthesis. Editing software, MIDI applications. prereq: Music grad student or instr consent

MUS 5592. Music Informatics Seminar. (3 cr. ; A-F or Audit; Every Spring)
Filtering, formant synthesis, reverberation techniques, additive synthesis. Interactive MIDI applications. prereq: 5591 or instr consent

MUS 5611. Resources for Music Research. (; 3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Development of skills in identifying, locating, and evaluating resources for research in music. Computer-searching techniques, acquaintance with basic reference sources in the field, preparation of the music research paper. prereq: 3603

MUS 5620. Topics in Opera History. (; 3 cr. [max 6 cr.] ; A-F or Audit; Periodic Fall & Spring)
Study of specific operas. Development of opera in context of other artistic, social, cultural, political events, movements, changes. Periods/ countries vary each semester.

MUS 5624. Music of J. S. Bach. (; 3 cr. ; A-F or Audit; Spring Even Year)
Issues of musical style, historical context. Moves chronologically through Bach?s career. Relationships between his duties and works he

composed. Genesis, function, relationship of a work to genre and performing forces. Lectures, presentations, research/analysis assignments. prereq: Grad student in music or instr consent

MUS 5630. Performance Practice: 1700 to the Present. (3 cr. ; A-F only; Fall Even Year)
This course will explore issues relevant to the historically informed performance of music written between 1700 and the present, including primary sources, original instruments and iconography, editions, treatises, phrasing and articulation, tempo and rubato, rhythmic alteration, ornamentation and cadenzas, and basso continuo. Class activities and assignments will include readings, discussion, and practicum. Pre-requisite: Graduate student in Music or instructor consent

MUS 5631. Beethoven Sonatas for Solo Piano, Violin, & Cello. (3 cr. ; A-F only; Fall Odd Year)
Beethoven's sonatas are central to the violin, cello, and piano repertoires, and they will be examined in relation to the composer's life, times, and developing style. Scholarly books and articles, mostly musicological but also analytical, will provide the stimulus for understanding these works. The implications of such scholarly investigations for performance will also be a running theme of the course. Attention will therefore be given to performance practice issues as well as some difficult editorial and notational problems associated with the scores. Pre-requisite: Graduate student in Music or instructor consent

MUS 5647. 20th-Century European/ American Music. (; 3 cr. ; Student Option; Every Spring)
Concert music and opera in European and American culture 1890s to present, political and social roles of music. prereq: MUS 1501 or equiv

MUS 5731. Jazz and Modernism. (3 cr. ; A-F or Audit; Spring Even Year)
Critical consideration of the mutual impact and cross-influences of jazz practices and modernist aesthetics. Contextualizes the emergence of styles including ragtime, swing, bebop, cool, third-stream, modal, and avant-garde jazz within the broader aesthetic currents of 20th-century art and popular music cultures. prereq: Graduate student in music or instr consent

MUS 5732. Free Jazz: From Structure to Gesture. (3 cr. ; A-F only; Spring Odd Year)
Discuss musical form of free jazz comprising flow expressivity, collaborative interaction, gestural communication from theoretical/ practical point of view. Major representatives such as Ornette Coleman, Cecil Taylor, Archie Shepp, The Art Ensemble of Chicago, John Coltrane. Sound material include classical recordings but also recent free jazz CDs/DVDs. prereq: Grad student in music or instr consent

MUS 5805. Worlds of Improvisation. (3 cr. ; A-F or Audit; Spring Odd Year)
This course will explore traditions of improvisation from a variety of world cultures -- such as African, African-American, European, Middle Eastern, South Asian -- to gain insight into processes of composition in performance, from ethnomusicological, music-theoretical, and applied vocal/instrumental perspectives.

MUS 5807. Raga Music. (3 cr. ; A-F only; Periodic Fall & Spring)
This seminar is an introduction to the theory and practice of Hindustani raga. Raga is melodic structure and melodic flavor: a secret suffused with affect, image, color, and memory, disclosed through a particular way of listening. Raga has sustained centuries of composition and improvisational practice and inspired a vast literature of poetry, metaphysics, painting, and music theory. We will learn to intuitively discern the identity of common ragas, to rigorously describe their differences in the language of Indian music theory, and to perform their characteristic movements.

MUS 5809. What Do Voices Do?. (3 cr. ; A-F only; Periodic Fall & Spring)
The voice is mysterious. Voice teachers disagree wildly about the best method of voice production; linguists are fascinated by the acoustic complexity of speech; and ethnomusicologists have no comprehensive theory of vocal action that accounts for the hundreds of distinct vocal traditions in the world, or for the great ethical and political power wielded by elevated speech and song. Indeed, political "voice" is often exercised silently (voting, letter writing, silent protest), and submission to political authority is often affirmed vocally (through pledges, songs, and oaths.) This course proceeds optimistically, in the hope that we can find our way through this vocal thicket through historical and ethnographic study, close listening, acoustical analysis, and experimental performance. Students from all disciplines--the natural and human sciences, the humanities, the arts, etc.-- are welcome.

MUS 5950. Topics in Music. (; 1-4 cr. [max 60 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Each offering focuses on a single topic. Topics specified in Class Schedule.

MUS 5993. Directed Studies. (1-4 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. prereq: instr consent, dept consent, college consent.

MUS 8110. Sonata Seminar. (; 2 cr. [max 8 cr.] ; A-F or Audit; Every Fall & Spring)
Performance in standard Baroque, Classical, and Romantic sonatas for piano and violin, cello, viola, flute, clarinet, or oboe. prereq: Accompanying emphasis, strings and winds by audition, instr consent

MUS 8112. Instrumental Repertoire: Reduction and Realization. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Reducing orchestra scores, representing orchestral reductions at piano, working with conductors. Conductors join course in mid-semester. prereq: Grad student in accompanying/conducting

MUS 8131. Advanced Keyboard Skills. (; 2 cr. ; A-F or Audit; Periodic Fall)
Diatonic/chromatic tonal harmony applied to keyboard. Emphasizes harmonization, transposition, and improvisation. Open score and clef reading using alto, tenor, and soprano clefs. prereq: Grad student in music or instr consent

MUS 8133. Seminar in Basso Continuo. (; 3 cr. ; A-F or Audit; Periodic Fall)
Realization of figured basses (bass lines annotated with Arabic numerals indicating harmony) and performance of continuo parts in European concerted music from 17th/18th centuries at keyboard. Emphasizes developing stylistic accompaniment skills at harpsichord/ organ. prereq: Grad student in Music or instr consent

MUS 8151. Seminar in Organ Repertoire. (; 3 cr. ; A-F or Audit; Periodic Fall)
Repertoire for pipe organ. Readings/ presentations on selected areas of repertoire of 15th through 20th centuries. Organ design/ construction of various European and American schools, as well as relevant performance practices. prereq: Grad student in music or instr consent

MUS 8170. Advanced Vocal Accompanying Skills and Repertoire. (; 2 cr. [max 8 cr.] ; A-F or Audit; Periodic Fall)
Advanced performance (Lieder, melodie, opera) emphasizing coaching techniques and performance skills of pianists and singers. prereq: [French, German, Italian diction], accompanying or DMA voice emphasis or MM voice emphasis by audition

MUS 8171. Song Repertoire and Performance for Pianists and Singers: German Lieder. (; 2 cr. ; A-F or Audit; Periodic Spring)
Surveys standard German-language song repertoire: Mozart, Schubert, Schumann, Brahms, Strauss, Wolf. prereq: [Grad student with major in vocal performance or in accompanying or in piano], instr consent

MUS 8181. Operatic Accompaniment Skills and Repertoire. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Development of skills required in operatic accompanying/coaching work. Standard opera arias, cultivation of orchestral sound at the piano, stylistic traditions, working with conductors. prereq: Grad student with major in accompanying or in conducting

MUS 8182. Opera History in Context: Monteverdi and Mozart. (; 3 cr. ; A-F only; Every Fall)
Development of opera in context of other artistic, social, cultural, and political events, movements, and changes. Focuses on two representative composers and some of their significant operas. prereq: Grad student in music or instr consent

MUS 8183. Opera History in Context: Verdi and Britten. (; 3 cr. ; A-F only; Every Spring)
Development of opera in context of other artistic, social, cultural, and political events, movements, and changes. Focuses on two representative composers and some of their significant operas. prereq: Grad student in music or instr consent

MUS 8237. Score Study: Choral. (; 3 cr. ; A-F or Audit; Every Fall)
Analysis of various choral scores ranging from Renaissance through 20th century. Reading of choral and choral/orchestral scores at piano, including scores with C clefs and transposing instrument. prereq: instr consent

MUS 8255. Choral Literature: Baroque Era to the Present. (; 3 cr. ; A-F or Audit; Every Spring)
Survey of sacred and secular choral works. prereq: instr consent

MUS 8299. Performance in Choral Conducting. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Preparation and performance of choral conducting recital, with supporting paper. prereq: instr consent

MUS 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

MUS 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

MUS 8450. Graduate Seminar in Conducting. (; 3-4 cr. [max 32 cr.] ; A-F or Audit; Every Fall & Spring)
Development of musicianship, conducting, rehearsal, and analytical skills. Repertoire, gesture, score study, interpretation, pedagogy, and performance presentation in wind band, orchestral, and choral conducting. Students meet twice weekly in group seminar, and prepare and participate in weekly conducting labs scheduled with all major University ensembles. prereq: Grad student in conducting or instr consent

MUS 8479. Performance and Document: Wind Ensemble/Band Conducting. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Preparing and performing full wind ensemble or band conducting program with supporting document. prereq: 8472, instr consent

MUS 8489. Performance and Document: Orchestral Conducting. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Preparing and performing full orchestral conducting program with supporting document. prereq: instr consent

MUS 8501. Music Theory Pedagogy. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Comparison of pedagogical philosophies/ methods in music theory. Pedagogical literature, practice teaching, curriculum design. prereq: Grad student in music or instr consent

MUS 8550. Composition. (; 3 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
Creation of original musical works in various instrumental and vocal forms; advanced development of writing and realization of musical ideas. prereq: instr consent

MUS 8560. Readings in Music Theory. (; 3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Seminars on major theoretical text or group of interrelated texts. Pre-tonal, tonal, post-tonal, or non-Western focus in individual offerings. prereq: instr consent

MUS 8570. Seminar in Composition. (; 2 cr. [max 4 cr.] ; A-F or Audit; Periodic Fall)
Aesthetic and professional issues in composition. Survey of professional activities, including r[e]sum[e] and grant writing and concert production. prereq: Composition emphasis or instr consent

MUS 8571. Composers' Laboratory. (; 3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Preparing original music composition to specification for possible radio/TV/theatre/ film use. Analytic projects based on research into current practice of music criticism/music journalism. Philosophical and sociological research into creative process. prereq: 8570

MUS 8580. Topics in Tonal Analysis. (; 3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Seminar. Sample topics: string quartets of Beethoven, chamber music of Brahms, significant works by tonal composers. prereq: instr consent

MUS 8581. Schenkerian Theory and Analysis I. (; 3 cr. ; A-F or Audit; Periodic Fall)
Analysis and critical readings pertaining to theory of tonal music developed by Heinrich Schenker. Application of his method to representative repertoire from 18th and 19th centuries. Contrapuntal writing modeled after presentation in Schenker's [Counterpoint]. prereq: instr consent

MUS 8582. Schenkerian Theory and Analysis II. (; 3 cr. ; A-F or Audit; Spring Even Year)
Application of Schenkerian theory to 18th-/19th-century music, coordinated with critical study of major music treatises from that era. prereq: 8581 or instr consent

MUS 8584. Current Issues in the Analysis of 19th-Century Music. (3 cr. ; A-F or Audit; Spring Even Year)
Recent analytic approaches to 19th-century music. Students demonstrate fluency with methods and current issues. In-class discussions, short written analytical projects, two longer papers. prereq: [[3502, 3512] or equiv placement exam], instr consent; grad-level Schenkerian analysis recommended

MUS 8585. Chromatic Harmony Seminar. (3 cr. ; A-F only; Fall Odd Year)
Careful study of chromatic harmonic practices (especially from the latter half of the nineteenth century) from both analytical and compositional perspectives. Students will analyze a wide range of music excerpts and movements using tools derived from Heinrich Schenker's analytical practice and will creatively harmonize sophisticated tonal melodies. The course also will incorporate readings from the analytical literature (both Schenkerian and non-Schenkerian) and will conclude with a substantial course paper.

MUS 8588. Sonata Theory. (; 3 cr. ; A-F or Audit; Periodic Fall)
Principles of the classic sonata: norms, types, and deformations. Structural analysis, analytical methodologies, and fundamentals of sonata hermeneutics. prereq: instr consent

MUS 8590. Topics in 20th-Century Analysis. (; 3 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
Seminar explores literatures of 20th-century art music.

MUS 8631. Seminar: Music in Medieval Europe. (; 3 cr. ; A-F or Audit; Periodic Fall)
Selected genres of polyphonic and monophonic music, 9th-14th centuries, for analysis and cultural criticism. Social roles of music and performance traditions; current musicological issues. prereq: Undergrad music degree

MUS 8632. Seminar: Music in Early Modern Europe. (; 3 cr. ; A-F or Audit; Periodic Fall)
Transformation of chanson, madrigal, mass, and motet from 1400 to 1580. Analysis and cultural criticism; social roles of music and performance traditions; current musicological issues. prereq: Undergrad music degree

MUS 8640. Seminar in Musicology. (; 3 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
Topics vary; readings, research, strategies, and methods. prereq: Musicology or theory emphasis or instr consent

MUS 8644. Seminar: Advanced Research in Historical Musicology. (3 cr. ; A-F or Audit; Periodic Fall)
Major reference and research materials in musicology and related disciplines, including databases. Historical methods and historiography. Locating and interpreting primary sources of music and archival documents. Developing research strategies for degree papers and theses. Forms of documentation and historical writing. prereq: Undergrad music degree

MUS 8647. Seminar: The Critical Editing of Early Music--Method and Practice. (; 3 cr. ; A-F or Audit; Periodic Fall)
Preparation of critical editions from primary sources of vocal and instrumental music (partbooks and tablatures). Nature of musical sources, both manuscripts and prints. Stemmatic filiation, editorial judgment and method, presentation of text. prereq: Undergrad music degree

MUS 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

MUS 8711. Performance Theory. (3 cr. ; A-F only; Spring Odd Year)
Investigate transformation process from score to its sounding instrumental realization. Discuss most important scholarly publications by B. Repp, Th. W. Adorno, et al. Theory first describes structure of such transformations, then investigates analytical, emotional, gestural rationales for expressive performance. prereq: Grad student in music or instr consent

MUS 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

MUS 8864. Current Issues in Ethnomusicology. (; 3 cr. ; A-F or Audit; Every Fall)
Ethnomusicological methods, theorizing, and research practice. Current issues in monographs, journals, and anthologies. Fieldwork practicum. prereq: instr consent

MUS 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

MUS 8994. Directed Research. (; 1-3 cr. [max 12 cr.] ; A-F or Audit; Every Fall & Spring)
Directed research. prereq: instr consent

MUS 8999. Recital Credits: Doctoral. (; 2-4 cr. [max 20 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Registration for recital credits coincides with performance of D.M.A. recital (five recitals for 20 credits). prereq: DMA student, instr consent

Music Applied (MUSA)

MUSA 5101. Piano: Elective (graduate non-major in music). (; 2 cr. [max 8 cr.] ; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 5103. Organ: Elective (graduate non-major in music). (; 2 cr. [max 8 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: dept consent

MUSA 5104. Voice: Elective (graduate non-major in music). (; 2 cr. [max 8 cr.] ; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 5105. Violin: Elective (graduate non-major in music). (; 2 cr. [max 8 cr.] ; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 5106. Viola: Elective (graduate non-major in music). (; 2 cr. [max 8 cr.] ; A-F or Audit; Periodic Fall & Spring)
Private instruction. prereq: dept consent

MUSA 5112. Clarinet: Elective (graduate non-major in music). (; 2 cr. [max 8 cr.] ; A-F or Audit; Periodic Fall & Spring)
Private instruction. prereq: dept consent

MUSA 5113. Saxophone: Elective (graduate non-major in music). (; 2 cr. [max 8 cr.] ; A-F or Audit; Periodic Fall & Spring)
Private instruction. prereq: dept consent

MUSA 5114. Bassoon: Elective (graduate non-major in music). (; 2 cr. [max 8 cr.] ; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 5116. Trumpet: Elective Individual Lessons (graduate non-major in music). (; 2 cr. [max 8 cr.] ; A-F or Audit; Periodic Fall, Spring & Summer)
Individualized trumpet instruction. prereq: dept consent

MUSA 5121. Percussion: Elective (graduate non-major in music). (; 2 cr. [max 8 cr.] ; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 5123. Guitar: Elective (graduate non-major in music). (; 2 cr. [max 8 cr.] ; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: dept consent

MUSA 5401. Piano: Music Major Secondary (graduate). (; 2-4 cr. [max 24 cr.] ; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: Audition, dept consent

MUSA 5402. Harpsichord: Music Major Secondary (graduate). (; 2-4 cr. [max 24 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 5403. Organ: Music Major Secondary (graduate). (; 2-4 cr. [max 24 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 5404. Voice: Music Major Secondary (graduate). (; 2-4 cr. [max 24 cr.] ; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: Audition, dept consent

MUSA 5405. Violin: Music Major Secondary (graduate). (; 2-4 cr. [max 24 cr.] ; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: Audition, dept consent

MUSA 5408. Double Bass: Music Major Secondary (graduate). (; 2-4 cr. [max 24 cr.] ; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: Audition, dept consent

MUSA 5409. Flute: Music Major Secondary (graduate). (; 2-4 cr. [max 24 cr.] ; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: Audition, dept consent

MUSA 5414. Bassoon: Music Major Secondary (graduate). (; 2-4 cr. [max 24 cr.] ; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: Audition, dept consent

MUSA 5415. French Horn: Music Major Secondary (graduate). (; 2-4 cr. [max 24 cr.] ; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: Audition, dept consent

MUSA 5416. Trumpet: Music Major Secondary (graduate). (; 2-4 cr. [max 24 cr.] ; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: Audition, dept consent

MUSA 5417. Trombone: Music Major Secondary (graduate). (; 2-4 cr. [max 24 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 5418. Baritone: Music Major Secondary (graduate). (; 2-4 cr. [max 24 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 5421. Percussion: Music Major Secondary (graduate). (; 2-4 cr. [max 24 cr.] ; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: Audition, dept consent

MUSA 5423. Guitar: Music Major Secondary (graduate). (; 2-4 cr. [max 24 cr.] ; A-F or Audit; Every Fall & Spring)
Private instruction. prereq: Audition, dept consent

MUSA 8301. Piano: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8302. Harpsichord: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8303. Organ: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8304. Voice: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8305. Violin: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8306. Viola: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8307. Cello: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8308. Double Bass: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8309. Flute: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8311. Oboe: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8312. Clarinet: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8313. Saxophone: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8314. Bassoon: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8315. French Horn: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8316. Trumpet: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8317. Trombone: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8318. Euphonium: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8319. Tuba: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8321. Percussion: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8322. Harp: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8323. Guitar: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

MUSA 8324. Accompanying/Coaching: Music Major (graduate). (; 2-4 cr. [max 48 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Private instruction. prereq: Audition, dept consent

Music Education (MUED)

MUED 5101. Improvisation and Creativity in the Music Classroom. (; 2 cr. ; A-F only; Every Fall)
This course will address issues of improvisation, composition, and creativity of critical importance to musicians and music educators, with a strong emphasis on music-theoretical and socio-cultural modes of understanding the meanings and functions of music. Students will gain experience with the creative practices characteristic of a variety of Western and non-Western forms, including those of jazz and Minnesota American Indian music. The workshop format of the class will challenge students to improvise and compose works, present and perform them to their peers, provide and receive constructive feedback, engage and respond to this feedback with reference to clearly articulated statements of artistic intent, and revise the works accordingly. Students will apply insights derived in this manner in final research projects focused on the development of lesson and unit plans. prereq: At least C- in MUS 4504 or instructor permission

MUED 5301. General Music I. (; 3 cr. ; A-F or Audit; Every Spring)
Materials, strategies and the field experience for planning and implement instruction for global arts understanding among early childhood and lower elementary school children. Experiential learning, for integrating international music and culture perspectives while planning and implementing sequential elementary music instruction. prereq: MUED 1201, MUS 4504, MUS 4514, [music education major or instr consent], successful completion of soph proficiency exam

MUED 5302. General Music II. (; 3 cr. ; A-F only; Every Fall)
Materials, strategies and an extensive field experience with expert general music teachers for planning and implementing sequential upper elementary, middle and high school music instruction for global arts understanding. Includes interdisciplinary connections, performance, and applications of academic technologies. prereq: MUED 5301, MUED 1201, MUS 4504, and MUS 4514 with a grade of at least C-

MUED 5350. Student Teaching in Classroom Music. (; 4-8 cr. ; A-F or Audit; Every Fall & Spring)
Supervised teaching and observing of classroom and general music in elementary, junior high, and senior high schools. Weekly seminar emphasizing classroom management, curriculum development, and administration of music programs.

MUED 5415. Choral/Vocal Methods and Materials I. (; 3 cr. ; A-F only; Every Spring)
Choral/vocal methods and materials as part of licensure to work in K-12 settings per legislated standards. Sight-singing, classroom management, warm-ups, adolescent voice, choral conducting skills, repertoire, and rehearsal techniques. 25 hours of practicum at the middle school level. Applications of technology. First of two required semesters. prereq: MUED 1201, MUS 4504, MUS 4514, [music education major or instr consent], successful completion of soph proficiency exam

MUED 5416. Choral/Vocal Methods and Materials II. (; 3 cr. ; A-F only; Every Fall)
Choral/vocal methods and materials as part of licensure to work in K-12 settings per legislated standards. Choral conducting skills, rehearsal techniques, and interpretation of choral compositions. Methods, materials, and curriculum for high school choral ensembles. 20 hours of practicum at the high school level. Second of two required semesters. prereq: MUED 5415, MUED 1201, MUS 4504, and MUS 4514 with grade of at least C-, [music education major or instr consent], completion of the Music Education sophomore proficiency exam

MUED 5419. Advanced Conducting and Repertoire (Choral). (; 2 cr. ; A-F only; Every Fall)
Conducting/baton technique, nonverbal communication skills, rehearsal techniques, score study habits. Aural/diagnostic skills to rehearse a choral ensemble. Selection of age-appropriate repertoire. prereq: 3416, MUS 3401, MUS 3502, MUS 3512, music education major [choral]

MUED 5450. Student Teaching in Vocal Music. (; 4-8 cr. ; A-F or Audit; Every Fall & Spring)
Supervised teaching and observing of vocal music in elementary, junior high, and senior high schools. Weekly seminar emphasizing classroom management, curriculum development, and administration of music programs.

MUED 5516. Instrumental Methods and Materials I. (; 3 cr. ; A-F only; Every Spring)
Instrumental methods and materials as part of licensure to work in K-12 settings per legislated standards. Sight-singing, classroom management, adolescent development, instrumental conducting skills, repertoire, and rehearsal techniques. 25 hours of practicum at the middle school level. Applications of technology. First of two required semesters. prereq: MUED 1201, MUS 4504, and MUS 4514 with a grade of C- or better, music education major, successful completion of Music Education sophomore proficiency exam

MUED 5517. Instrumental Methods and Materials II. (; 3 cr. ; A-F only; Every Fall)
Instrumental methods and materials as part of licensure to work in K-12 settings per legislated standards. Sight-singing, classroom management, adolescent development, instrumental conducting skills, repertoire, and rehearsal techniques. 25 hours of practicum at the middle school level. Applications of technology. Second of two required semesters. prereq: MUED 5517, MUED 1201, MUS 4504, and MUS 4514 with a grade of C- or better, music educ major, completion of the Music Education sophomore proficiency exam

MUED 5519. Advanced Conducting and Repertoire (Instrumental). (; 2 cr. ; A-F only; Every Fall)
The Advanced Conducting (Instrumental) course continues exploration of the many facets of the role of a conductor (within orchestral and wind band areas), conducting philosophies, and conducting and rehearsal

techniques for instrumental ensembles. Students advance in knowledge of score study, analysis, non-verbal communication skills, body awareness, repertoire selection, and rehearsal techniques. Advanced Conducting is offered in annually in the fall semester. Pre-req: MUED 5416 (Choral/Vocal Methods and Materials II) MUS 3401 (Basic Conducting) MUS 4504 (Intensive Theory and Analysis of 20th-Century Music) MUS 4514 (Ear-Training and Sight-Singing for 20th-Century Music) music major or instructor approval

MUED 5550. Student Teaching in Instrumental Music. (; 4-8 cr. ; A-F or Audit; Every Fall & Spring)
Supervised teaching and observing of instrumental music in elementary, junior high, and senior high schools. Weekly seminar emphasizing classroom management, curriculum development, and administration of music programs.

MUED 5650. Student Teaching Seminar. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Reflective practice during student teaching. Developing materials for professional employment (e.g., resume, portfolio). prereq: At least C- in all required [music, music education, professional education] courses

MUED 5669. Psychology of Music. (; 3 cr. ; A-F or Audit; Every Fall)
Basic study of the psychology and psychoacoustics of music including hearing, music perception and cognition, values and preferences, musical abilities, musical systems, media music effects, the influence of music on human behavior, and psycho-socio-physiological processes involved in musical behavior. prereq: Psy 1001 or Psy 3604 or instr consent

MUED 5750. Topics in Music Education. (; 1-4 cr. [max 16 cr.] ; A-F or Audit; Periodic Fall & Spring)
Focuses on single topic, specified in Class Schedule.

MUED 5800. Group Music Leadership Skills. (; 3 cr. ; A-F or Audit; Every Spring)
Role of group music experiences in human development. Relations specific to music therapy. Students develop repertoire of music applications/techniques for various age groups/populations. Standards for group leadership. Precision teaching skills. prereq: [[Completion of [MUS 1151, MUS 1152] or MUS 1155], music therapy major] or instr consent

MUED 5803. Therapeutic Management in Music Settings. (; 4 cr. ; A-F only; Every Fall)
Cognitive behavioral methodology related to music therapy and music education settings. Prepares students to complete case studies mandated for internship completion set forth by American Music Therapy Association. prereq: [5804, 5805] or instr consent

MUED 5804. Music Therapy Methods and Procedures I. (; 4 cr. ; A-F or Audit; Every Fall)
Methods/procedures for developing basic music therapy competencies/professionalism. Music therapy populations, their clinical needs. How to use music therapy in an evidence-based approach to meet client objectives. prereq: 5800 or instr consent

MUED 5805. Music Therapy Methods and Procedures II. (; 4 cr. ; A-F only; Every Spring)
Second course in professional sequence for music therapy. Topics include psychotherapy techniques and other music therapy approaches. Practicum in the community, in-class lab. prereq: 5804 or instr consent

MUED 5806. Career Preparation. (; 4 cr. ; A-F or Audit; Every Spring)
Ethics, grant writing, resume/CV preparation, supervision, board certification, professional responsibilities. Students design evidence-/research-based music therapy program, present their proposals to class/community. prereq: 5805 or instr consent

MUED 5807. Psychiatric Music Therapy. (; 3-4 cr. ; A-F only; Every Fall)
Psychiatric populations. How music therapy can be implemented as evidence-based practice. Students design original research and role-play music therapy interventions for psychiatric populations. Practicum component on designing music therapy interventions. Graduate students registering for this course should enroll for 4 credits. Undergraduate students registering for this course should enroll for 3 credits. prereq: Grad music therapy student or instr consent

MUED 5808. Medical Music Therapy. (; 3-4 cr. ; A-F only; Every Spring)
Role/scope of music therapy in medical treatment. Medical diagnoses. How to program appropriate music therapy interventions to address patient needs. prereq: Grad music therapy major or instr consent

MUED 5855. Music Therapy Internship. (; 1-13 cr. ; S-N or Audit; Every Fall & Spring)
Six-month resident internship in music therapy at an affiliated, approved hospital or clinic. prereq: Music therapy major, instr consent

MUED 5991. Independent Study. (; 1-4 cr. [max 8 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Independent study project organized by the student in consultation with the appropriate instructor. prereq: Music ed or music therapy major or grad, instr consent, dept consent

MUED 8112. Introduction to Research Methods and Design in Arts Education. (; 3 cr. ; A-F or Audit; Fall Odd, Spring Even Year)
Methods and research designs employed in investigating education issues in the arts. Reporting results. Proposal development. Bibliographic skills for conducting a review of related research literature. Common analytical techniques. prereq: Grad student in [music or music education], dept consent

MUED 8115. Assessment in Arts Education. (; 3 cr. ; A-F or Audit; Fall Odd, Spring Even Year)
Methods for assessing unique challenges in artistic achievement: performances, products, and other artistic achievements. Assessment design. Interpretation for large-/small-scale assessments in performance, classroom, and clinical settings. prereq: Grad student in [music or music education], dept consent

MUED 8118. Qualitative Research in Arts Education. (; 3 cr. ; A-F or Audit; Fall Even, Spring Odd Year)
A theoretical, practical and systematic approach to qualitative research in arts education. Students participate in a joint field exploration or work in a setting relevant to their long-term research interests. prereq: Grad student in [arts or education], dept consent

MUED 8119. Advanced Applications of Research Methods. (; 3 cr. ; A-F only; Spring Even Year)
Application of research methods/design. Emphasizes both quantitative and qualitative methods. Contemporary procedures/theories of data collection, management, analysis, and interpretation. prereq: Grad music education student or instr consent

MUED 8210. Advanced Music Teaching Seminar. (3 cr. ; A-F only; Spring Odd Year)
Designed to address the needs of music teachers in a variety of contexts, students will explore topics in advanced music teaching pedagogy including: frameworks for teaching, assessment practices in music settings, advanced delivery skills, addressing diversity, equity, and access in music settings, and other topics as determined by the needs of the students. Focus will be promising practices with immediate application in the music classroom. prereq: Grad student in music education or with music teaching license, other graduate students with permission of instructor

MUED 8211. Foundations of Music Education. (; 3 cr. ; A-F or Audit; Every Fall & Summer)
Major historical, philosophical, sociological, and psychological foundations of music education. Primary literature in the field. Role and current state of music education. prereq: Grad student in [music or music education] or instr consent

MUED 8212. Curriculum Design in Music Education. (3 cr. ; A-F only; Every Fall & Spring)
Examine/critically analyze curricular models from multiple perspectives, consider influence on music teaching/learning. Design/construct curricula with view towards promoting musical growth. prereq: Grad student in music education or instr consent

MUED 8280. Seminar: Current Trends in Music Education. (; 3 cr. [max 30 cr.] ; A-F only; Periodic Fall, Spring & Summer)
Current issues/trends in music education: philosophical, historical, psychological, and pedagogical. Course's focus varies, reflecting the dynamic nature of the field. prereq: dept consent

MUED 8284. Seminar: Research and Scholarly Issues. (; 3 cr. ; A-F or Audit; Spring Even Year)
Scholarly/professional expectations of music educators and music therapists in academia and other positions of leadership. Writing for a variety of professional purposes/publications. prereq: Doctoral student in music or music education or instr consent

MUED 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

MUED 8809. Advanced Music Therapy Competencies. (3-4 cr. [max 8 cr.] ; A-F only; Fall Even Year)
Entry to the music therapy profession requires basic competencies that are acquired through undergraduate music therapy coursework. This course is designed to provide graduate music therapy students with advanced music therapy competencies related to ethics, supervision, diversity, social justice, counseling, and higher education in a seminar style format. prereq: Music Therapy 4th-year undergraduates with instructor consent; Music Therapy MA or PhD

MUED 8810. Music Therapy Research. (3-4 cr. [max 8 cr.] ; A-F only; Spring Odd Year)
This course is a graduate level course designed to provide music therapy students with advanced music therapy competencies using a variety of paradigms, data types, and modes of inquiry. This class will emphasize research reporting guidelines as care-related decisions are increasingly being made based upon the quality of the evidence. prereq: 4th year music therapy undergraduate student (with instructor consent), Music Therapy MA or PhD, or PhD-level music education student.

MUED 8880. Master's Research Project. (3-6 cr. [max 12 cr.] ; A-F only; Every Fall, Spring & Summer)
Individual projects for MM in Music Education emphases (Research/Pedagogical). prereq: Grad music ed major, instr consent

MUED 8900. Seminar: Music Education Doctoral Seminar. (; 1 cr. [max 8 cr.] ; A-F only; Every Fall & Spring)
Research-oriented collaboration between students and faculty. Models the manner in which research is conceived, primary literature evaluated, methods designed, and research projects carried through to completion. prereq: dept consent

MUED 8994. Directed Research. (; 1-8 cr. ; A-F or Audit; Every Fall, Spring & Summer)
tbd prereq: instr consent

Nanoparticle Science and Eng (NPSE)

NPSE 8001. Introduction to Nanoparticle Science and Engineering. (; 3 cr. ; A-F or Audit;)
A broad, interdisciplinary overview of the emerging field of nanoparticle science and engineering. This introductory course, designed for students with diverse backgrounds in science and engineering, covers a wide spectrum of topics--from the synthesis of nanoparticles, to nanoparticle growth and transport, to characterization methods for nanoparticles, to novel nanoparticle-based materials and devices.

NPSE 8002. Nanoparticle Science and Engineering Laboratory. (; 3 cr. ; A-F or Audit; Periodic Summer)
Practical exposure to computational and experimental techniques in nanoparticle research. Required for Ph.D. students minoring in nanoparticle science and engineering. prereq: 8001, [CSE grad student or instr consent

NPSE 8101. Nanoparticle Science and Engineering Seminar. (; 1 cr. ; S-N or Audit; Every Fall & Spring)
Broad overview of current research in nanoparticle science and engineering. Topics include areas of nanoparticle synthesis, nanoparticles characterization, nanoparticle-based materials and devices, environmental impact of nanoparticles, and instrumentation for nanoparticle research. Speakers from the University of Minnesota as well as external experts. prereq: CSE grad student or

Natural Resources Sci and Mgmt (NR)

NR 5021. Statistics for Agricultural and Natural Resource Professionals. (; 3 cr. ; Student Option; Every Spring)
This course is designed for graduate students in the agricultural, environmental, natural resources, and other related programs that require an understanding of statistics and applied quantitative research. Course content focuses on data analysis approaches using common statistical methods, e.g., probability and distributions, simple linear, multiple, and logistic regression, linear models, and analysis of variance. This course is completely online and asynchronous. prereq: College algebra or instructor consent

NR 8100. Topics in Natural Resources Science and Management. (; 1-2 cr. ; S-N only; Periodic Fall & Spring)
Topics course for NRSM

NR 8101. Natural Resources Science and Management Orientation. (1 cr. ; A-F only; Every Fall)
All incoming Natural Resources Science and Management (NRSM) graduate students are required to complete a one-credit orientation course. Students will become acquainted with the NRSM program and resources available at the graduate program, College, and University level. In addition, students will learn about the motivations and development of the research process and receive grounding in the ethical conduct of research.

NR 8107. Seminar: Natural Resources Science and Management. (1 cr. ; Student Option; Every Fall & Spring)
A required seminar designed for M.S. and Ph.D. candidates nearing the end of their degree programs. Topics include science communication, presentation design concepts, and related content. Expect assignments focused on data visualization and communication, student presentations, and presentation reviews.

NR 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

NR 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

NR 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

NR 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

NR 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(no description) prereq: Max 18 cr per semester or summer; 24 cr required. Must be doctoral student with advisor's consent to register.

Neurology (NEUR)

NEUR 5121. Descriptive Neurology. (; 2 cr. ; O-N or Audit; Every Spring)
Central and peripheral nervous system. Correlation of neuroanatomy, neurophysiology, clinical neurology, and pathology of the nervous system. prereq: enrolled OT or PT

NEUR 5230. Cerebrovascular Hemodynamics and Diseases I. (; 4 cr. ; A-F only; Every Fall)
Principles of cerebrovascular disease/ pathophysiology, hemodynamics, diagnostic imaging, and endovacular devices. Bench-to-bedside experiments. Clinical trials, including design constraints and biostatistics. prereq: [[PHSL 3051 or PHSL 3063], [MATH 1271 or MATH 1371], [MATH 1272 or MATH 1372], [PHYS 1201W or PHYS 1301W], instr consent] or [grad student, [PHSL 5061 or instr consent]]

NEUR 7120. Neurology Research. (; 2-8 cr. ; H-N only; Every Fall, Spring & Summer)
Students are eligible to participate in clinical or basic science research programs conducted by members of the Department of Neurology at the Fairview-University Medical Center or affiliated hospitals. The specific nature of the project is decided upon by the student and the faculty member. The student is responsible for making their own arrangements with the faculty member.

NEUR 7124. Sleep Disorders. (2 cr. ; H-N only; Every Fall, Spring & Summer)
Students will rotate with sleep medicine physicians at one of two sites.

NEUR 7300. Interventional Neurology Elective. (2-4 cr. ; H-N only; Every Fall, Spring & Summer)
Rotation with the interventional neurology team: observe procedures, see patients in

clinic, participate in research projects. Prereq 7510.

NEUR 7510. Neurology Externship. (; 4 cr. ; P-N only; Every Fall, Spring & Summer)
This required 4-week clerkship offers students the opportunity to work directly with neurologists in inpatient and outpatient settings.

NEUR 7511. Essentials of Clinical Neurology. (2 cr. ; P-N only; Every Fall, Spring & Summer)
The goals of the neurology clerkship are to increase clinical skills in diagnosing and treating neurologic illnesses, to stimulate interest in clinical neurosciences, and to increase awareness of the role of the neurologist. Upon completion of the course, the student will be familiar with common neurological disorders and will have a sense for when neurologic consultation is appropriate.

NEUR 7512. Neurology Apprenticeship. (2 cr. ; P-N only; Every Fall, Spring & Summer)
he goals of the neurology clerkship are to increase clinical skills in diagnosing and treating neurologic illnesses, to stimulate interest in clinical neurosciences, and to increase awareness of the role of the neurologist. Upon completion of the course, the student will be familiar with common neurological disorders and will have a sense for when neurologic consultation is appropriate.

NEUR 7520. Pediatric Neurology Elective. (2-4 cr. ; H-N only; Every Fall, Spring & Summer)
This elective for third- and fourth- year medical students will offer a chance to interact with Child Neurologists with varying focuses of practice including developmental, neuromuscular, movement, epilepsy, and miscellaneous neuro-genetic and neuro-metabolic disorders. Students will be involved in both the inpatient and outpatient aspects concurrently.

NEUR 7542. Pediatric Neurology. (; 4 cr. ; H-N or Audit; Every Fall & Spring)
Successful completion of this rotation satisfies the neurology requirement (Neur 7-510). Pediatric neurology patients have a variety of problems ranging from coma, muscular dystrophy, epilepsy to learning disabilities; from inborn errors of metabolism, metabolic neurologic dysfunction to behavior disorders. Patients are seen both on service and in consultation in the hospital and in the outpatient clinic which meets three times weekly. Students will function as part of the group of physicians who evaluate and suggest therapy for these children. There will be close supervision and tutorial sessions with the senior pediatric neurology fellows as well as scheduled rounds with pediatric neurology staff members at least three times weekly. There is no night call, routinely. A teaching conference is held weekly and students are encouraged to participate during the rotation.

NEUR 7545. Neuromuscular Diseases. (; 2-4 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Students participate in all aspects of diagnosis/management of patients with neuromuscular disease. Rotation includes neuromuscular and Muscular Dystrophy Association clinics, clinical electrophysiology laboratory evaluations of patients, nerve/ muscle biopsy histological interpretation, and clinic/electromyography conferences. Diseases seen include carpal tunnel syndrome, radiculopathies, polyneuropathies, muscular dystrophy, amyotrophic lateral sclerosis, myasthenia gravis. Molecular basis of inherited neuromuscular disease. Students may participate in clinical research projects.

NEUR 7565. Neurology Subspecialty Elective. (; 2 cr. [max 4 cr.] ; H-N only; Every Fall, Spring & Summer)
The student will be exposed to a variety of neurological subspecialty outpatient clinics. This elective is intended as an opportunity to gain greater familiarity with neurological clinical findings and management of common neurological problems. Course coordinator will discuss areas of student interest and help coordinate a schedule from among the available subspecialties.

NEUR 7599. Acting Intern Neurology. (; 2-4 cr. ; H-N only; Every Fall, Spring & Summer)
This hospital-based course is designed for students with special interest in the clinical and basic neurosciences who desire additional experience in clinical neurology. The majority of the subintern's time is spent performing inpatient consultations under the supervision of a senior resident and/or staff neurologist. Students are able to attend conference with the neurology residents. This course is designed primarily for students considering a career in neurology. prereq: NEUR 7511 plus 2 additional non-research neurology credits or NEUR 7510

NEUR 7600. Epilepsy Diagnosis and Treatment. (; 2 cr. ; H-N only; Every Fall, Spring & Summer)
The student works with an epileptologist in inpatient/outpatient settings. Emphasis is on learning diagnosis, pharmacological and surgical treatment, and the social and psychological consequences to care for the needs of epilepsy patients.

NEUR 7910. Neurology Medical Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Neurology medical residency.

NEUR 7930. Neurology Medical Fellowship. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Neurology medical fellowship.

NEUR 8201. Clinical Pediatric Neurology. (; 1-15 cr. ; Student Option;)

Neuroscience (NSC)

NSC 5031W. Perception. (WI; 3 cr. ; Student Option; Periodic Fall)
Cognitive, computational, and neuroscience perspectives on visual perception. Color vision, pattern vision, image formation in eye, object recognition, reading, impaired vision. Course is biennial: offered fall of odd years. prereq: Psy 3031 or Psy 3051 or instr consent

NSC 5040. Brain Networks: From Connectivity to Dynamics. (; 4 cr. ; A-F or Audit; Fall Odd Year)
Brain networks. Application of emerging science of complex networks to studies of the brain. Network approaches that provide fundamental insights into the integrative nature of brain function and its relation to the brain structure. Organization of brain networks and dynamics at multiple spatial scales, ranging from the microscale of single neurons and synapses, to mesoscale of anatomical cell groupings and their projections, and to the macroscale of brain regions and pathways. Experimental studies, including electrophysiology, voltage-sensitive dye imaging, electroencephalography, magnetoencephalography, and functional magnetic resonance imaging, that allow mapping network elements and structural/ functional connectivity between them at different temporal and spatial scales will be considered. Experimental/theoretical perspectives.

NSC 5202. Theoretical Neuroscience: Systems and Information Processing. (; 3 cr. ; Student Option; Every Spring)
Concepts of computational/theoretical neuroscience. Distributed representations and information theory. Methods for single-cell modeling, including compartmental/integrate-and-fire models. Learning rules, including supervised, unsupervised, and reinforcement learning models. Specific systems models from current theoretical neuroscience literature. Lecture/discussion. Readings from current scientific literature. prereq: [3101, 3102W] recommended

NSC 5203. Basic and Clinical Vision Science. (; 3 cr. ; Student Option; Spring Even Year)
Basic and clinical vision science. prereq: instr consent

NSC 5461. Cellular and Molecular Neuroscience. (; 3 cr. [max 4 cr.] ; A-F or Audit; Every Fall)
Lectures by team of faculty, problem sets in important physiological concepts, discussion of original research papers. prereq: NSc grad student or instr consent

NSC 5462. Neuroscience Principles of Drug Abuse. (; 2 cr. ; Student Option; Periodic Spring)
Current research on drugs of abuse, their mechanisms of action, characteristics shared by various agents, and neural systems affected by them. Offered biennially, spring semester of even-numbered years. prereq: instr consent

NSC 5540. Survey of Biomedical Neuroscience. (2 cr. ; A-F or Audit; Every Summer)
Current topics in biomedical neuroscience, accompanied by supporting, fundamental concepts. Intensive, one week course. prereq: instr consent, intended for members of biomedical community or students with advanced scientific backgrounds

NSC 5551. Itasca Cell and Molecular Neurobiology Laboratory. (; 4 cr. ; S-N or Audit; Every Summer)
Intensive lab introduction to cellular and molecular aspects of research techniques in contemporary neurobiology; held at Itasca Biological Station. Electrophysiological investigations of neuronal properties, neuropharmacological assays of transmitter action, and immunohistochemical studies in experimental preparations. prereq: Neuroscience grad or instr consent

NSC 5561. Systems Neuroscience. (; 4 cr. ; A-F or Audit; Every Fall)
Principles of organization of neural systems forming the basis for sensation/movement. Sensory-motor/neural-endocrine integration. Relationships between structure and function in nervous system. Team taught. Lecture, laboratory. prereq: NSc grad student or instr consent

NSC 5661. Behavioral Neuroscience. (; 3 cr. [max 4 cr.] ; A-F or Audit; Every Spring)
Neural coding/representation of movement parameters. Neural mechanisms underlying higher order processes such as memorization, memory scanning, and mental rotation. Emphasizes experimental psychological studies in human subjects, single cell recording experiments in subhuman primates, and artificial neural network modeling. prereq: Grad NSc major or grad NSc minor or instr consent

NSC 8014. Small RNA Biology. (; 2 cr. ; A-F or Audit; Every Spring)
Small RNAs as major regulators of gene/protein expression. MicroRNAs and their potential use in diagnosis/prognosis of various disease conditions, including cancers. Small RNAs and their role in health and disease. prereq: BIOC 8002 or MICA 8004 or equiv or instr consent

NSC 8026. Neuro-Immune Interactions. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Regulatory systems (neuroendocrine, cytokine, and autonomic nervous systems) linking brain and immune systems in brain-immune axis. Functional effects of bidirectional brain-immune regulation. Course is offered fall of even-numbered years. prereq: 5561, MicB 4131

NSC 8041. Cognitive Neuroscience. (; 4 cr. ; A-F only; Every Fall)
Relations between brain activity and cognitive function in mammals. Working memory, attention, decision processing, executive function, categorization, planning, sequence processing. Behavioral/physiological perspectives. Disruption of cognitive function following brain damage. Extracellular recording of single neuron activity in nonhuman primates. Functional neuroimaging/magnetoencephalography in humans. prereq: instr consent

NSC 8111. Quantitative Neuroscience. (3 cr. ; A-F or Audit; Every Fall)
Principles of experimental design and statistical analysis in neuroscience research. Includes an introduction to computer programming for data analysis using both classic and modern quantitative methods.

NSC 8207. Seminar: Psychopharmacology. (; 1-3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Faculty and postdoctoral fellows interested in psychotropic drugs and chemicals participate. Some seminars devoted to biomedical ethics. Neurochemistry, pharmacology, and behavior as antecedent or consequential variables. prereq: instr consent

NSC 8208. Neuropsychopharmacology. (; 3 cr. ; A-F or Audit; Fall Even Year)
Methodologies to study relationships between drugs and biochemical, behavioral, and neurophysiological consequences. Functional biogenic amine, peptidergic, other pathways. How manipulations alter neuronal function or behavior. Feedback mechanisms, induction, inhibition. Reinforcement of, tolerance to, or dependence on drugs of abuse: stimulants, hallucinogens, depressants, opiates. Student presentations. prereq: [5212, 6112, PSY 5021, PSY 5061] or instr consent

NSC 8211. Developmental Neurobiology. (; 4 cr. ; A-F or Audit; Every Spring)
How neuronal types develop. Emphasizes general mechanisms. Experimental data demonstrating mechanisms. prereq: Neuroscience grad student or instr consent

NSC 8216. Selected Topics in Autonomic and Neuroendocrine Regulation. (; 1 cr. ; S-N or Audit; Every Fall & Spring)
Advanced seminar. Course is offered fall and spring semesters. prereq: instr consent

NSC 8217. Systems and Computational Neuroscience. (; 2 cr. ; S-N or Audit; Every Fall & Spring)
Advanced seminar. prereq: 5561 or instr consent

NSC 8221. Neurobiology of Pain and Analgesia. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Pain and analgesia. Course is triennial. prereq: instr consent

NSC 8222. Central Regulation of Autonomic Function. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Neural/hormonal sensory pathways affecting central autonomic nuclei involved in maintenance of homeostasis. Current research on physiological control systems at cellular, organ, and integrative levels. Course is offered fall of odd-numbered years. prereq: 5561

NSC 8247. Anatomy and Physiology of Hearing and Balance. (; 3 cr. ; Student Option; Every Spring)
Structure/function of auditory/vestibular systems. Network analysis of middle/inner ear mechanics, hair cell biophysics, auditory nerve/CNS electrophysiology, information processing, neural mechanisms subserving balance/gaze, cellular morphology, and computer models.

NSC 8248. Directed Readings in Auditory Physiology. (; 1-2 cr. ; Student Option; Every Fall & Spring)
Current research on biophysics and physiology of auditory system; topics selected for each student. Written reviews prepared and discussed.

NSC 8320. Readings in Neurobiology. (; 1-4 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
Topics in neurobiology and neurophysiology.

NSC 8321. Career Skills and Understanding Responsibilities as a Neuroscientist. (; 0.5 cr. [max 2 cr.] ; S-N or Audit; Every Fall & Spring)
Information that falls outside of core neuroscience academic curriculum. Areas of practical value for graduate school and career development. Career skills, writing skills, responsible conduct in research. prereq: Neurscience grad major or instr consent

NSC 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall & Summer)
FTE: Master's prereq: Master's student, adviser approval

NSC 8334. Laboratory Neuroscience. (; 1-3 cr. [max 10 cr.] ; S-N or Audit; Every Fall & Spring)
Guided research. prereq: Grad NSc major

NSC 8411. Teaching in Neuroscience. (; 1 cr. [max 4 cr.] ; S-N or Audit; Periodic Spring)
Grad students serve as primary instructors in 4151 and work with fellow students and faculty mentors to design curriculum, classroom sessions, exams, and course evaluations. prereq: instr approval

NSC 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

NSC 8481. Advanced Neuropharmaceutics. (; 4 cr. ; A-F or Audit; Fall Even Year)
Delivery of compounds to central nervous system (CNS) to activate proteins in specific brain regions for therapeutic benefit. Pharmaceutical/pharmacological issues specific to direct drug delivery to CNS. prereq: instr consent

NSC 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Doctoral Pre-Thesis Credits prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

NSC 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall & Summer)
Thesis Credits: Master's

NSC 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Neuroscience Department (NSCI)

NSCI 5101. Neurobiology I: Molecules, Cells, and Systems. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
This course discusses the basic principles of cellular and molecular neurobiology and

nervous systems. The main topics include: Organization of simple networks, neural systems and behavior; how the brain develops and the physiology and communication of neurons and glia; the molecular and genetic basis of cell organization; ion channel structure and function; the molecular basis of synaptic receptors; transduction mechanisms and second messengers; intracellular regulation of calcium; neurotransmitter systems, including excitation and inhibition, neuromodulation, system regulation and the cellular basis of learning, memory and cognition. The course is intended for students majoring in neuroscience, but is open to all students with the required prerequisites.

NSCI 5110. Dental Neuroscience for Graduate Students. (; 2 cr. ; A-F or Audit; Every Spring)
Structure/function of human nervous system. Lectures and reading assignments emphasize topics pertinent to dentistry. prereq: Credit will not be granted if credit has been received for: : 6110; BioC 3021, Biol 4004, instr consent; intended for grad students who require a comprehensive grad-level neuroscience course

NSCI 5111. Medical Neuroscience for Graduate Students. (; 5 cr. ; A-F or Audit; Every Spring)
Survey of molecular, cellular, and systems neuroscience as related to medicine. Lecture/lab. prereq: Credit will not be granted if credit has been received for: : 6111; BioC 3021, Biol 4004, instr consent; intended for grad students who require a comprehensive medically-oriented neuroscience course

NSCI 5501. Neurodegenerative Diseases, Mechanisms to Therapies. (3 cr. ; A-F only; Every Fall)
With a rapid increase in population aging in western educated industrialized rich democratic (WEIRD) societies, neurodegenerative disorders such as Alzheimer?s disease have become an alarming health priority due to the current absence of disease-modifying therapies. The objective of this course is to acquire a fundamental appreciation for the most common degenerative disorders of the nervous system as well as to integrate central notions shared across these diseases and emerging concepts in the field.

NSCI 5551. Statistical Foundations of Systems Neuroscience. (3 cr. ; A-F only; Spring Even Year)
The purpose of this course is to provide the student with a familiarity with the mathematical and statistical techniques to practice contemporary systems neuroscience. Topics are chosen with a focus on current areas of active research, as well as problems that have driven the field over the past twenty years. The class will combine lectures with discussions of important systems neuroscience papers, and will move at a fast pace. It is intended for graduate students and ambitious undergraduates. One major difference between this course and other math and statistics courses is the focus on systems neuroscience. Our examples will come from the Systems Neuroscience field. Our research priorities will come from Systems Neuroscience and our Friday paper discussions will draw exclusively from scholarly papers in Systems Neuroscience.

NSCI 5916. BrainU 101: Neuroscience in the Classroom. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Four-weekend workshop. Concepts in neuroscience. Neurobiology of learning. Effects of drugs. Lectures, activities, discussion, designing investigations. In 2009-10, held in Winona. In 2010-11, held in Duluth. prereq: instr consent; intended for high school teachers

NSCI 6110. Neuroscience for Dental Students. (; 2 cr. ; A-F or Audit; Every Spring)
Structure/function of the human nervous system. Lectures, reading assignments. prereq: Credit will not be granted if credit has been received for: : 5110; Dental student

NSCI 6111. Medical Neuroscience. (; 5 cr. ; Student Option; Every Spring)
Survey of molecular, cellular, systems neuroscience as related to medicine. Lecture/lab. prereq: med student

NSCI 6112. Medical Neuroscience for Professional Students. (; 5 cr. ; Student Option; Every Spring)
Molecular, cellular, and systems neuroscience as related to medicine. Lecture, lab. prereq: BioC 3021, Biol 4004, instr consent; intended for non-medical professional students

Neurosurgery (NSU)

NSU 5667. Neurobiology of Disease. (; 2-3 cr. ; Student Option; Every Fall)
Basic clinical/pathological features, pathogenic mechanisms. Weekly seminar.

NSU 7200. Surgical Specialty: Neurosurgery. (; 2 cr. [max 4 cr.] ; P-N only; Every Fall, Spring & Summer)
During the course, the student will evaluate patients in the outpatient clinic. Students will learn about basic disease processes and are encouraged to spend time in the operating room observing neurosurgical procedures. Medical students will also participate in daily teaching rounds and should attend most regularly scheduled conferences held within the department.

NSU 7400. Surgical Specialty: Neurosurgery Elective, Duluth. (; 2-4 cr. ; H-N or Audit; Periodic Fall & Spring)
Students evaluate patients in outpatient clinic. Basic disease processes. Students spend time in operating room, observing neurosurgical procedures, and in emergency room, inpatient setting, pain clinic, inpatient setting, and office practice.

NSU 7500. Acting Internship Neurosurgery. (; 4 cr. [max 8 cr.] ; H-N only; Every Fall, Spring & Summer)
Student will be an integral part of the neurosurgical team, participating closely with the other house staff in patient care and decision-making processes. An important aspect of the acting internship will be the opportunity to see neurosurgical procedures in correlation with the patients for whom the student is caring. In addition, regular teaching sessions and conferences will be held with the neurology and neurosurgical staff. During the final week of the rotation the student will be expected to do independent study on a topic and present this to the neurosurgical team.

NSU 7510. Externship at the VA Medical Center. (; 2-6 cr. ; H-N or Audit; Every Fall, Spring & Summer)
During this externship, the student attends daily ward rounds and participates in the evaluation and treatment in the outpatient department. Each student is expected to attend neurosurgical, neuroradiological and neuropathology weekly conferences.

NSU 7910. Neurosurgery Medical Residency. (; 6 cr. [max 150 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Neurosurgery medical residency.

NSU 7930. Neurosurgery Medical Fellowship. (; 6 cr. [max 150 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Neurosurgery medical fellowship.

NSU 8318. Neuroradiological Conference. (; 1 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Neuroradiological conference.

NSU 8320. Neurosurgical Conference. (; 1 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Neurosurgical conference.

NSU 8324. Fundamentals of Neuroscience for Neurosurgery. (1-15 cr. ; S-N only; Every Fall, Spring & Summer)
Provide neuroscience foundation needed for practice of clinical neurosurgery. Prereq 8104, college consent.

Nursing (NURS)

NURS 5011. Interprofessional Diabetes Experience. (; 2 cr. ; A-F only; Every Spring)
Explore diabetes mellitus through active, hands-on learning in an interprofessional environment. Week-long simulated experience of living with diabetes. Online learning activities focused on interprofessional teamwork for optimal care to patients with diabetes. prereq: 2nd or 3rd year in nursing curriculum prereq: 2nd or 3rd year in nursing curriculum

NURS 5016. Critical Reading of Scientific Literature in Adolescent Health. (1 cr. ; Student Option; Every Fall)
Develop skills for critically reading empirical literature within field of adolescent health. Written/oral critiques of core elements of research articles, including literature review, conceptual framework, research questions/hypotheses, methods, results, discussion, conclusions. prereq: [Grad-level research methods course, inferential statistics course] or instr consent

NURS 5029. Introduction to Nursing Interventions. (; 3 cr. ; A-F only; Every Fall)
Introduction to evidence-based interventions for safe, inclusive, and ethical nursing practice.

Active learning activities in laboratory, simulation, are used to build skills to support nursing process.

NURS 5030. Foundational Concepts of Professional Nursing. (; 3 cr. ; A-F or Audit; Every Fall)
Foundation of knowledge for culturally appropriate, ethical, evidence-based nursing practice across the life span. Research/theory that underlie the art/science of professional nursing. Concepts of person, environment, health, and nursing. prereq: Admission to master's in nursing program

NURS 5031. Human Response to Health and Illness: Adults and Elders. (; 4 cr. ; A-F or Audit; Every Spring)
Focus on individual responses to health and illness in the context of families and environments. The clinical component will emphasize the application of the nursing process in adult and older adult populations.

NURS 5032. Human Response to Health and Illness: Children and Childbearing Families. (; 5 cr. ; A-F or Audit; Every Spring)
Focus is on family responses to health and illness. Application of the nursing process in children and childbearing families is emphasized. The family as the unit of care is the focus of a seminar.

NURS 5033. Population-Focused Health in Public Health and Mental Health Nursing. (; 5 cr. ; A-F or Audit; Every Summer)
Focus on population- based public health and mental health nursing practice across the lifespan, with local to global perspectives. Emphasis on health equity, health promotion and levels of disease prevention. Apply theory and research to examine interventions and outcomes.

NURS 5034. Transition to Professional Nursing Practice. (3 cr. ; A-F or Audit; Every Fall)
Critical analysis of issues affecting the transition to professional nursing practice including those related to the quality of healthcare, quality improvement, and the ability of nurses to improve patient outcomes across settings. prereq: Nurs 5033, Nurs 6200

NURS 5035. Practicum Nursing Care for Complex Health Conditions. (4 cr. ; A-F or Audit; Every Fall)
Clinical decision-making, comprehensive nursing care of clients with complex health problems. In collaboration with a clinical preceptor and a faculty advisor, students develop an individualized learning contract. prereq: Nursing postbaccalaureate certificate program or master of nursing program

NURS 5115. Interprofessional Health Care Informatics. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Implications of informatics for practice, including nursing, public health, and health care in general. Electronic health record issues. Ethical, legislative, political, and global/future informatics issues.

NURS 5116. Consumer Health Informatics. (; 2 cr. ; Student Option No Audit; Every Fall)
This course examines issues from the consumer?s perspective in the acquisition, understanding, or use of health information. Mobile health, telehealth, sensor technology, and internet sources for improving health are examined. The impact on consumer-provider communication and relationships as well as ethical and legal issues are explored. prereq: Grad student or instr consent

NURS 5117. Consumer Health Informatics Practicum. (; 2 cr. ; S-N only; Every Fall)
Students apply consumer health informatics principles, theories, and research to consumer health informatics topics and how technology is used to engage patients, clinicians, and family members in their health care. Specific topics include electronic health literacy, digital/mobile health technologies (health apps), and sensor/remote monitoring. prereq: Graduate student, [Nurs 5116 or &Nurs 5116] or instructor consent

NURS 5190. Essentials of Holistic Health Assessment and Foundational Clinical. (; 3 cr. ; A-F only; Every Fall & Spring)
Introduction to health and physical assessment for safe, culturally sensitive, inclusive, and ethical nursing practice across the life span. Active learning, simulation, and clinical settings are used to develop a holistic approach to nursing process: assessment, diagnosis, outcome, planning, implementation, and evaluation. prereq: Admission to MN Program

NURS 5200. Advanced Holistic Health Assessment for the Advanced Practice Nurse. (; 3 cr. ; A-F only; Every Fall & Summer)
Provides students with advanced holistic health assessment knowledge and skills needed for ANP across the life span. Prepares students to utilize advanced health assessment skills to differentiate between normal, variations of normal and abnormal findings. Integrates Integrates EB data into a comprehensive health assessment. prereq: Admission to advanced practice nursing area of study (DNP or Post-Graduate certificate program), instr consent

NURS 5220. Pharmacotherapeutics for Nurse Anesthesia I. (2 cr. ; A-F only; Every Fall)
Basic overview of the pharmacologic principles for commonly used medication classes specific to acute care and perioperative populations. Includes an overview of each drug class, a review of related physiology, and the pharmacodynamics and pharmacokinetics of drug classes and specific medications.

NURS 5222. Advanced Human Physiology. (; 2 cr. ; A-F or Audit; Every Fall)
This course will use a systems approach to human physiology and physiologic changes across life span. Emphasizes clinical application using population-specific content related to various specialty areas in advanced practice nursing.

NURS 5225. Psychopharmacology Advanced Practice Psychiatric/Mental Health Nursing. (; 3 cr. ; A-F only; Every Fall & Spring)
Advanced concepts in neuroscience, psychopharmacology, and clinical management related to psychopharmacologic treatment of psychiatric disorders/symptoms. Application to problems in various clinical settings. prereq: 5228 or instr consent

NURS 5226. Advanced Human Pathophysiology. (; 2 cr. ; A-F or Audit; Every Spring)
This course will use a systems approach to human pathophysiology across the life span. Emphasizes clinical application using population-specific content related to various specialty areas in advanced practice nursing.

NURS 5227. Pharmacology for Pediatric Nurse Practitioner - Acute Care. (; 2 cr. ; A-F or Audit; Every Summer)
This course is designed to provide students with the knowledge of pharmacodynamics and pharmacokinetics of medications used in the pediatric acute care setting. Content provided in this course will enable the students to select pharmacologic agents safely and appropriately for the management of acute and chronic health care problems of pediatric patients. The course addresses representative drugs of pharmacologic groups, indications for use, drug selection, titration of dose, key adverse effects, drug to drug interactions, and monitoring of therapy.

NURS 5228. Pharmacology for Advanced Practice Nursing. (; 2 cr. ; A-F or Audit; Every Fall)
Overview of pharmacological principles for commonly used medication classes. Each drug class, related physiology. Pharmacodynamics and pharmacokinetics of drug classes and specific medications. prereq: Grad nursing student or instr consent

NURS 5229. Clinical Pharmacotherapeutics. (; 3-4 cr. ; A-F only; Every Spring)
Pharmacokinetics, pharmacodynamics, therapeutic dosages for various age groups. Client patterns of drug use. Prescriptive privileges. Prescription writing for advanced practice nurses. prereq: 5222, [5228 or PHAR 5800], DNP student, instr consent

NURS 5230. Pharmacotherapeutics for Nurse Anesthesia II. (4 cr. ; A-F only; Every Spring)
Reviews basic physics, organic and biochemistry of metabolic processes, pharmacodynamics & pharmacokinetics. Detailed description of anesthetic drugs, physiologic mechanisms, side effects, toxicities, metabolism & elimination as outlined on National Certification Examination. Synthesis of pharmacotherapeutics into nurse anesthesia plan of care.

NURS 5241. Nursing Leadership for Effective Practice. (; 2 cr. [max 3 cr.] ; A-F or Audit; Every Fall)
Analysis of leadership theory and application of leadership skills needed for safe and effective practice as a new graduate nurse. Exploration of system issues affecting nursing practice and patient outcomes. prereq: Final sem of MN Program

NURS 5284. Supporting Physiologic Labor and Childbirth for Nurses. (2 cr. ; S-N only; Every Fall & Spring)
Techniques to provide labor support, discussion about doula role and overlap with nursing support. Emphasizing continuous physical and emotional labor support plus information to enhance physiologic birth. Experience providing labor support to women at a clinical facility included.

NURS 5448. Interprofessional Collaborative Practice in HIV Care. (1 cr. ; A-F only; Every Spring)
This program is designed to provide learners with foundational knowledge of HIV prevention and care and to develop the ability to work as a member of an interprofessional collaborative health care team. Learners will explore options for involvement in HIV care as part of their health care career and will be inspired to lifelong learning related to HIV care and interprofessional collaborative practice.

NURS 5505. Assessment and Support of Individuals in Labor. (2 cr. ; S-N only; Every Spring)
Self-directed study with goal of working with experienced labor nurses/learning knowledge/ skills required to perform labor. Clinical experience. Completion of selected online modules related to nursing care of women in labor. prereq: Admission to DNP Program

NURS 5604. Advanced Health Assessment and Interventions with Adolescents. (; 2 cr. ; Student Option; Every Summer)
Integrates knowledge from nursing, public health, health behavior, and adolescent development as framework for developing health assessment/intervention strategies for clinical practice with adolescents. prereq: CPsy 5303 or equiv or instr consent

NURS 5611. Database Principles for Healthcare. (; 2 cr. ; A-F only; Every Fall)
Principles of database theory, modeling, design, and manipulation of databases will be introduced, taught with a healthcare applications emphasis. Students will be able to critically evaluate database query methods and results, and understand their implications for healthcare. Course Prerequisites: Graduate student or instructor consent

NURS 5726. Sexual Assault Nurse Examiner (SANE) Trauma-Informed Care Clinical Experience. (; 1-2 cr. ; Student Option; Every Fall, Spring & Summer)
Practicum course in which there is supervised application of clinical skills in SANE assessment using a trauma-informed approach. During this course, students will explore the tenets of trauma-informed care and integrate them into their forensic nursing practice and patient encounters during SANE exams.

NURS 5800. Nursing Topics. (; 1-4 cr. [max 16 cr.] ; Student Option; Every Fall, Spring & Summer)
Course allows students to study a topic not included in regular courses, or for faculty to offer a course to determine interest in a topic. prereq: instr consent

NURS 5812. Global Health Through Study Abroad. (; 1-2 cr. ; S-N only; Periodic Spring & Summer)
Nursing as a global profession and the issues that impact health of populations worldwide. prereq: instr consent

NURS 5830. Advanced Clinical Nursing. (; 1-6 cr. ; Student Option; Every Fall, Spring & Summer)
Independent study or faculty seminar on special clinical topic. prereq: Grad nursing major, instr consent

NURS 6102. Family Health Theory. (; 2 cr. ; A-F only; Every Fall)
Emerging theory in family nursing science, related theories. Research on family systems for structuring systemic framework to examine clinical problems related to family health care. Applies family health theories to selected phenomena of interest to health care. prereq: 6200 or instr consent

NURS 6105. Systems Analysis and Design. (; 3 cr. ; A-F or Audit; Every Spring)
Role of informatian in interprofessional team for analysis and design of information systems. Concepts/theories of systems analysis, system life cycle, project management, system requirements, human factors. Evaluation of use of health information systems. prereq: 5115 or equiv or instr consent

NURS 6110. Epidemiology in Nursing. (; 2 cr. ; A-F only; Every Fall & Spring)
For nurses in advanced practice and leadership positions to utilize basic epidemiological principles in assessing determinants of health and their outcomes in populations. Application of epidemiological concepts to nursing.

NURS 6200. Science of Nursing Intervention. (; 3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Examination/application of theories and conceptual frameworks to clinical practice problems. prereq: Admission to MN, DNP, or PhD program

NURS 6210. Midwifery Care of the Childbearing Family. (; 3 cr. ; A-F only; Every Summer)
In this course students will investigate and evaluate evidence-based models of midwifery practice for the management and support of women, individuals seeking midwifery care and their families during labor, birth, the immediate postpartum period, and care of the newborn. prereq: 6305, 6306, 6308, 6925

NURS 6211. Midwifery Care of the Childbearing Family Practicum. (; 2 cr. ; S-N only; Every Summer)
In this course students will implement evidence-based models of midwifery practice in the management and support of women, individuals seeking midwifery care and their families during labor, birth, the immediate postpartum period, and care of the newborn. prereq: 6305, 6306, 6308, 6925

NURS 6213. Reproductive Healthcare for Patients with Complex Conditions. (; 2 cr. ; A-F only; Every Fall)
The course provides an evidence based, theoretical and epidemiologic basis for advanced practice nursing care of patients with complex reproductive health problems requiring multidisciplinary interventions. Selected high-risk gynecologic and perinatal conditions are examined. prereqs: (NM and WHNP) 6305/6306, 6501, 6925; (NM only) 6308, 6210/6211; (WHNP only) 6502, 6926, 6927/6928

NURS 6214. Reproductive Health Care for Patients with Complex Conditions Practicum. (; 2 cr. ; S-N only; Every Fall)
Apply advanced assessment and management skills in the care of patients and infants at risk for medical and/or psychosocial problems and to gain experience in the management of selected high-risk perinatal conditions. prereqs: Nurse-Midwife DNP student, N5222, N5228, N5229, N5200, N6305, N6306, N6308, N6925, N6210, N6211 WHNP DNP Student: N5222, N5228, N5229, N5200, N6305, N6306, N6926, N6925, N6927, N6928

NURS 6302. Racism and Health Disparity Prevention for Midwives. (1 cr. ; A-F only; Every Spring)
This course prepares students to understand the impact of history, societal structure, systems of oppression, power dynamics, and privilege on health care delivery and outcomes, especially in context of pregnancy and reproduction. The course explores the root causes of health disparities in the United States and provides foundational knowledge for clinicians. Students will be able to identify institutional and interpersonal interventions that can be employed to improve health equity.

NURS 6305. Reproductive and Sexual Health Care. (; 3 cr. ; A-F only; Every Fall)
Application of theory and evidence to holistic practice in reproductive and sexual health care. Emphasis is placed on theoretical knowledge and skills related to caring for persons with common reproductive health needs throughout the life cycle. The sociopolitical context of women's lives and those seeking reproductive and sexual health care is integrated throughout. prereq: DNP student, 5200, 5222, 5228, 5229

NURS 6306. Reproductive and Sexual Health Practicum. (; 1 cr. ; S-N only; Every Fall)
This course provides clinical experience in a reproductive and sexual health setting to develop basic skills in providing holistic, safe, and competent care, including history taking, physical examination, and patient education specific to reproductive and sexual health issues across the lifespan. prereq: 5200, 5222, 5228, 5229, 6305 (or concurrent)

NURS 6307. Assessment and Management of Health for APNs Practicum III. (; 1 cr. ; S-N only; Every Summer)
Comprehensive advanced nursing assessment and management for acute and chronic health conditions of the adult primary care population across the life span. Synthesis and application of nursing theory and evidence-based implementation and evaluation of safe and effective therapeutic interventions to promote, maintain, and restore health.

NURS 6308. Women's Primary Care Practicum. (; 1-2 cr. ; S-N only; Every Spring)
Practicum in reproductive/primary health care settings to continue development of basic skills in providing holistic, safe, and competent care, including history taking, physical examination, and patient education specific to reproductive and primary health care issues across the lifespan. prereqs: 5200, 5222, 5228, 5229, 6501, 6305, 6306

NURS 6405. Advanced Practice CNS Roles Across the Lifespan. (; 3 cr. ; A-F only; Every Fall)
Develop expertise and leadership in the clinical nurse specialist roles within the three spheres of influence (patient, nursing, organization), using current evidence. prereq: 5200, 7103, 7900

NURS 6406. Advanced Practice CNS Roles Across the Lifespan: Practicum. (; 1 cr. ; S-N only; Every Fall)
Students analyze/evaluate roles of CNS within three spheres of influence, using current practice standards/research. prereq: 5200, 7103

NURS 6407. Advanced Nursing Care of Older Adults. (; 3 cr. ; A-F only; Every Fall)
Theory/research in promotion, maintenance, and restoration of the health of older adults within the context of their families and different care settings. Independent/collaborative roles of the advanced practice nurse in different settings. prereq: [5200, 5222, 5224, 5228, 6500, 6501, 7504, 7505] or instr consent

NURS 6408. Advanced Nursing Care of Older Adults Practicum. (; 1-2 cr. ; S-N only; Every Fall)
Application of theory and evidence-based knowledge for advanced practice nursing students to develop skill in assessing and managing health issues commonly experienced by older adults in a variety of care settings. prereq: [5200, 5222, 5224, 5228, 6500, 6501, 7504, 7505] or instr consent

NURS 6501. Assessment and Management of Health for Advanced Practice Nurses, I. (; 3 cr. ; A-F only; Every Fall)
Advanced practice nursing. Health promotion and data-based assessment/management of common acute and stable chronic conditions for the primary care populations. Role of the advanced practice nurse, process of clinical reasoning and decision-making, and independent and collaborative practice health care plans, utilizing evidence-based practice. prereq: DNP student or instr consent

NURS 6502. Assessment and Management of Health for Advanced Practice Nurses, II. (; 2-3 cr. ; A-F only; Every Spring)
Advanced practice nursing. Health promotion and data-based assessment/management of patient's acute and chronic health conditions. Physical, psychosocial, and pharmacological intervention. Age-related variation. prereq: Nurs 5228

NURS 6504. Assessing, Managing Psychiatric Disorders in Adv Practice Psychiatric-Mental Health Nursing. (; 2 cr. ; A-F only; Every Spring)
Apply advanced concepts from nursing theory and research, social sciences, neuropsychology, and neurophysiology in the differentiation and explanation of psychiatric symptoms and disorders across the age continuum.

NURS 6505. PMH/APN Prac II:Assessing, Managing Psychiatric Disorders in Adv Prac Psychiatric-Mental Health Nurs. (; 2 cr. ; S-N only; Every Spring)
Diagnostic interviewing skills to conduct a comprehensive psychiatric assessment for patients across the lifespan. In collaboration with an interdisciplinary team and patient, students develop an initial evidence-based, integrative treatment plan. prereq: 5200, 5222, 5224, 5228, 6604, 6605, CSH 5101, concurrent registration is required (or allowed) in 6404

NURS 6519. Advanced Pediatric Assessment. (; 1 cr. ; A-F only; Every Fall)
Students develop the advanced pediatric health assessment knowledge and skills needed for the pediatric nurse practitioner/pediatric clinical nurse specialist. Selected nursing interventions and integrative therapies are examined for their application to the pediatric population. Prerequisites: NURS 5200 Holistic Health Assessment & Therapeutics for APNs; NURS 5222 Advanced Physiology; NURS 5229 Clinical Pharmacotherapeutics or Instructor Consent

NURS 6600. Health Systems and Care Models. (; 3 cr. ; A-F only; Every Spring)
Current/emerging care delivery systems and nursing models are analyzed as to how they meet dynamic, social, economic, technological, political trends. Impact of disruptive technologies, business models, value networks, designing better models.

NURS 6602. PMH Advanced Practice Nursing: Group as a Health Care Intervention. (2 cr. ; A-F only; Every Fall)
Theoretical concepts/research findings from areas of group theory, group dynamics, group therapy applied in development of model for utilizing group as intervention for various client populations. prereq: 6802, 6803, concurrent registration is required (or allowed) in 6603

NURS 6603. PMH APN Practicum IV: Group as a Health Care Intervention. (; 2 cr. ; S-N only; Every Fall)
Develop new competencies in conducting group therapy. Diagnostic interviewing/ assessment skills. Evidence-based management plans with individuals/families at risk of psychiatric disorders/mental health problems. prereq: concurrent registration is required (or allowed) in 6602, 6802, 6803

NURS 6604. Foundations for Integrative Mental Health and Psychiatric Advanced Practice Nursing. (; 2 cr. ; A-F only; Every Fall)
Examine concepts, theories, and paradigms foundational to psychiatric and mental health nursing practice and inter-professional integrative mental health care. Develop clinical interviewing methods that elicit a client?s health narrative and facilitate the therapeutic relationship. Promotes beginning skill in reflective clinical practice. prereq: concurrent registration is required (or allowed) in 6605, 5200, 5222, 5226, 5228, 5229, CSH 5101

NURS 6605. Psychiatric/Mental Health Advanced Nursing Practice Practicum I. (1 cr. ; S-N only; Every Fall)
First clinical course in advanced practice psychiatric/mental health nursing. Mental health promotion/mental illness risk reduction. Clinical interviewing, holistic health assessment, integrative mental health care management. prereq: concurrent registration is required (or allowed) in 6604, 5200, 5222, 5228, 5229, CSH 5101

NURS 6702. Nursing Leadership Seminar: Introduction to Innovation and Leadership. (; 3 cr. ; A-F only; Every Fall)
Leadership models and recommended competencies in context of current trends. Applying design thinking/insights from nursing leaders. Innovation and expansion of nursing leadership into new settings and roles.

NURS 6703. Nursing Leadership Seminar: Organizational Culture and Leadership. (; 2 cr. ; A-F only; Every Spring)
Evaluate the evidence base for nurse executive practices and the relationships between leadership and organizational culture and performance. prereq: Grad student or instr consent

NURS 6704. Nursing Leadership Practicum: Organizational Culture and Leadership. (; 1-2 cr. ; S-N only; Every Spring)
Implement evidence-based models through projects with preceptor in area of organizational environment and culture through experiential activities, including conferences, intensive clinical experiences, clinical conferences, and simulation. prereq: concurrent registration is required (or allowed) in 6703

NURS 6705. Nursing Leadership Seminar: Quality and Change Management. (2 cr. ; A-F only; Every Fall)
Comprehensive background in the science of patient safety, quality improvement, error management, and change implementation. prereq: [6702, 6703] or instr consent, concurrent registration is required (or allowed) in 6704

NURS 6706. Nursing Leadership Practicum: Quality and Change Management. (; 1-2 cr. ; S-N only; Every Fall)
Gain experience in implementing evidence-based model of change related to safety promotion, quality improvement, or error management in collaboration with preceptor or designee. prereq: 6705

NURS 6707. Health Care Design and Innovation Practicum. (; 2 cr. ; S-N only; Every Fall & Spring)
Synthesis, reflection, and evaluation of learning from courses in the health innovation leadership and design curriculum to identify gaps in knowledge and developmental practicum needs related to leadership in health care innovation and design. prereq: Students in Health Care Design and Innovation certificate program or DNP students who have completed Nurs 7610, CSpH 5711, HUMF 5874.

NURS 6802. Psychiatric/Mental Health Advance Practice Nursing: Psychotherapy with Individuals and Families. (; 2 cr. ; A-F only; Every Summer)
Evaluate selected theories/models, research, clinical evidence, therapeutic use of self for developing/implementing psychotherapeutic interventions used to promote mental health/ assist individuals. prereq: 6102, 6604, 6605

NURS 6803. Psychiatric/Mental Health Adv Prac Nurs Practicum III: Psychotherapy With Individuals,Families. (; 1 cr. ; S-N only; Every Summer)
Theories, research, clinical evidence. Psychotherapeutic interventions/therapeutic use of self to promote mental health/advance treatment, management, recovery from bio/ psycho/social sequelae of psychiatric illnesses. prereq: concurrent registration is required (or allowed) in 6802, 6102, 6504, 6505

NURS 6881. Introduction to Public Health Informatics and Information Systems. (; 2 cr. ; A-F only; Every Fall)
Public Health is an information-intense enterprise. Surveillance systems provide information on infectious disease tracking, disease clusters, food-borne outbreaks, and injuries. Registries in public health contain information on vital statistics such as birth, death, cancer, and immunizations. Introduction to Public Health Informatics describes these public health information systems, their role in providing data for decision-making and addressing inequities in health. Key issues in managing this information effectively, such as data analytics, decision support, data standards, health information exchange, privacy, and security are discussed. Graduate student or instructor permission

NURS 6895. Adult Acute Care Holistic Health Assessment and Wellness. (; 2 cr. ; A-F only; Every Fall)
Provides nurse anesthesia students and other interested APRN students with the cognitive and psychomotor skills necessary to perform an advanced health assessment for acute care adult patients and/or those in need of a preoperative assessment. prereq: Nurse anesthesia DNP student or instr consent

NURS 6900. Introduction to Principles of Anesthesia. (4 cr. ; A-F only; Every Spring)
Introduction to basic and safe nurse anesthesia care principles and orientation to clinical setting for patients undergoing surgical procedures. prereq: Doctorate of nursing practice program

NURS 6901. Basic Nurse Anesthesia Principles. (; 3 cr. ; A-F only; Every Fall)
Examination and application of basic anesthesia principles and practice including holistic patient assessment and formulating nurse anesthesia care plans in the adult surgical patients. prereq: 6900, 6910, concurrent registration is required (or allowed) in 6911

NURS 6902. Nurse Anesthesia Care: Cardiothoracic and Vascular Diseases. (; 2 cr. ; A-F only; Every Fall)
Examine and apply principles of nurse anesthesia delivering safe care to high acuity and complex special population including cardiac, thoracic, and vascular patients undergoing surgical procedures. prereq: 5222, 5228, 6900, 6901, concurrent registration is required (or allowed) in 6912, PHSL 5115

NURS 6903. Nurse Anesthesia Care: Special Populations Across the Lifespan. (; 2 cr. ; A-F only; Every Summer)
Examine/apply principles used to deliver anesthesia by nurse anesthetists to special populations: pediatric, trauma, obstetric/ gynecologic, and acute and chronic pain patients. prereq: 6900, 6901, 6902, concurrent registration is required (or allowed) in 6912, admission to BSN-DNP nurse anesthesia specialty

NURS 6910. Nurse Anesthesia Clinical Integration. (3 cr. ; S-N only; Every Spring)
Develop progressive proficiency in nurse anesthesia practice including basic equipment safety checks, room set up, pre-operative assessment, basic airway skills, intravenous fluid replacement, positioning of the patient and management of emergence prereq: Grad Student in Doctorate of Nursing Practice Program, concurrent registration is required (or allowed) in 6900

NURS 6911. Basic Nurse Anesthesia Principles Practicum I. (2 cr. ; S-N only; Every Summer)
Develop progressive proficiency in nurse anesthesia practice including basic equipment safety checks, room set up, pre-operative assessment, basic/advanced airway skills, intravenous fluid replacement, positioning of the patient, apply interventions, charting, management of emergence, handoff report, and setting personal daily clinical goals to achieve. prereq: N6910; concurrent registration is required (or allowed) in N6901, Grad student in Doctorate of Nursing Practice Program

NURS 6912. Nurse Anesthesia Care: Cardiothoracic and Vascular Disease Practicum III. (; 3 cr. ; S-N only; Every Spring)
Introduction to basic and safe nurse anesthesia care principles and orientation to clinical setting for patients undergoing surgical procedures. prereq: concurrent registration is required (or allowed) in 6902, DNP-nurse anesthesia specialty student

NURS 6913. Nurse Anesthesia Care of the Special Population and Across the Lifespan Practicum IV. (; 4 cr. ; S-N only; Every Summer)
Develop proficiency in nurse anesthesia practice for special populations, including pediatrics, obstetrics/gynecology, trauma, and patients with acute and chronic pain. prereq: Grad student in doctorate of nursing practice program nurse anesthesia specialty; concurrent registration is required (or allowed) in 6903

NURS 6914. Basic Nurse Anesthesia Principles Practicum II. (3 cr. ; S-N only; Every Fall)
Develop progressive proficiency in nurse anesthesia practice including basic equipment safety checks, room set up, pre-operative assessment, basic airway skills, intravenous fluid replacement, positioning of patient, management of emergence. prereq: N6910, concurrent registration is required (or allowed) in N6901

NURS 6920. Primary Care: Assessment of Health and Care of Well Children. (; 3 cr. ; A-F only; Every Spring)
Age specific, family-centered, assessment, prevention and health promotion services for infants through adolescents. Comprehensive health supervision. Critical thinking and advanced practice nursing interventions. prereq: 5200, 5222, 5229, concurrent registration is required (or allowed) in 6921, instr consent

NURS 6921. Assessment of Health and Care of Well Children: Primary Care Practicum. (; 1-2 cr. ; S-N only; Every Spring)
Age-specific, family-centered nursing assessment and interventions to promote wellness for infants through adolescence. Compiling and evaluating advanced nursing interventions for disease prevention and health promotion. Models of primary prevention. prereq: 5200, 5222, 5229, concurrent registration is required (or allowed) in 6920, instr consent

NURS 6922. Primary Care: Assessment and Management of Common Conditions Affecting Children. (; 3 cr. ; A-F only; Every Fall)
Research-based evaluation and management of common conditions affecting children from infancy through adolescence. Theories and models used to explain and predict physiologic and psychological adaptation of children and their families. prereq: 6920, 6921, concurrent registration is required (or allowed) in 6923, instr consent

NURS 6923. Primary Care Practicum: Assessment and Management of Common Conditions Affecting Children. (; 2 cr. ; S-N only; Every Fall)
Age-specific, family-centered nursing assessment and intervention of acute and chronic conditions of children within the family context. Nursing intervention strategies including diagnostics, therapeutics, education, and follow-up evaluation of outcomes. prereq: 6920, 6921, concurrent registration is required (or allowed) in 6922, instr consent

NURS 6924. Assessment and Interventions for Children and Youth With Special Health Care Needs. (; 2 cr. ; A-F only; Every Fall)
Children and youth with special health care needs. Growth and development, pathophysiology, and specific conditions within a holistic, family-centered, community based, culturally competent, coordinated approach to assessment and intervention. prereq: instr consent

NURS 6925. Advanced Concepts in Reproductive and Sexual Health Care. (; 2-3 cr. ; A-F only; Every Spring)
The course builds on foundational theoretical and evidence-based content to develop advanced assessment and care planning competencies throughout the lifespan with

a focus on complex gynecological and pregnancy-related conditions. prereq: 6305, 6306, 6501

NURS 6926. Advanced Concepts in Women's Health for WHNP Practicum I. (; 1 cr. [max 2 cr.] ; S-N only; Every Spring)
Develop advanced women's health assessment/planning skills. Experience working with women who have complex gynecological/pregnancy-related conditions. prereq: WHNP DNP student, concurrent registration is required (or allowed) in 6925, 5222, 5228, 5229, 5200, 6305, 6306

NURS 6927. Advanced Concepts in Women's Health II. (; 3 cr. ; A-F only; Every Summer)
Advanced concepts in gender-specific health care over adult lifespan and common primary health care issues. Utilization of evidence based integrative therapies and inter-professional practice competencies to promote positive outcomes in women's health populations. prereq: 6305, 6306, 6925, 6926, concurrent registration is required (or allowed) in 6928, CSPH 5101, current DNP WHNP student

NURS 6928. Adv Concepts in Women's Health II WHNP Prac. (; 1 cr. ; S-N only; Every Summer)
Expands on advanced assessment/ management skills in women's health through individualized patient centered care that encompasses primary health issues utilizing integrative approaches/interprofessional practice to promote positive outcomes in women's health populations. prereq: 6305, 6306, 6925, 6926, concurrent registration is required (or allowed) in 6927, CSPH 5101, DNP WHNP student

NURS 6929. Advanced Nursing Care of Children with Acute Illness; Practicum for PCNS. (; 2 cr. ; S-N only; Every Fall)
Synthesis and application of theory, research, and evidence-based practice to effectively implement pediatric clinical nurse specialist role. Focuses on comprehensive acute, complex care, role implementation, and contextual factors affecting health of children with special health needs and families. prereq: [6405, grad student in Nursing admitted to pediatric clinical nurse specialist area] or instr consent

NURS 6930. Foundations of Advanced Public Health Nursing Practice. (; 3 cr. ; A-F or Audit; Every Fall)
Conceptual frameworks for advanced public health nursing practice, trends in population health status. Population-focused nursing evidence. Legal/ethical considerations. Intervention strategies. prereq: DNP grad student in public health nursing

NURS 6931. Health Equity and Social Justice. (1 cr. ; A-F only; Every Fall)
Complex relationships among social determinants of health, health disparities, population health status. Analyze/critique both evidence-based/untested strategies for reducing health disparities. prereq: 6930 or instr consent

NURS 6934. Population-focused Assessment and Prioritization. (; 1 cr. ; A-F or Audit; Every Fall)
Principles of community-based participatory methods used to conduct population-focused assessments. Review literature/identify gaps in knowledge. prereq: 6930 or instr consent

NURS 6942. Health Equity and Social Justice Practicum. (2 cr. ; S-N only; Every Fall)
Practicum experiences at community site serving populations with compromised health status related to health disparities. Collaborate with agency staff/community partners to identify health disparities relevant to populations served. Develop social justice conceptual framework/propose strategies to improve population health. prereq: instr consent

NURS 6944. Population-focused Assessment & Prioritization Practicum. (1 cr. ; S-N only; Every Fall)
Population-focused assessment in collaboration with community partners. Identify key informants. Develop community partnerships. Use multiple approaches to data collection/analyses. Prioritize community assets, needs, contributing factors. prereq: 6930 or instr consent

NURS 7000. DNP Proseminar. (; 1 cr. ; A-F only; Every Fall)
Historical, regulatory, and professional underpinnings of advanced specialty nursing practice within a clinical doctoral framework. prereq: Admission to Post-BSN Doctorate of Nursing Practice Program

NURS 7004. Advanced Nurse Anesthesia Practicum V. (; 5 cr. ; S-N only; Every Fall)
Develop proficiency in nurse anesthesia practice and progressive independent or minimal supervision anesthesia care including knowledge application of pathophysiology, pharmacology, diagnostics/therapeutic, best practices, and interprofessional collaboration in patients undergoing surgical procedures.

NURS 7005. Advanced Nurse Anesthesia Practicum VI. (; 5 cr. ; S-N only; Every Spring)
Develop proficiency in nurse anesthesia practice and independent patient care management for patients undergoing complex and high acuity surgical procedures. prereq: 7004

NURS 7006. Advanced Nurse Anesthesia Practicum VII. (; 5 cr. ; S-N only; Every Summer)
Develop proficiency in nurse anesthesia practice and management of patient anesthesia care including evaluation of impact of research on clinical practice, achieving a level of safe care in preparation for entry to practice, and demonstration of leadership in the clinical setting with increasing autonomy in decision-making, and case management for various patient populations. prereq: 7004, 7005

NURS 7051. Data Science for Healthcare. (; 2 cr. ; A-F only; Every Fall)
This course builds understanding of data science and analytics for use in healthcare, explores concepts of clinical intelligence and the learning health system, and introduces data science methods and analytical skills to evaluate healthcare quality and outcomes. Course Prerequisites: Strongly recommended graduate level statistical course; Graduate students, and/or instructor consent.

NURS 7052. Data Science for Healthcare Practicum. (; 1 cr. ; S-N only; Every Fall)
This course applies knowledge of data science and analytics concepts within the learning health system using selected methods to address gaps in knowledge regarding health care quality or outcome in simulated or real life healthcare data. Course Prerequisites: Recommend graduate level statistics course

NURS 7100. Quality Improvement and Implementation Science in Health Care. (; 3 cr. ; A-F only; Every Fall)
Study of improvement and implementation science with emphasis on integration of organizational change theory, quality improvement models, guidelines, and strategies to drive evidence-based change and improve patient outcomes in the context of healthcare systems.

NURS 7102. Scholarly Dissemination and Advanced Professional Engagement. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Synthesis of DNP project components with emphasis on development and dissemination of scholarly manuscript. Recognition of advancement of professional opportunities and commitment.

NURS 7105. Knowledge Representation and Interoperability. (; 2 cr. ; A-F only; Every Summer)
Conceptual/operational aspects of knowledge representation structures in nursing, including standards and interoperability. Representation of clinical work in the electronic health record. Critical analysis of interoperability, ethical issues, and values. prereq: NURS 5115 or instr consent

NURS 7106. Knowledge Representation and Interoperability Practicum. (; 2 cr. ; S-N only; Every Summer)
Knowledge representation and interoperability principles/standards to improving knowledge in clinical or public health settings. Applied knowledge representation to nursing. prereq: [NURS 5115 or instr consent], [NURS 7105 or concurrent registration is required (or allowed) in NURS 7105]

NURS 7108. Population Health Informatics. (; 2 cr. ; A-F only; Every Fall)
Standards, interoperability, and integration of information systems for population health are examined. Population health use cases are analyzed for potential benefits, legal, ethical, and practical issues related to the development of population health information systems. prereq: [5115 or [HINF 5430, HINF 5431]] or instr consent

NURS 7109. Population Health Informatics Practicum. (; 2 cr. ; S-N only; Every Fall)
Apply principles, theories, and standards to integration of data to solve a particular population health problem. prereq: [5115,

[[7108 or concurrent registration is required (or allowed) in 7108] or [HINF 5430, HINF 5431]]] or instr consent

NURS 7110. NURS 7110 DNP Project Practicum. (1-3 cr. [max 12 cr.] ; S-N only; Every Fall, Spring & Summer)
Directed application of a quality improvement process, change theory, and inter-professional collaboration through the development, implementation, evaluation and dissemination of an evidence-based intervention (DNP Project) within the context of health, a health care system and/or healing environment.

NURS 7113. Clinical Decision Support: Theory. (; 2 cr. ; A-F only; Every Spring)
Principles and concepts of knowledge management and decision making for support of clinical practice. Students design a clinical decision support intervention and examine the legal, ethical, and practical issues related to its implementation and maintenance of CDS interventions. prereq: 5115 or HINF 5430/5431 or instr consent

NURS 7114. Clinical Decision Support Practicum. (; 2 cr. ; S-N only; Every Spring)
Apply clinical decision support knowledge to the development and application of a clinical decision support intervention. prereq: [5115, [[7113 or concurrent registration is required (or allowed) in 7113] or [HINF 5430, HINF 5431]]] or instr consent

NURS 7118. Human Factors and Human-Computer Interaction in Health Informatics. (; 3 cr. ; A-F or Audit; Every Spring)
Principles of human factors and human-computer interaction to optimize research/practice in nursing and health informatics. Interactive system design that accommodates/enhances capabilities of user. prereq: Biostatistics or instr consent

NURS 7200. Economics of Health Care. (; 3 cr. ; A-F or Audit; Every Spring & Summer)
Economic theories of health care in relation to health disparities and global health. Financing strategies, payment systems, and their effect on doctor/nursing practice. prereq: Admission to DNP program

NURS 7202. Moral and Ethical Positions and Actions in Nursing. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Normative ethics and theoretical underpinnings for positions taken. Implications for subsequent action. Morally defensible positions on health-related issues, corresponding actions from perspective of nursing.

NURS 7209. Integrative Nursing I. (; 1 cr. ; A-F only; Every Fall & Summer)
This is a foundational course for advanced nursing practice with a focus on the scholarship, research, and theory underlying integrative nursing. prereq: NURS 5101, NURS 5200, NURS 5222, NURS 7000, taken concurrent with CSpH 5226

NURS 7210. Integrative Nursing Practicum I. (; 1 cr. ; S-N only; Every Fall)
This is a foundation clinical course in advanced integrative nursing practice with a focus on integrative nursing assessment, management, and evaluation. prereqs: N5101, N5200, N5222, N7000, CSpH 5535, CSpH 5806, CSpH 5631, CSpH 5313, CSpH 5503, concurrent with N7209

NURS 7211. Integrative Nursing Didactic II. (; 1 cr. ; A-F only; Every Fall)
This is a foundational course for advanced integrative nursing practice with a focus on the scholarship, research, and theory underlying integrative therapies and integrative models of care within the context of health promotion, disease prevention, health care provider wellbeing and resilience, interprofessional collaboration, and education. prereqs: N5101, N5200, N5222, N5701, N6200, N7000, N7209, N7210, N7900, CSpH 5421, CSpH 5713, CSpH 5431, CSpH 5226, CSPH 5706

NURS 7212. Integrative Nursing Practicum II. (; 2 cr. ; S-N only; Every Fall)
This is a foundational course for advanced integrative nursing practice with a focus on the development of clinical competencies in community needs assessment, healthcare provider wellbeing, teaching and learning, and interprofessional collaboration. prereq: N5101, N5200, N5222, N5701, N6200, N7000, N7209, N7210, N7900, N7211 (or concurrent enrollment), CSpH 5535, CSpH 5806, CSpH 5631, CSpH 5313, CSpH 5503, CSpH 5421, CSpH 5713, CSpH 5431, CSpH 5226, CSPH 5706

NURS 7213. Midwifery Clinical and Professional Integration. (; 3 cr. ; S-N only; Every Spring)
Integration of the clinical role of the nurse-midwife, including understanding of the role of the midwife in leadership, legislation, and policy. prereq: Nurse midwifery DNP student in final semester, no incomplete cr, instr consent

NURS 7214. Integrative Health and Healing III. (; 1 cr. ; A-F only; Every Spring)
Programs of integrative therapies and healing practices in a variety of clinical/organizational settings. Creation of holistic nursing health care models, sustainable business plans, and the application of leadership skills. prereq: 7211 or instr consent

NURS 7215. Integrative Health and Healing Practicum III. (; 2 cr. ; S-N only; Every Spring)
Application of leadership competencies in developing, implementing, and evaluating integrative health and healing services and programs. prereq: 7212 or instr consent

NURS 7300. Program Planning and Evaluation. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
A critical analysis of methods for practical program planning and evaluation for advanced nursing professionals in leadership roles; includes evaluation of approach and design, intervention processes including stakeholder issues, measurement issues, and strategies to evaluate outcomes achievement. prereq: Admission to DNP program or instr consent

NURS 7310. WHNP Clinical and Professional Integration. (2 cr. ; S-N only; Every Spring)
Integration of the clinical and professional role of the women's health nurse practitioner, including understanding of the role of the WHNP in leadership, legislation, and policy. prereq: WHNP DNP student in final semester, passed all courses, no incomplete credits

NURS 7312. Pediatric Nurse Practitioner - Acute Care Skills Practicum. (; 1-2 cr. ; S-N only; Every Summer)
This course provides the student with exposure to advanced skills commonly performed in pediatric acute care settings. The student will apply this knowledge as they formulate and implement individualized patient-centered health care management plans to support positive health outcomes in acute care settings.

NURS 7313. Pediatric Nurse Practitioner Acute Care I. (3 cr. ; A-F only; Every Fall)
The first of two theoretical courses focusing on the principles of diagnostic evaluation and treatment of acutely and chronically ill and injured pediatric patients. Synthesis and application of nursing theory, research, and evidence-based practice standards in the evaluation and implementation of safe and effective interventions in care and treatment of acutely and chronically ill and injured pediatric patients.

NURS 7314. Pediatric Nurse Practitioner Acute Care Practicum I. (2-3 cr. ; S-N only; Every Fall)
In this practicum, the student will have practical application of the PNP-AC role in a variety of acute care clinical settings. Emphasis will be on nursing intervention strategies including diagnostics, therapeutics, education, and follow-up of clinical outcomes.

NURS 7400. Health Policy Leadership. (; 3 cr. ; A-F or Audit; Every Spring & Summer)
Acquisition of policy leadership and advocacy principles and skills and engagement in the process of organizational and governmental health policy development to transform health care delivery, promote equitable distribution of health care resources, address health disparities, and improve population health. prereq: Admission to DNP program

NURS 7401. Health Policy Leadership Practicum. (0.5-1 cr. ; S-N only; Every Spring)
Translation of nursing, health, and political science and application of health policy advocacy knowledge and skills to improve health care delivery, address health disparities, or advance population health.

NURS 7406. Advanced Nursing Practicum in Adult-Gerontology Health. (; 2 cr. ; S-N only; Every Spring)
Final clinical course developing proficiency in the advanced practice specialty role. Focus is on applying/evaluating evidence for clinical practice and achieving a level of competency as a clinical nurse specialist or nurse practitioner in adult-gerontology health. prereq: [5222, 5228, 5224, 5200, 6407, 6501, 7505, not [ANP or GNP]] or [5222, 5228, 5224, 5200, 6407, 6500, 6501, 7504, 7505, [ANP or GNP]] or instr consent

NURS 7501. Health Care of Children for the Family Nurse Practitioner Practicum. (; 1 cr. ; S-N only; Every Fall)

Nursing theory, research, and evidence-based practice standards in evaluating/implementing safe and effective interventions to promote health and prevent illness in infants, children, and adolescents. Evaluation of evidence-based outcomes. prereq: 5200, 5222, 5228, 5229, 6501, 7504, 7505, instr consent

NURS 7503. Reproductive Health Care of Women Practicum for Family Nurse Practitioners. (; 1 cr. ; S-N only; Every Spring)
Application of holistic health histories and physical assessments of women. Synthesize/use knowledge and research in clinical decision making to formulate health care management plans related to women's reproductive and sexual health throughout the life cycle. prereq: 5200

NURS 7504. Assessment and Management of Health for Advanced Practice Nurses, Practicum I. (; 1-2 cr. ; S-N only; Every Fall)
Application of holistic health histories and physical assessments by advanced practice nurses to formulate and implement individualized patient-centered health care management plans to support positive health outcomes in primary care populations experiencing acute and stable chronic conditions. prereq: 5200, 5222, 5224, 5229, 6501

NURS 7505. Assessment and Management of Health for Advanced Practice Nurses Practicum II. (; 1-2 cr. ; S-N only; Every Spring)
Comprehensive advanced nursing assessment/management for acute and chronic health conditions of the primary care population across the life span. Synthesis/application of nursing theory and evidence-based implementation/evaluation of safe and effective therapeutic interventions to promote, maintain, and restore health. prereq: 5200, 5222, 5224, 5229, (6501 or concurrent registration is required (or allowed) in 6501), (6502 or concurrent registration is required (or allowed) in 6502)

NURS 7506. Family Practice Practicum III: Assessment and Management of Health for the Family Nurse Practitioner. (; 1 cr. ; S-N only; Every Fall)
Evaluation of theories and research to support the development of holistic nursing practice models and clinical decision-making for health promotion, disease prevention and intervention. Evaluation of patient outcomes using nursing standards and criteria. prereq: 5200, 5222, 5228, 5229, 6501, 7504, 7505, instr consent

NURS 7507. Assessment and Management of Health Practicum IV:Health Leadership for Family Nurse Prac. (; 1 cr. ; S-N only; Every Spring)
Integration of the essentials of doctoral education into the FNP clinical role. Students analyze individual level and community/systems factors and public policies to demonstrate leadership capabilities in creating holistic, multi-system, interprofessional collaborative approaches to address health concerns and health disparities. prereq: 7400 or concurrent registration is required (or allowed) in 7400, 7506

NURS 7508. Health Care of the Elderly for the Family Nurse Practitioner Practicum. (1 cr. ; S-N only; Every Summer)
Synthesis and application of nursing theory, research and evidence-based practice standards in the evaluation and implementation of safe, effective interventions to promote health and prevent illness in elder patients from family- and patient-centered contexts. Evaluation of evidence-based outcomes. prereq: 7504, 7505

NURS 7509. Assessment and Management of Health Practicum VI: Primary Care for the Family Nurse Practitioner. (; 1 cr. ; S-N only; Every Spring)
Managing health across the lifespan in primary care settings. Health promotion, disease prevention, intervention. Implementing holistic, culturally-sensitive comprehensive, collaborative nursing practice models. Theories, ethical principles, research. prereq: 5200, 5222, 5228, 5229, 6501, 7504, 7505, concurrent registration is required (or allowed) in 7507, concurrent registration is required (or allowed) in 7508

NURS 7515. Health Care of Children for the Family Nurse Practitioner: Well Child Care. (1 cr. ; A-F or Audit; Every Summer)
Development of knowledge of mid-range theories, care models. Promotion/maintenance of health of newborns, infants, children, adolescents within context of families/communities. prereq: Admitted FNP DNP student

NURS 7516. Health Care of Children for the Family Nurse Practitioner: Acute and Chronic Management. (2 cr. ; A-F only; Every Fall)
Identifying diagnostic criteria for common acute/chronic pediatric conditions. Apply mid-range theories, research, models of care to restore health of newborns, infants, children, adolescents. prereq: 5200, 7515, 7504, 7505

NURS 7518. Health Care of the Elder Patient for the Family Nurse Practitioner. (1 cr. ; A-F only; Every Summer)
The application of mid-range theories, models, and concepts applicable to the promotion, maintenance, and restoration of the health elderly patients within the context of their families and communities. Current research is evaluated and used as the basis for designing age-specific interventions for elderly patients and their families. prereq: Nurs 6502

NURS 7600. Nursing Research and Evidence Based Practice. (; 4 cr. ; A-F only; Every Fall & Spring)
Examination of evidence based nursing including types and levels of evidence, research process, critique, and synthesis of research studies, and the science of implementation. prereq: Completion of or concurrent enrollment in a 3 credit inferential statistics course

NURS 7604. Executive Leadership Seminar: Boundary Spanning Leadership. (; 2 cr. ; A-F only; Every Spring)
Boundary spanning leadership for solving problems, driving innovation, and transforming healthcare organizations to advance the common good and improve health care by employing strategies that engage people from outside the organization in collaborative teams. prereq: [6705, 6706] or instr consent

NURS 7605. Executive Leadership Practicum: Boundary Spanning Leadership. (; 1-2 cr. ; S-N only; Every Spring)
Apply boundary spanning leadership in comparison to other leadership theories for solving problems, driving innovation, and transforming healthcare organizations to a specific healthcare setting/organization by implementing strategies that engage people from outside the organization in collaborative teams. prereq: [6704, 6706] or instr consent

NURS 7606. Relationship-Based Leadership and Management. (; 3 cr. ; A-F only; Every Spring)
Concepts, theories, and practices that support relationship-based leadership and management. Framework/set of tools to provide leadership in an empowered organization. prereq: Grad student or instr consent

NURS 7608. Health Care Finance and Resource Management. (; 3 cr. ; A-F or Audit; Every Fall)
Financial planning, budgeting, reimbursement and decision-making concepts and strategies are applied to health care and service organizations. Emphasis is on conceptualizing resources broadly, particularly nursing, and translating practice relevant concepts and priorities into actions valued by organizational decision makers. prereq: Grad student or instr consent

NURS 7610. System Leadership and Innovation. (; 3 cr. ; A-F only; Every Fall & Spring)
Integrate whole system thinking, contemporary theories, and evidence of factors contributing to effective leadership to advance innovation and achieve sustainable change in contemporary health care environments.

NURS 7612. Psychiatric/Mental Health Advanced Practice Nursing: Professional Seminar. (; 1 cr. ; A-F only; Every Spring)
Psychiatric/mental health advanced practice nursing: professional seminar. prereq: 6802, 6803

NURS 7613. Psychiatric/Mental Health Advanced Practice Nursing: Practicum V. (; 2 cr. ; S-N only; Every Spring)
Final course provides opportunities for refinement of PMH APN roles and integration of DNP activities into clinical experiences. Providing evidence-based nursing care to persons experiencing or at risk of experiencing psychiatric disorders to positively influence health care delivery. prereq: [6802, 6803] or instr consent

NURS 7705. The Adult and Gerontological Clinical Nurse Specialist in Acute Care. (; 2 cr. ; A-F only; Every Summer)
Development of advanced clinical reasoning, assessment of clinical outcomes, quality improvement and research based care for adult

and elder patients with acute illness. Use of theory and research in the role of the CNS. prereq: 5200, 5222, 5224, 5228, 6100, 6405, 7103, 7900

NURS 7706. Implementing the Role of the Clinical Nurse Specialist in Acute Care. (1 cr. ; S-N only; Every Summer)
Development of clinical expertise of CNS in provision of advanced nursing care for adults/elders. Students will utilize theory/research to implement roles of CNS. prereq: N5222, N5228, N5224, N7103, N5200, N7900, N6100, 7705 (co-requisite)

NURS 7800. Advanced Topics in Professional Nursing. (; 1-6 cr. [max 36 cr.] ; Student Option; Every Fall, Spring & Summer)
Methods, theory, or advanced topics, including supervised projects. prereq: instr consent

NURS 7900. Scholarly Teaching and Learning in Nursing. (; 3 cr. ; A-F only; Every Spring & Summer)
Critical analysis of teaching-learning theories and evidence about elements that comprise effective teaching in diverse populations in order to design and evaluate the quality of plans for educational experiences that facilitate achievement of desired learner outcomes in nursing.

NURS 7904. Nursing Education Practicum. (; 2 cr. ; Student Option No Audit; Every Fall)
Design, implementation, and evaluation of evidence-based, scholarly teaching and learning in various nursing education contexts. Analysis of select nursing program in relation to meeting standards for accreditation and various other expected outcomes of nursing programs. prereq: Graduate student in nursing or Nurs 7900 or equivalent.

NURS 7925. Systems of Care for Children and Youth With Special Health Care Needs Practicum. (; 2 cr. ; S-N only; Every Spring)
Research-based evaluation/management of psychologic and physiologic responses to chronic illness of children and youth. Developing theory-based systems of nursing care that are holistic, family-centered, community-based, culturally-competent, and coordinated. prereq: 6924 or instr consent

NURS 7926. Advanced Assessment, Intervention in Families of Children and Youth With Special Health Care Needs. (; 2 cr. ; A-F only; Every Spring)
In-depth, systemic, and theory-based study of family health assessment methods/intervention models. Assess, intervene, and evaluate intervention models related to patterns of functioning in families of children with complex health care needs. prereq: [6102 or equiv family theory course, 6200, concurrent registration is required (or allowed) in 7925] or instr consent

NURS 7930. Public Health Nursing Leadership Practicum. (2 cr. ; S-N only; Every Spring)
Synthesis of advanced public health nursing research. Theory/application to health policy leadership, management, administration within public health nursing leadership situations. prereq: 6930

NURS 7939. Public Health Nurse Leadership Role. (1 cr. ; A-F only; Every Spring)
Analyzes issues challenging advanced practice public health nursing including policy/practice issues. Relationships with stakeholders/constituencies involved with public health issues. Public sector financing. prereq: [6930, DNP student] or instr consent

NURS 7940. Application of Behavior Change Theory to Population Health. (1 cr. ; A-F only; Every Spring)
Review of selected theories of health behavior change for individuals, groups, organizations, communities, systems. Synthesize/apply theories appropriately/effectively to guide public health nursing practice. prereq: 6930, [PubH 6020 or instr consent]

NURS 7942. Application of Behavior Change Theory to Population Health Practicum. (2 cr. ; S-N only; Every Spring)
Clinical application/synthesis of selected theories of health behavior change for individuals, groups, organizations, communities, systems in population-based setting. prereq: 6930, PubH 6020

NURS 8121. Health Behaviors and Illness Responses. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Theories of health behaviors and responses to illness are analyzed/critiqued. Multivariate research designs. Specification of testable, descriptive, dynamic models for health/illness that incorporate culture, biology, environment, and health systems for diverse individuals, families, communities, and populations. prereq: Doctoral student or instr consent

NURS 8131. Theory in Nursing Research. (4 cr. ; A-F only; Every Fall)
Analysis of current philosophical and theoretical perspectives in nursing science. Evaluation of theories and conceptual models and their application in nursing research.

NURS 8132. Qualitative Research for Nursing and Health Care. (4 cr. ; A-F only; Every Spring)
Analysis of key qualitative research methods and corresponding analysis strategies. Focus is on developing understanding of rigorous qualitative methods that contribute to nursing and health science knowledge generation. prereq: NURS 8131

NURS 8141. Designing Quantitative and Intervention Nursing Research. (3 cr. ; A-F only; Every Fall)
Designs for quantitative and intervention research will be analyzed and applied to investigating nursing topics. Emphasis is on evaluation of the appropriateness of designs in relation to nursing research questions and strengths and limitations of the designs. prereq: NURS 8131 (pre or concurrent) or instructor approval

NURS 8142. Quantitative Data Collection Methods and Measurement for Nursing Research. (3 cr. ; A-F only; Every Spring)
Principles of data collection and measurement appropriate for use in quantitative nursing research investigations will be examined. Different types of data collection methods, measurement designs and methods, their strengths and limitations, and application in nursing research studies will be analyzed.

NURS 8152. Advanced Ethics in Nursing Research and Scholarship. (; 2 cr. ; A-F only; Every Spring)
Students will analyze values underlying concepts and discourses of health, disease, risk, and use of health care technologies. They will analyze central ethical issues in nursing research, scholarship, and research integrity as part of ethics training required to conduct research. prereq: Nursing PhD student or permission of faculty

NURS 8153. Developing Research Proposals in Nursing or Health Sciences. (2 cr. ; A-F only; Every Fall)
This course integrates scientific and practical aspects of conducting research and encourages students to think through study design, sample selection, measures and data collection, analysis plans, and study conduct. The primary goal is to develop grant writing skills for extramural/intramural nursing or health-related research grants. prereq: NURS 8141, NURS 8132, 8142 (prereq or concurrent)

NURS 8171. Qualitative Research Design and Methods. (; 3-4 cr. ; Student Option; Every Spring)
Overview and comparative analysis of selected qualitative research methods and analytic strategies. Focuses on developing rigorous qualitative designs that contribute to development of nursing and health care knowledge for diverse populations. prereq: 8170 or equiv

NURS 8172. Theory and Theory Development for Research. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Paradigms in nursing/health, associated methods of scientific/scholarly inquiry. Inductive/deductive techniques for theory development Theory-testing using data obtained under controlled conditions. prereq: Doctoral student

NURS 8173. Principles and Methods of Implementing Research. (; 3 cr. ; Student Option; Every Spring)
Integrates scientific, statistical, and practical aspects of research. Inter-relationships among design, sample selections, subject access, human subjects requirements, instrument selection and evaluation, data management, analyses plans, grant writing, and research career issues. Field experiences required. prereq: 8114 or other 8xxx grad research methods course, 2 grad stat courses;

NURS 8175. Quantitative Research Design and Methods. (; 3 cr. ; A-F or Audit; Every Fall)
Designs for quantitative description and quasi-experimental/experimental evaluation of scientific problems across domain of nursing. Evaluation of logic of design/attribution of causality from health and social science perspectives. prereq: [PhD student in nursing, advanced applied statistics] or instr consent

NURS 8177. Advanced Nursing Research Practicum. (; 1-2 cr. ; S-N or Audit; Every Fall, Spring & Summer)
NURS 8177 Advanced Nursing Research Practicum is a required independent study course where students participate in designing or conducting a nursing or health-related research study under the supervision of a School of Nursing faculty investigator. prereq: PhD nursing student, instr consent, adviser consent

NURS 8179. Biophysiological Measurement and Instrumentation in Clinical Research. (; 3 cr. ; Student Option; Every Fall)
Critical issues in measurement and instrumentation for clinical research. Methodological issues and critical appraisal of instruments in the study of biophysiological phenomena. Field observation experiences. prereq: [8173, 8175 or equiv, advanced level stat or concurrent registration is required (or allowed) in advanced level stat] or instr consent

NURS 8180. Doctoral Proseminar I: Scholarly Development. (; 1 cr. ; S-N or Audit; Periodic Fall & Spring)
Transition to doctoral study. Begins socialization process to role of nursing scholar/scientist. Career trajectories of nursing scholars who have pursued various roles. prereq: Doctoral nursing student

NURS 8185. Qualitative Data Analysis for Health Care Research. (; 3-4 cr. ; Student Option; Every Spring)
Qualitative analysis techniques for descriptive, interpretive, and analytic data including data preparation, management and analysis are presented. Transforming data from multiple texts to theoretical conceptualizations, writing skills and dissemination of qualitative research findings suitable to each method are stressed. prereq: 8171 or grad course in qualitative research methods

NURS 8190. Critical Review in Nursing and Health Research. (; 2 cr. ; A-F or Audit; Every Fall)
Skills needed to critique a body of scientific literature in focused areas of nursing research and related fields. Includes construction of literature reviews for planning research projects and for research utilization. prereq: NURS 8142, instructor consent

NURS 8195. Mixed Methods Research. (; 2 cr. ; Student Option; Every Fall)
Synthesis of of qualitative and quantitative approaches in research designs. Evaluation of major mixed method designs and strategies for evaluating quality based on criteria. Data collection and analysis strategies for integrating quantitative and qualitative findings will be explored. prereq: NURS 8141

NURS 8201. Transition to Becoming a Scientist of Nursing. (1 cr. ; S-N only; Every Fall)
Emphasizes the transition to PhD study and begins the socialization process to the role of a scientist of nursing.

NURS 8202. Developing a Foundation as a Scientist of Nursing. (1 cr. ; S-N only; Every Spring)
Emphasizes the development of scholarly communication, and development and management of scientific resources.

NURS 8212. Planetary Health: Cross-Cutting Principles for Nursing Research. (; 2 cr. ; A-F only; Every Fall)
Ecosystem transformations due to human activity have a serious impact on global health. Students will analyze scientific evidence and discuss ethics about the effects of ecosystem changes on human health. Opportunities for nursing research and theory development to promote planetary health will be identified.

NURS 8255. Dissertation Seminar. (1 cr. ; S-N only; Every Fall & Spring)
This seminar is intended to support Nursing PhD students in the candidacy stage as they prepare and implement the dissertation proposal in collaboration with their dissertation committees. Students will participate in presenting and critically appraising parts of each other?s dissertation proposal plan or implementation as it develops. Students will seek and incorporate ongoing feedback from their advisor/committee in their discussion. Prereq: PhD candidacy (passed preliminary written and oral exams)

NURS 8361. Special Topics in Nursing. (; 1-4 cr. [max 8 cr.] ; Student Option; Every Fall, Spring & Summer)
Students select and study a topic of interest.

NURS 8444. FTE: Doctoral. (; 1 cr. [max 3 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

NURS 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

NURS 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

NURS 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Nutrition (NUTR)

NUTR 5622. Vitamin and Mineral Biochemistry. (; 3 cr. ; Student Option; Every Spring)
Nutritional, biochemical, and physiological aspects of vitamins and essential minerals in human and experimental-animal models. prereq: BioC 3021, Phsl 3051, FSCN 4612

NUTR 5624. Nutrition and Genetics. (; 2 cr. ; Student Option; Every Fall)
Overview of gene-diet interactions and relevant technologies used to study such interactions. Nutrigenomics, epigenetics, transcriptomics, proteomics, metabolomics. Examples of gene-diet interactions, implications. Current issues. Prerequisites: Courses in Nutritional Biochemistry (e.g., NUTR 5625), and Vitamin and Mineral Biochemistry (e.g., NUTR 5622), or consent of instructor

NUTR 5625. Nutritional Biochemistry. (; 3 cr. ; Student Option; Every Fall)
Overview of biochemical molecules and pathways important in nutritional events. prereq: BIOC 3021 or instr consent

NUTR 5626. Nutritional Physiology. (; 3 cr. ; A-F or Audit; Every Spring)
Whole body macronutrient metabolism as it relates to etiology of metabolic diseases. Signaling between tissues to control homeostasis. How dysregulation of crosstalk can lead to metabolic diseases. How diet, exercise, or starvation impact metabolism. Regulation of food intake and energy expenditure. Designing/analyzing/interpreting research data. prereq: NUTR 5625

NUTR 5627. Nutritional and Food Toxicology. (; 3 cr. ; A-F only; Every Spring)
Toxic agents, organisms, and toxic effects that are important in the toxic events, with a focus on food toxicants and nutrient-toxicant interaction. prereq: BIOC 3021; designed for students majoring in [nutrition or food science or toxicology]

NUTR 5993. Directed Research. (1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
A course in which a student designs and carries out a directed study on selected topics or problems under the direction of a faculty member; eg, literature review. Directed study courses may be taken for variable credit and special permission is needed for enrollment. Students enrolling in a directed study will be required to use the University-wide on-line directed study contract process in order to enroll. Prereq: department consent, instructor consent, no more than 6 credits of directed study counts towards CFANS major requirements.

NUTR 5994. Directed Research. (1-4 cr. ; Student Option; Every Fall, Spring & Summer)
An opportunity in which a student designs and carries out a directed research project under the direction of a faculty member. Directed research may be taken for variable credit and special permission is needed for enrollment.Students enrolling in a directed research will be required to use the University-wide on-line directed research contract process in order to enroll. Prereq: department consent, instructor consent, no more than 6 credits of directed research counts towards CFANS major requirements.

NUTR 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

NUTR 8411. Obesity Prevention - From the Molecule to the Bedside. (2 cr. ; Student Option; Every Fall)
This course will cover research topics in obesity prevention at a graduate level. The course will emphasize a multidisciplinary understanding of obesity in the following areas: ? Adipocyte biology, including relevant issues relating to fat storage, retrieval, and trafficking of intracellular energy; adipose tissue function at a system level especially factors favoring fat storage and retrieval. ? Physiology of obesity, to include neural and hormonal influences on energy balance, including brain mechanisms of appetite, feedback mechanisms triggered by negative energy balance, hedonic mechanisms, and feedback systems triggered by excess consumption. The interaction between obesity and hypertension, inflammation, cardiovascular disease, sleep, exercise, stress and the microbiome. ? Clinical consequences of obesity with specific reference to the many organ system dysfunctions related to excess body weight. Treatment of obesity, with understanding of behavior change therapies. Bariatric and pharmaceutical approaches to the treatment of obesity, with emphasis on basic mechanisms involving brain, adipose tissue, and adipocytes. We will also cover special issues related to fetal programming of diabetes and pediatric obesity. Study design and analyses for studies will be discussed within all arms. Students will engage in critical evaluation of literature in biological and clinical obesity prevention research. Course learning objectives: The student will gain a comprehensive understanding of adipocyte biology and function; animal obesity models; physiology of body fat regulation; central nervous system regulation of energy intake and energy expenditure; cardiovascular disease, hypertension, stress, microbiome and sleep effects in obesity; genetic and individual propensity for obesity; fetal programming of diabetes and clinical consequences and treatment of obesity in adults and children; pharmaceutical approaches; an understanding of design and analyses in all types of studies, and an ability to critically analyze relevant literature. Prerequisites: This 8000 level course is intended for graduate students pursuing graduate work in a health science-related program. Undergraduate degrees can include, but are not limited to, a Bachelor of Science in nutrition, physiology, integrative biology or other related degree. The instructor will consider other majors on an individual basis and permission.

NUTR 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

NUTR 8620. Advances in Nutrition. (; 2 cr. ; Student Option; Every Fall & Spring)
Recent research or special topics (e.g., obesity, vitamin biochemistry, nutrition education).

NUTR 8621. Presentation Skills. (; 1 cr. ; S-N or Audit; Every Fall)
Orientation to nutrition graduate program. Presenting scientific seminars, using electronic presentation programs/equipment. prereq: dept consent

NUTR 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

NUTR 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

NUTR 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Obstetrics and Gynecology (OBST)

OBST 7211. Advanced Obstetrics and Gynecology III. (; 1-15 cr. ; No Grade Associated; Every Spring)
Advanced obstetrics and gynecology III. prereq: 7210

OBST 7500. Obstetrics, Gynecology and Women's Health Clerkship. (; 4 cr. [max 8 cr.] ; P-N only; Every Fall, Spring & Summer)
This is the core clinical course in Ob/Gyn for years three and four students.

OBST 7501. Obstetrics, Gynecology and Women's Health Clerkship Part A. (; 2 cr. ; P-N only; Periodic Fall, Spring & Summer)
Course created specifically to accommodate clinical setting restrictions due to COVID-19 from spring 2020 to spring 2021. Part A of this course covers the virtual coursework while Part B covers the clinical component. Both parts A and B must be completed for the clerkship requirement to be considered fulfilled. Catalog Description: This is the core clinical course in Ob/Gyn for Year Three medical students consisting of a four-week experience in obstetrics and gynecology. All students will meet for Problem-Based Learning sessions addressing clinical aspects involved in common obstetric and gynecological problems twice during the 4-week period. Students will participate in clinical procedures, deliveries and surgical operations. Students may be on a day/night float schedule or traditional call during L&D.

OBST 7502. Obstetrics, Gynecology and Women's Health Clerkship Part B. (2 cr. ; H-N only; Periodic Fall, Spring & Summer)
Course created specifically to accommodate clinical setting restrictions due to COVID-19 from spring 2020 to spring 2021. Part A of this course covers the virtual coursework while Part B covers the clinical component. Both parts A and B must be completed for the clerkship requirement to be considered fulfilled. Catalog Description: This is the core clinical course in Ob/Gyn for Year Three medical students consisting of a four-week experience in obstetrics and gynecology. All students will meet for Problem-Based Learning sessions addressing clinical aspects involved in common obstetric and gynecological problems twice during the 4-week period. Students will participate in clinical procedures, deliveries, and surgical operations. Students may be on a day/night float schedule or traditional call during L&D.

OBST 7520. Advanced Externship in Ob/Gyn. (; 3 cr. ; H-N or Audit; Every Fall & Spring)
Three-week rotation focusing on the management of gynecologic oncology patients. Students serve as junior interns, work up cases, and participate in rounds and case discussion conferences. prereq: 7500

OBST 7521. Advanced Externship in Ob/Gyn. (; 3 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Each student is under preceptorship of member(s) of full-time faculty. Areas of study may include general obstetrics/gynecology, maternal/fetal medicine, high risk obstetrics, benign gynecology, and reproductive endocrinology. prereq: 7500, instr consent

OBST 7530. Acting Intern Ob/Gyn Gynecologic Oncology. (; 2-4 cr. ; H-N only; Every Fall, Spring & Summer)
This course focuses on the management of gynecologic oncology patients. Students will serve as junior interns, work-up cases and participate in rounds and case discussion conferences.

OBST 7540. Advanced Externship in Ob/Gyn. (; 6 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Six-week rotation focusing on the management of gynecologic oncology patients. Students serve as junior interns, work up cases, and participate in rounds and case discussion conferences. prereq: 7500

OBST 7541. Acting Intern Ob/Gyn Maternal-Fetal Medicine. (; 2-4 cr. ; H-N only; Every Fall, Spring & Summer)
Students will receive in-depth exposure to diagnosis and management of maternal and fetal complications of pregnancy.

OBST 7542. Advanced OB/Gyn: Urogynecology. (2-4 cr. ; H-N only; Every Fall, Spring & Summer)
Students will receive in-depth exposure to diagnosis and management of female pelvic floor disorders. Students will be under the guidance of the Urogynecology faculty. Students will be involved in both the inpatient and outpatient care of Urogynecology practice including the diagnosis and treatment of: urinary incontinence, pelvic organ prolapse, fecal incontinence, pelvic and bladder pain. Students will see urodynamic studies, office and surgical cystoscopy, complex surgical correction of pelvic floor disorders including sacral neuromodulation, midurethral slings, and sacralcolpopexy.

OBST 7543. Acting Intern General Obstetrics and Gynecology. (2-4 cr. ; H-N only; Every Fall, Spring & Summer)
Advanced clinical course in General OB/GYN for Year Four medical students consisting of enhanced four-week experience in OB/GYN and mature womans OB/GYN health. All students will participate in clinical procedures, deliveries, and surgical operations. Students will participate in didactic activities and lead one presentation on a top of interest in OB/GYN. Students may be on a day/night float schedule or traditional call during Labor and Delivery.

OBST 7560. Research in Obstetrics and Gynecology. (; 4-8 cr. ; H-N only; Every Fall, Spring & Summer)
This is an individually designed course, with topics selected for each student. Most members of the ob-gyn staff are available for this one-to-one experience depending upon the establishment of joint interests with the student.

OBST 7575. Gynecological Pathology and Diagnostic Cytology. (; 3-6 cr. ; H-N or Audit; Every Fall & Spring)
The student participates in the diagnostic practice with the gynecologic pathology staff. Includes diagnostic cytology of pap smears encountered in actual practice and participation in working conferences. To be arranged in advance with the Ob/Gyn Education office. prereq: 7500

OBST 7591. Women's Health Rotation. (; 2-6 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Multidisciplinary exploration of women's health issues. Clinical experience/academic perspectives in gynecology/reproductive health, internal medicine, adolescent medicine, and psychology. Culture, economics, psycho-social status, and life span in women's health care delivery. prereq: 7500, Med 5500

OBST 7910. Obstetrics and Gynecology Medical Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Obstetrics and gynecology medical residency.

OBST 7930. Obstetrics and Gynecology Medical Fellowship. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Obstetrics and gynecology medical fellowship.

OBST 8224. Gynecological Endocrinology I. (; 1-15 cr. ; Student Option; Every Fall & Spring)
N/A prereq: prereq 8223

OBST 8225. Gynecological Endocrinology II. (; 1-15 cr. ; Student Option; Every Fall & Spring)
N/A prereq: prereq 8224

OBST 8226. Obstetrical Physiology and Anesthesiology. (; 1-15 cr. ; Student Option; Every Fall & Spring)
N/A prereq: prereq 8225

OBST 8227. Preceptorship in Clinical Practice. (; 1-15 cr. ; Student Option; Every Fall, Spring & Summer)
N/A prereq: prereq 8226

OBST 8240. Human Gametes and Fertilization. (; 3 cr. ; Student Option; Every Fall & Spring)

OBST 8241. Human Gametes and Fertilization Laboratory. (; 2 cr. ; Student Option; Every Fall & Spring)

OBST 8243. Topics in Family Planning. (; 2-8 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)

Occupational Therapy (OT)

OT 7111. Professional Development in Occupational Therapy I. (2 cr. ; A-F only; Every Fall)
This course guides students through first steps in developing attitudes and skills for competent and ethical occupational therapy practice. By using self-assessment tools while participating in community-engaged learning and AHC sponsored interprofessional activities with peers from other health professions, students will create their own professional development goals and plans to meet them.

OT 7121. Foundations of Occupational Therapy. (8 cr. ; A-F only; Every Fall)
This course provides foundational knowledge of the occupational therapy profession by examining the history, philosophy, and language of OT, the science of occupation, occupation-based theory, and sociopolitical perspectives on health and well-being. The Occupational Therapy Practice Framework is introduced and key concepts examined.

OT 7122. Mind and Body Aspects of Occupational Therapy Practice. (2 cr. ; A-F only; Every Fall)
Learners explore psychosocial aspects of occupational therapy practice that influence the experience of both therapists and their clients. Concepts of mental and physical health, wellness, resilience and therapeutic use of self are emphasized to demonstrate how mind and body are inextricably connected to occupational engagement.

OT 7141. Body Structures & Functions I. (3 cr. ; A-F only; Every Fall)
This is the first of a 3 course series exploring the concept of body structures and functions as open and changing systems across the lifespan, directly and indirectly affected by the person's unique contexts. Students will learn functional neuroanatomy, developmental plasticity, and the effects of internal and external environments on occupations.

OT 7175. Level I Fieldwork in Occupational Therapy with Children and Youth. (; 1 cr. ; S-N only; Every Fall & Spring)
Learners apply the OT process with children and youth in this real-world 40-hour experiential learning opportunity. Students will focus on developing professional skills.

OT 7176. Level I Fieldwork in Occupational Therapy with Adults. (; 1 cr. ; S-N only; Every Fall & Spring)
Learners apply the OT process with adults in this real-world 40-hour experiential learning opportunity. Students will focus on developing professional skills.

OT 7177. Level I Fieldwork in Occupational Therapy with Older Adults. (; 1 cr. [max 3 cr.] ; S-N only; Every Fall & Spring)
Learners apply the OT process with older adults in this real-world 40-hour experiential learning opportunity. Students will focus on developing professional skills.

OT 7211. Professional Development in Occupational Therapy II. (2 cr. ; A-F only; Every Spring)
This course guides students through next steps in becoming a competent and ethical occupational therapist. Students examine the basics of teamwork and interprofessional health care teams. They participate in a group, learning concepts that include, but are not limited to, problem solving, decision making, and conflict resolution strategies to enhance group process.

OT 7221. OT Process: Children & Youth I. (3 cr. ; A-F only; Every Spring)
Learners apply occupational therapy theory to infant and toddlers by analyzing the occupational performance of populations and individuals of this age. Learners practice assessment and intervention methods used by occupational therapists to support engagement of young children in everyday activities. Case-based instruction emphasizes critical thinking, clinical reasoning and ethical practice.

OT 7222. Occupational Therapy Process for Adults I. (3 cr. ; A-F only; Every Spring)
Learners analyze occupations and roles typical in early adulthood; particularly examining the impact of mental health concerns on participation in these occupations of daily life. The course includes experiential learning to integrate content with prerequisite and concurrent coursework as students apply the OT Process through cases and simulations.

OT 7223. Occupational Therapy Process for Older Adults I. (3 cr. ; A-F only; Every Spring)
This course, the first in a three-part series, focuses on occupations and roles, habits, and routines that are typical in young-old adults ages 65 to 75 and the impact of disruption on participation. Students will apply the OT process using case-based learning for cognitive conditions and substance abuse. This course aligns with experiential learning activities to integrate concurrent coursework.

OT 7231. Critical Inquiry in Occupational Therapy. (2 cr. ; A-F only; Every Spring)
Learners will gain the knowledge and skills needed for critiquing research studies to be critical consumers of research and evidence-based practitioners.

OT 7242. Body Structures and Functions II. (2 cr. [max 4 cr.] ; A-F only; Every Spring)
This course covers functions, brain processes and problems of consciousness and the cardiovascular, respiratory, endocrine and gastrointestinal systems. Through reflection, it emphasizes theoretical principles and case examples of plasticity in these structures/functions as they adapt with development and respond to life experiences, occupations, illness, injury and occupational therapy.

OT 7271. Level I Fieldwork in Occupational Therapy in Mental Health Settings. (; 1 cr. ; S-N only; Every Fall & Spring)
This course provides a 40-hour experiential learning opportunity for learners to apply the OT process with individuals diagnosed with mental health conditions in a real world experience.

OT 7332. Quantitative Research in Occupational Therapy. (2 cr. ; A-F only; Every Summer)
Learners analyze how quantitative evidence in health sciences is developed, disseminated, and used. Students become evidence-based practitioners by learning to analyze and critique quantitative studies and by developing their own research questions, implementing rigorous methodologies, applying appropriate statistics and knowledgeably interpreting results.

OT 7343. Body Structures and Functions III. (4 cr. ; A-F only; Every Summer)
An introduction to the structures and functions of the integumentary, musculoskeletal and other sensory systems, and how they interact with the central nervous system. The plasticity of these structures in response to development, life experiences, occupations, illness, injury, and occupational therapy interventions is emphasized.

OT 7411. Professional Development in Occupational Therapy III. (; 2 cr. [max 20 cr.] ; A-F only; Every Fall)
This course is third in a four course series. Learners explore leadership development using various models of leadership development. Learners will incorporate skill development of leadership practices into their professional development plan.

OT 7421. OT Process: Children & Youth II. (3 cr. ; A-F only; Every Fall)
Learners apply foundational knowledge of occupational therapy to the school aged child , prioritizing those client factors, performance skills, performance patterns, and contextual factors that contribute to participation. Case-based instruction applies assessment and intervention methods to cases that emphasize critical thinking, clinical reasoning, and ethical practice.

OT 7422. OT Process: Adults II. (3 cr. ; A-F only; Every Fall)
Second in a series of OT Process for Adults courses, this course focuses on the occupations typical of middle adulthood and the impact of disruption on participation. Students will apply the OT process toward increasingly complex cases throughout this experiential learning course that includes laboratory practice.

OT 7423. OT Process: Older Adults II. (3 cr. ; A-F only; Every Fall)
This course, the second in a three-part series, focuses on occupations and roles, habits, and routines that are typical in middle-old adults ages 75 to 85 and the impact of disruption on participation. Students apply the OT process to selected cases demonstrating their development of clinical reasoning in OT.

OT 7431. Qualitative Research in Occupational Therapy. (2 cr. ; A-F only; Every Fall)
Learners will explore the epistemological, ethical, methodological approaches, and procedures associated with qualitative inquiry. This knowledge will be applied when evaluating evidence and designing a proposal for a qualitative study in occupational therapy.

OT 7451. OT Capstone Preparation I. (1 cr. [max 2 cr.] ; A-F only; Every Fall)
First in a series of Capstone courses, the primary goal of this course is for learners to explore the areas of advanced occupational therapy practice. Through exploration of personal characteristics required to succeed in each area, students will narrow the scope of potential capstone project choices to three potential areas.

OT 7511. Professional Development in Occupational Therapy IV. (2 cr. ; A-F only; Every Spring)
This is the final course in a four part series exploring professional development. Topics include ways to communicate with clients, patients, family members, and the health care team. Communication modes include oral communication, virtual and telecommunication, written materials, formal and informal presentations, and forums.

OT 7521. OT Process: Children & Youth III. (3 cr. ; A-F only; Every Spring)
Learners analyze occupational performance of adolescents, prioritizing client factors, performance skills, performance patterns, and contextual factors. Learners practice assessment and intervention methods to support societal participation. Case-based instruction of individuals and populations emphasizes critical thinking, clinical reasoning, and ethical practice.

OT 7522. OT Process: Adults III. (3 cr. ; A-F only; Every Spring)
Learners analyze occupations typical in late middle adulthood and the resulting impact when these occupations are disrupted by physical or environmental impairment. Learners apply the OT process to increasingly complex individual and population- based cases designed to develop clinical reasoning used by occupational therapists.

OT 7523. OT Process: Older Adults III. (3 cr. ; A-F only; Every Spring)
This course, the third in a three-part series, focuses on occupations and roles, habits, and routines typical in old-old adults aged 85 to 95+ and the impact of disruption on participation. Students apply the OT process using case-based learning for orthopedic and rheumatic conditions and sensory loss accompanied by frailty. Experiential learning activities integrate concurrent coursework.

OT 7541. Assistive Technology and Orthotics in OT Practice. (4 cr. ; A-F only; Every Spring)
Orthotics, prosthetics, and assistive technologies are used by occupational therapists to enhance client occupational performance and participation. This experiential case-driven course focuses on evaluation for device needs, assessment of the complexities of design/fitting of multiple technologies, and selection/fabrication various devices.

OT 7552. OT Capstone Preparation II. (1 cr. ; A-F only; Every Spring)
This course is the second of four courses that prepare learners for the final Capstone experience and project. In this course, learners select an advanced practice capstone experience site, develop relationships, and conduct a needs assessment.

OT 7641. Management of Occupational Therapy Practice. (; 2 cr. ; A-F only; Every Fall & Spring)
Students learn basic principles of management as applied in occupational therapy practice.

OT 7653. OT Capstone Preparation III. (1 cr. ; A-F only; Every Fall, Spring & Summer)
This course is the third of four courses that prepare learners for the final Capstone experience and project. Learners present a summary of a needs assessment, develop a Capstone Project and Experience Plan, and present both to stakeholders of the site(s) they have selected for their Capstone experience.

OT 7695. Level II Fieldwork in Occupational Therapy. (; 3-9 cr. [max 18 cr.] ; S-N only; Every Fall, Spring & Summer)
This course provides in depth mentored experiences, delivering occupational therapy services to clients, focusing on the application of the OT Process. Learners will repeat this course up to 3 times to achieve the equivalent of 24 weeks full time experience in a variety of settings that serve patients or clients across the lifespan.

OT 7754. OT Capstone Preparation IV. (1 cr. ; A-F only; Every Fall, Spring & Summer)
This course is the last of 4 courses that prepare the learner for the final Capstone experience and project. Learners will develop and present a Capstone Experience and Project Plan to stakeholders and, if needed, submit for IRB approval.

OT 7821. Systems of Occupational Therapy Practice. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Learners compare various systems that employ occupational therapists by analyzing components of health systems. Learners evaluate how these systems impact occupational therapy practice.

OT 7831. Professional and Grant Writing for Occupational Therapists. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Students find public and private (not for profit) funding sources and agencies to support innovative research, training, demonstration and practice-based projects. They are guided to write lucid and compelling grant applications to support these projects. Learners anticipate reviewer concerns and how to respond constructively to criticism by participating in peer review of other proposals.

OT 7841. Program Development for Occupational Therapists. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)

Learners apply basic principles of program development when writing a business or project plan in an occupational therapy area of practice.

OT 7842. Teaching and Learning in Occupational Therapy. (; 1 cr. ; A-F only; Every Fall, Spring & Summer)
Learners are introduced to the roles of an academic educator and the basic principles of adult education, active learning, course design and teaching in academic environments.

OT 7851. Advocacy in OT. (; 1 cr. ; Student Option No Audit; Every Fall, Spring & Summer)
This course introduces the concept of advocacy and explores why, where, and how occupational therapists advocate for the needs of their clients and the profession.

OT 7852. Introduction to Trauma Informed Care for OT. (; 1 cr. ; Student Option No Audit; Every Fall, Spring & Summer)
This course explores the concept of Trauma Informed Care and its use by occupational therapists in practice.

OT 7855. Seminar in Current OT Practice Issues. (; 1 cr. ; A-F only; Every Fall, Spring & Summer)
Learners examine current issues of the OT profession by evaluating and synthesizing published knowledge pertaining to the issue(s), discussing varied perspectives, and forming recommendations for best practice.

OT 7856. Special Topics in Occupational Therapy. (; 1-3 cr. [max 6 cr.] ; A-F only; Every Fall, Spring & Summer)
Students will locate and critically evaluate information about a topic pertinent in occupational therapy.

OT 7891. Independent Study in Occupational Therapy. (1-3 cr. [max 6 cr.] ; Student Option No Audit; Every Fall, Spring & Summer)
Independent study in Occupational Therapy.

OT 8995. OTD Advanced Practice Capstone Experience and Project. (; 3-10 cr. ; S-N only; Every Fall, Spring & Summer)
The capstone experience enables students to experience an in-depth exposure to an area of advanced OT practice including clinical practice skills, research skills, administration, leadership, program and policy development, advocacy, education or theory development. Learners will complete a data-driven project as part of their experience, evaluating project outcomes and disseminating results to faculty committee and site stakeholders.

Ojibwe (OJIB)

OJIB 5106. Advanced Ojibwe Language I. (; 3 cr. [max 12 cr.] ; A-F or Audit; Every Fall)
Focuses on immersion method.

OJIB 5109. Advanced Ojibwe Language II. (; 3 cr. [max 12 cr.] ; A-F or Audit; Every Spring)
Focuses on immersion method.

OJIB 5202. Ojibwe Mastery I. (3 cr. ; A-F or Audit; Every Fall)
The purpose of the first three years of the Ojibwe language courses at the University is to introduce students to the most common Ojibwe grammatical and conjugational systems, and to help develop their fluency through immersion. In this course and in the subsequent course in the winter semester, students will work towards Ojibwe language mastery by learning less frequent, but crucial aspects of the Ojibwe language and further working towards a more sophisticated level of talking.

OJIB 5204W. Ojibwe Mastery II. (WI; 3 cr. ; A-F or Audit; Every Spring)
The purpose of the first three years of the Ojibwe language courses at the University is to introduce students to the most common Ojibwe grammatical and conjugational systems, and to help develop their fluency through immersion. In this semester, students will continue refining their Ojibwe language ability by studying verb conjugational systems, more complex mii-phrases, reduplication, more grammar pattern study, and more opportunities to use and apply their language skills.

OJIB 5250. Ojibwe Conversations 1. (3 cr. [max 6 cr.] ; A-F or Audit; Periodic Fall & Spring)
The course provide students opportunities to increase their Ojibwe speaking ability through consistent practice and performance of dialogues and stories while receiving native-speaker/instructor feedback. This is a performance based class, which will allow students to apply and practice what they have learned from other Ojibwe courses.

OJIB 5252. Ojibwe Conversations II. (3 cr. ; A-F or Audit; Every Spring)
The course provide students opportunities to increase their Ojibwe speaking ability through consistent practice and performance of dialogues and stories while receiving native-speaker/instructor feedback. This is a performance based class, which will allow students to apply and practice what they have learned from other Ojibwe courses.

Ophthalmology (OPH)

OPH 5201. Orthoptics I. (4 cr. ; S-N or Audit; Every Summer)
Human anatomy, Ocular anatomy, history taking skills, basic optics, Diagnostic Testing I, Intro to Clinical Skills, Vision Screening and Assessment

OPH 5301. Orthoptics II. (5 cr. ; S-N or Audit; Every Fall)
Basic Ophthalmic skills, Strabismus, Retinoscopy, Surgical technique I, Pharmacology I, Clinical Skills II, Embryology

OPH 5401. Orthoptics III. (; 5 cr. ; S-N or Audit; Every Spring)
Pharmacology II, Vision Development, Amblyopia I, Visual Field, Orthoptic treatment I, Clinical Skills III, Visual Fields, Imaging

OPH 5501. Orthoptics IV. (4 cr. ; S-N only; Every Summer)
First semester Advanced Placement of Orthoptics Certificate program. prereq: Admission to Orthoptics Certificate program and completion of

OPH 5601. Orthoptics V. (5 cr. ; S-N only; Every Fall)
Second semester of Advanced Placement Year - Orthoptics training program. prereq: Enrollment in Orthoptics Certificate program

OPH 5701. Orthoptics VI. (5 cr. ; S-N only; Every Spring)
Third semester of Advanced Placement Year - Orthoptics certificate program. Medical Genetics, Ophthalmic Syndromes, Genetic syndromes, Treatment and Management, Oral and Practical exam review, Clinical Skills Review

OPH 7150. Basics of Pediatric Ophthalmology. (; 4 cr. ; P-N only; Periodic Fall, Spring & Summer)
Amblyopia is the leading cause of monocular blindness in children. Early diagnosis and treatment is predictive of outcome. Primary care providers and ophthalmologists have collaborative roles to play in the diagnosis and treatement of amblopia and other pediatric ocular conditions. This course addresses pathophysiology, diagnostics, therapeutics, and the role of team management for childhood opthalmic conditions. prereq: Ped 7501 or Ped 7510 - required; Neur 7510 or Neur 7511 - preferred but not required

OPH 7180. Externship in Ophthamology. (4 cr. ; H-N only; Every Fall, Spring & Summer)
A variety of lectures planned during the first part of the rotation. The remaining two and one-half weeks is spent at one of the three Twin Cities teaching hospitals.

OPH 7181. Acting Intern Neuro-Ophthothalmology. (4 cr. ; H-N only; Every Fall, Spring & Summer)
During the rigorous 4-week rotation, students will be in clinic evaluating patients 8 to 10 half days per week. Students will be expected to work-up new patients at the level of a first-year resident and present them to the neuro-ophthalmology attending. After clinic, students should read about diagnoses encountered in clinic. In addition, there will be required reading. Comprehension of the reading will be assessed by scheduled quizzes which will then be reviewed with the student by a faculty member. Interested students will be encouraged to engage in a research project with one of the faculty members although this is not required for the rotation.

OPH 7190. Ophthalmology Research. (4-8 cr. [max 16 cr.] ; H-N only; Every Fall, Spring & Summer)
This course will introduce the student to some of the research problems in ophthalmology. It will be particularly valuable to someone who is headed for a career in ophthalmology.

OPH 7500. Ophthalmology Acting Internship in Ocular Diagnostics. (4 cr. ; H-N only; Every Fall, Spring & Summer)
Ophthalmology utilizes numerous imaging modalities for diagnosis, monitoring, and treatment of numerous ocular conditions. This course is specifically focused on ocular diagnostics to help students grow in their understanding of these tools in Ophthalmology

and better prepare them for Ophthalmology Residency.

OPH 7910. Ophthalmology Medical Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Ophthalmology medical residency.

OPH 7930. Ophthalmology medical fellowship.. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Ophthalmology Med Fellowship

Oral Biology (OBIO)

OBIO 5001. Methods in Research and Writing. (; 2 cr. ; Student Option; Every Fall)
Skills necessary to begin a research project, including literature review, hypothesis formation, research design, and writing. Each student develops a research protocol.

OBIO 5010. Molecular Virology. (1 cr. ; A-F or Audit; Every Fall)
This course provides graduate students and upper-level undergraduate students with a knowledge base for understanding the molecular aspects of replication strategies utilized in virus replication. Topics for the course will focus on the molecular aspects of virus replication for the major virus families (e.g., arenaviruses, bacteriophages, flaviviruses, herpesviruses, orthomyxoviruses, picornaviruses, and retroviruses) as well as virus evolution, structure, and taxonomy.

OBIO 5020. Virus Pathogenesis and Host Interactions. (1 cr. ; A-F or Audit; Every Fall)
This course provides graduate students and upper-level undergraduate students with a knowledge base for understanding virus pathogenesis and host interactions. Topics for the course will focus on the molecular, cellular, and organismal aspects of virus pathogenesis and host interactions. The concepts of cellular pathogenesis, tissue tropism, portals of entry, local replication and virus spread, virus dissemination, and congenital infections will be covered. A particular emphasis will be placed on virus pathogenesis of the major virus families (e.g., arenaviruses, bacteriophages, flaviviruses, herpesviruses, orthomyxoviruses, picornaviruses, and retroviruses) and virus-host cell interactions that can restrict virus replication and are responsible for immunity will be discussed.

OBIO 5050. Evolution of Emerging Viruses. (2 cr. ; A-F or Audit; Every Spring)
This course is designed to provide graduate students and undergraduate students with junior or senior standing a knowledge base for understanding how HIV and other emerging viruses (e.g., Ebola, influenza, SARS, West Nile virus, hantavirus, hepatitis C) evolve and become public health threats. Topics for the course will focus on the biochemical, molecular, cellular, clinical, and epidemiological aspects of emerging viruses, with an emphasis on how each plays a role in virus evolution and emergence. This course will emphasize HIV as a key example of an emerging virus disease that has had a profound impact on human health.

OBIO 6500. Research Topics in Oral Health & Biology. (3 cr. ; A-F or Audit; Every Fall)
This course introduces graduate students and dental residents to research areas in oral health and biology through faculty experts. Students learn to critically read and review research articles. Prereq: Graduate student in Oral Biology, Dental specialist, or instr consent

OBIO 8012. Basic Concepts in Skeletal Biology. (2 cr. ; A-F or Audit; Every Spring)
Cells (osteoblasts, osteoclasts, chrondrocytes) that make up skeleton. Transcription/signaling networks that regulate cell growth/differentiation. Mechanisms of bone remodeling. Regulation of bone by such agents such as hormones. Prereq Grad student or instr consent.

OBIO 8018. Topics in Oral Pathobiology. (; 2 cr. [max 4 cr.] ; A-F or Audit; Every Fall)
Clinical understanding of oral disease. Correlates about underlying basic mechanisms in microbiology, immunology, cancer biology, developmental biology, neuroscience. Dialog between clinic/bench to improve preventative/treatment modalities. prereq: All students must be degree-seeking graduate students or dental fellows and should hold a PhD or DDS. instr consent for 4th year dental students and PhD students. CDE available for practitioners.

OBIO 8020. Virus Pathogenesis and Host Interactions. (2 cr. ; A-F or Audit; Every Spring)
This course provides graduate students with a knowledge base for understanding virus pathogenesis and host interactions. Topics for the course will focus on the molecular, cellular, and organismal aspects of virus pathogenesis and host interactions. The concepts of cellular pathogenesis, tissue tropism, portals of entry, local replication and virus spread, virus dissemination, and congenital infections will be covered. A particular emphasis will be placed on virus pathogenesis of the major virus families (e.g., arenaviruses, bacteriophages, flaviviruses, herpesviruses, orthomyxoviruses, picornaviruses, and retroviruses) and virus-host cell interactions that can restrict virus replication and are responsible for immunity will be discussed.

OBIO 8021. Oral Microbiology. (; 2 cr. ; Student Option; Fall Odd Year)
Role of indigenous human oral microflora in health/disease. Colonization of oral cavity. Role of specific pathogens in development of dental caries and periodontal diseases. Infections of dental pulp and periapical tissues. Oral manifestations of viral/fungal infections. Microbial considerations in specialty areas of dental practice. prereq: Dental specialist or oral research trainee or instr consent

OBIO 8022. Oral Neuroscience. (; 2 cr. ; Student Option; Spring Odd Year)
Background lectures and student presentations on current research topics to evaluate questions in general motor/sensory function related to oral/nasal structures. Taste, smell, and other chemical senses as they relate to those structures. prereq: Dental specialist or oral research trainee or instr consent

OBIO 8023. Physical Biology of the Oral Cavity. (; 2 cr. ; A-F or Audit; Spring Even Year)
Structure/function of load-bearing components of human masticatory system from biophysical point of view. Mandibular form/movement. Infrastructure of hard tissues as related to occlusal wear and masticatory efficiency. Role of saliva and salivary pellicle in reduction of interocclusal friction. Computer simulation of jaw mechanics. prereq: Dental specialist or oral research trainee or instr consent

OBIO 8024. Genetics and Human Disease. (; 1 cr. ; Student Option; Every Spring)
Principles of medical genetics. Emphasizes oral diseases. Twins, chromosomes, recombinant DNA, major gene traits, genes in populations, chromosomal abnormalities, complex traits, facial clefts, dental caries, periodontal diseases. prereq: Dental specialist or oral research trainee or instr consent

OBIO 8025. Topics in Cariology. (; 2 cr. ; A-F or Audit; Spring Even Year)
Lectures, assigned readings, and discussions of basic epidemiological, biological, and chemical aspects of dental caries. Etiology, epidemiology, and pathogenesis of dental caries. Influence of dietary, salivary, plaque, and microbial factors on caries process. prereq: Dental specialist or oral research trainee or instr consent

OBIO 8026. Salivary Glands and Secretions. (; 2 cr. ; A-F or Audit; Fall Even Year)
Salivary gland structure/development. Mechanisms/control of macromolecule/electrolyte secretion. Salivary protein structure/function, interactions with bacteria. Salivary pellicle, salivary gland disease. Clinical studies, readings, student presentations. Each student develops a research proposal. prereq: Dental specialist or oral research trainee or instr consent

OBIO 8027. Biomaterials in Regenerative Dentistry. (; 2 cr. ; A-F or Audit; Fall Odd Year)
Describes most modern research strategies that are being developed by interdisciplinary groups to obtain revolutionary materials for its use in tissue engineering and regenerative medicine. The central role of biotechnology, nanotechnology, and biomimetics in these research strategies is highlighted. Focus on dental applications is provided. prereq: Dental specialist or oral research trainee or instr consent

OBIO 8028. Molecular Basis of Cellular and Microbial Adhesion. (; 2 cr. ; A-F or Audit; Spring Odd Year)
Biochemical basis of adhesion phenomena. Cells of immune system, development of organs, tissue formation, bacterial colonization of the human. prereq: Dental specialist or oral research trainee or instr consent

OBIO 8030. Oral Biology Seminar. (; 1 cr. [max 10 cr.] ; S-N or Audit; Every Fall & Spring)
Faculty and student discussion of current topics in oral biology. prereq: Dental specialist or oral research trainee or instr consent

OBIO 8050. Evolution of Emerging Viruses. (2 cr. ; A-F or Audit; Fall Odd Year)
This course is designed to provide PhD-level graduate students a knowledge base for understanding how HIV and other emerging viruses (e.g., Ebola, influenza, SARS, West Nile virus, hantavirus, hepatitis C) evolve and become public health threats. Topics for the course will focus on the biochemical, molecular, cellular, clinical, and epidemiological aspects of emerging viruses, with an emphasis on how each plays a role in virus evolution and emergence. This course will emphasize HIV as a key example of an emerging virus disease that has had a profound impact on human health. MS-level and advanced undergraduate students should register for OBIO 5050.

OBIO 8093. Tutorial in Oral Biology. (; 1-2 cr. ; S-N only; Every Fall & Spring)
Semester-long apprenticeship with faculty members to familiarize students with faculty research interests. Individual study of selected topics. prereq: instr consent

OBIO 8094. Directed Research. (; 1-10 cr. ; S-N or Audit; Every Fall & Spring)
tbd prereq: instr consent

OBIO 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

OBIO 8371. Mucosal Immunobiology. (; 3 cr. ; A-F or Audit; Every Fall)
Host immune processes at body surfaces. Innate/adaptive immunity at mucosal surfaces. Interactions/responses of various mucosal tissues to pathogens. Approaches to target protective vaccination to mucosal tissues. Lectures, journal. prereq: MICa 8001 or equiv or instr consent

OBIO 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

OBIO 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

OBIO 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

OBIO 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Oral and Maxillofacial Surgery (OSUR)

OSUR 5257. Ambulatory General Anesthesia for the Oral and Maxillofacial Surgeon. (; 0-6 cr. ; S-N only; Every Fall, Spring & Summer)
Clinical rotation involving experience in outpatient management and using intravenous sedation and general anesthesia. prereq: Participation in oral and maxillofacial surgery training program.

OSUR 5276. Medicine Rotation for the Oral and Maxillofacial Surgeon. (; 0-6 cr. ; S-N only; Every Fall, Spring & Summer)
Clinical rotation at Fairview-University Medical Center under the direction of the Internal Medicine Department. Involves workup, admission, and daily management of patients on medical service, specifically cardiology and pulmonary. prereq: Participation in oral and maxillofacial surgery training program.

OSUR 5277. Physical Diagnosis for Oral Surgery Residents. (; 2 cr. [max 6 cr.] ; S-N only; Every Summer)
Six-week didactic course coupled with evaluation of patients. prereq: Participation in oral and maxillofacial surgery training program.

OSUR 8250. Oral and Maxillofacial Surgery Rotation for the Oral and Maxillofacial Surgeon. (; 0-6 cr. ; S-N only; Every Fall, Spring & Summer)
Rotations at assigned oral and maxillofacial surgery clinics and operating rooms at Fairview-University Medical Center, Hennepin County Medical Center, Veterans Administration Medical Center. prereq: Participation in oral and maxillofacial surgery training program

OSUR 8251. Oral and Maxillofacial Surgery Core Curriculum. (; 0-2 cr. ; S-N only; Every Fall, Spring & Summer)
Standardized curriculum of fundamental concepts of surgery and medicine. Fourteen core curriculum topics covered in a two-year cycle. prereq: Participation in oral and maxillofacial surgery training program

OSUR 8253. Case Presentations and Chief Conferences. (; 0-6 cr. ; S-N only; Every Fall, Spring & Summer)
Topic-oriented journal reviews. Guest oral surgeons, specialists, or chief resident present topics in case-based format. prereq: Participation in oral and maxillofacial surgery training program

OSUR 8254. Oral and Maxillofacial Surgery Resident Presentations. (; 0-6 cr. ; S-N only; Every Fall, Spring & Summer)
Contemporary subjects researched and presented by current residents. prereq: Participation in oral and maxillofacial surgery training program

OSUR 8255. General Surgery Rotation for the Oral and Maxillofacial Surgeon. (; 0-6 cr. ; S-N only; Every Fall, Spring & Summer)
Clinical rotation on general surgery, neurosurgery, and surgical intensive care unit at Hennepin County Medical Center. Seminars, clinics, and operating room experience. prereq: Participation in oral and maxillofacial surgery training program

OSUR 8256. Contemporary Anesthesia Literature Review. (; 0-6 cr. ; S-N only; Every Fall, Spring & Summer)
Seminar presentation format of current publications that address anesthesia management for the oral and maxillofacial surgery patient. prereq: Participation in oral and maxillofacial surgery training program

OSUR 8258. Off-Site Hospital Rotation for the Oral and Maxillofacial Surgeon. (; 0-6 cr. [max 18 cr.] ; S-N only; Every Fall, Spring & Summer)
Clinical rotation at North Memorial Medical Center under instruction of Oral and Maxillofacial surgeons to receive new or additional training/experience in the areas of management of traumatic head and neck injuries, pathology of the head and neck to include malignant and non-malignant disease, reconstruction of major facial defects, infections of the head and neck, and management complex facial deformities. prereq: Participation in Oral and Maxillofacial Surgery training program

OSUR 8260. Surgical Rounds for the Oral and Maxillofacial Surgeon. (; 0-6 cr. ; S-N only; Every Fall, Spring & Summer)
Pre- and post-operative case discussions of patients currently being managed for surgery at all affiliated institutions. As they relate to individual patients, discussions involve medical, anesthesia, surgical, and management of post-surgical and sequela complications. prereq: Participation in oral and maxillofacial surgery training program

OSUR 8262. Plastic Surgery Rotation for the Oral and Maxillofacial Surgeon. (; 0-6 cr. ; S-N only; Every Fall, Spring & Summer)
Clinical rotation at HealthPartners St. Paul Ramsey Medical Center under direction of plastic and reconstructive surgery faculty. Elective or trauma cosmetic and esthetic surgery experience. prereq: Participation in oral and maxillofacial surgery training program

OSUR 8267. Anesthesia Rotation for the Oral and Maxillofacial Surgeon. (; 0-6 cr. ; S-N only; Every Fall, Spring & Summer)
Clinical rotation at Fairview University Medical Center under direction of anesthesia faculty. After a suitable period of supervision determined by anesthesia faculty, residents are assigned their own anesthesia room and are given responsibility for pre-operative patient evaluation and inter-operative management of patient's general anesthetic. prereq: Participation in oral and maxillofacial surgery training program

Org Leadership, Policy & Dev (OLPD)

OLPD 5001. Formal Organizations in Education. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Classical/current theories of organizations. Applications to education and related fields.

OLPD 5002. Private Colleges as Formal Organizations. (; 3 cr. ; A-F or Audit; Every Fall, Spring & Summer)

Provide certificate students with introduction to contemporary thinking on organizations/ administration. Primary focus on organizational theory. prereq: Bachelors degree must be completed before starting this course.

OLPD 5003. Borderland, Education Policy, Immigrant Expereince. (3 cr. ; Student Option; Every Spring)
Borderland, Education Policy and Immigrant Student Experience brings to focus the history of individual, institutional (educational) and cultural forms of marginalization and discrimination of immigrant communities from US history. This class includes a Spring Break trip to Tucson and the Sonora Desert led by the non-profit Borderlinks (www.borderlinks.org). Service learning opportunities may include water drops in the desert, interpreting for newly arrived migrants and serving as a supportive witness for migrants at deportation court. Both in Minnesota and Tucson, participants will dialogue with local stakeholders, advocates and agents of change including migrants, activists, border patrol, ranchers, faith communities, lawyers and lawmakers. Students will also have the opportunity to compare and contrast US immigrant issues with those across the globe.

OLPD 5005. School and Society. (2 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Readings in history, philosophy, social sciences, and law revealing diverse educational values in a pluralistic society. Multiple expectations of schools. Civil liberties, rights, community. Varying cultural backgrounds of students, family circumstances, exceptional needs. prereq: Jr or sr or MEd/ initial licensure student or CLA music ed major or preteaching major or instr consent

OLPD 5009. Human Relations: Applied Skills for School and Society. (1 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Issues of prejudice/discrimination in terms of history, power, social perception. Knowledge/ skills acquisition in cooperative learning, multicultural education, group dynamics, social influence, leadership, judgment/ decision making, prejudice reduction, conflict resolution, teaching in diverse educational settings. prereq: MEd/init lic or CLA music ed or preteaching or instr consent

OLPD 5011. Leading Organizational Change: Theory and Practice. (; 3 cr. ; Student Option; Every Fall)
How theory is incorporated, affects the change process, and can improve schools/institutions of higher education. Characteristics that impact change processes/outcomes. Leadership/policy effects.

OLPD 5033. Foundations of Individual/ Organizational Career Development. (; 3 cr. ; Student Option; Every Spring)
Introduction to individual and organizational career development theory and practice. Examines critical issues in work patterns, work values, and workplaces in a changing global society, with implications for career planning, development, and transitions, emphasizing personal and organizational change. For nonmajors: serves students in adult ed, HRD, IR, college student advising, and other related fields.

OLPD 5041. Sociology of Education. (; 3 cr. ; Student Option; Every Spring)
Structures and processes within educational institutions; linkages between educational organizations and their social contexts, particularly related to educational change.

OLPD 5044. Introduction to the Economics of Education. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Costs and economic benefits of education, with a focus on K-12; educational markets, prices, and production relationships; investment and cost-benefit analysis.

OLPD 5048. Cross-Cultural Perspectives on Leadership. (; 3 cr. ; Student Option; Every Fall & Summer)
Introduction to cultural variables of leadership that influence functioning of cross-cultural groups. Lectures, case studies, discussion, problem-solving, simulations. Intensive workshop.

OLPD 5056. Case Studies for Policy Research. (; 3 cr. ; A-F or Audit; Periodic Fall, Spring & Summer)
This course introduces students to knowledge and skills appropriate for the conduct of rigorous case study research in educational, organizational, and other social settings. Underlying purposes and assumptions of case study methods will be examined as well as a variety of methodological approaches. The course focuses on the use of qualitative and mixed-methods approaches as these are the predominant strategies employed in contemporary case study research. Accordingly, it emphasizes links between research purposes, the conceptualization of case study projects, and the development of researchable questions. It also takes up a variety of ethical and political issues related to working with participants during the research process, as well as contemporary trustworthiness criteria for case study reports. The bulk of the course is given to training in observation, generating field notes, interviewing, collecting material cultural artifacts, using surveys, and analyzing, interpreting, and writing up case study data. The first segment of the course focuses on a critical discussion of research paradigms and epistemological assumptions of a variety of case study approaches. Students choose and critique a published case study from their field of interest. The second part of the course is devoted to a very small scale case study project which students design and carry out themselves. This project is supported by relevant readings and in-class activities (including peer review) related to the actual conduct of case study research.

OLPD 5061. Ethnographic Research Methods. (; 3 cr. ; Student Option; Periodic Fall, Spring & Summer)
This course introduces students to knowledge and skills appropriate for the conduct of ethnographic research. Underlying purposes, assumptions, and distinctive characteristics of ethnographic methods will be examined as well as appropriate exemplars. Accordingly, the course emphasizes links between research purposes, the conceptualization of ethnographic projects and the development of researchable questions. The course also takes up a variety of ethical and political issues related to working with participants during the research process, as well as contemporary trustworthiness criteria for ethnographic written accounts. The bulk of the course is given to training in observation, generating field notes, developing interview questions, interviewing, collecting material cultural artifacts, using surveys, and analyzing, interpreting, and writing up ethnographic data. The first part of the course focuses on a critical discussion of ethnographic research purposes, epistemological assumptions, and essential features. Students choose and explore a published ethnographic study from their field of interest. The second part of the course is devoted to a very small scale ethnographic project which students design and carry out themselves. This project is supported by relevant readings and in-class activities (including peer review) related to the actual conduct of ethnographic research.

OLPD 5080. Special Topics: Organizational Leadership, Policy, & Development. (; 1-3 cr. [max 9 cr.] ; Student Option; Every Fall, Spring & Summer)
Topical issues in organizational leadership, policy, development.

OLPD 5087. MA Research Seminar. (3 cr. ; S-N only; Every Fall, Spring & Summer)
OLPD 5087, MA Research Seminar, is intended to support OLPD Masters students working on their plan A or plan B papers. The course will focus on conducting effective research and developing the writing skills and habits needed to support the development and completion of the paper, including setting individual and realistic goals to further the project. Class time will include review and discussion of research strategies and practice, expectations for graduate level writing, in-class research and writing time, reviewing and commenting on work in progress in small groups, and review of proper APA style documentation and practices.

OLPD 5095. Problems: Organizational Leadership, Policy, and Development. (1-3 cr. [max 24 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Course or independent study on specific topic within department program emphasis.

OLPD 5096. Internship: Organizational Leadership, Policy, and Development. (; 1-9 cr. [max 24 cr.] ; Student Option; Every Fall & Spring)
Internship in elementary, secondary, general, postsecondary administration, or other approved field related setting.

OLPD 5103. Comparative Education. (; 3 cr. ; Student Option; Every Fall)
Examination of systems and philosophies of education globally with emphasis upon African,

Asian, European, and North American nations. Foundations of comparative study with selected case studies.

OLPD 5104. Strategies for International Development of Education Systems. (; 3 cr. ; A-F or Audit; Periodic Fall)
This course provides a critical analysis of strategies used to improve educational outcomes worldwide. This course examines contemporary trends in educational policy, development, and practice, focusing on how?s and why?s of educational change. Empirical studies, organizational reports, and student experiences all inform class discussion. prereq: Grad student

OLPD 5107. Gender, Education, and International Development. (3 cr. ; A-F or Audit; Every Fall)
Role of gender/gender relations in international development/education. Interdisciplinary body of literature from development studies, political science, economics, anthropology, cultural studies, gender/women's studies.

OLPD 5121. Educational Reform in International Context. (; 3 cr. ; Student Option; Every Spring)
Critical policy analysis of educational innovation and reform in selected countries. Use theoretical perspectives and a variety of policy analysis approaches to examine actual educational reforms and their implementation.

OLPD 5122. Indigenous Education: Research, Policy, and Practice. (; 3 cr. ; A-F only; Periodic Fall, Spring & Summer)
This course examines the relationship between local cultures, knowledges, and education. Linked with the field of comparative and international education, this course pays particular attention to local Indigenous educational experiences and in the global context. These experiences are examined using chronological (factors of time), thematic (topical yet interconnected ideas), and critical approaches (issues requiring urgent attention), including analysis of historical trajectories of Indigenous education, the expansion of mass schooling, education and language ideologies and policies, and notions of resistance, agency, and innovation in educational design that addresses pressing concerns today. This course assumes Indigenous education as part of an array of anti-, post-, and decolonial strategies for Indigenous self-determination, and thus takes a holistic and connective approach towards understanding educational design, practice, and impacts as part of Indigenous knowledge systems. The course also assumes multiple definitions of education proposed by Indigenous and other critical scholars, highlighting education as a) formal schooling historically designed by non-Indigenous groups, b) ancestral education/ Indigenous socialization; and c) Indigenous sovereign pedagogies (Goodyear-Ka?? pua, 2013). The course seeks to expand our understanding of the vital links between these different educational practices, in and out-of- school and across diverse places, from U.S. American Indian and Alaska Native communities to agrarian Indigenous communities in the highland Andes to the Pacific Islands and beyond. Central to student work in this course is learning the ways in which Indigenous communities shape learning contexts while drawing from multiple epistemologies. Three main themes comprise the course and are reflected through readings and lectures: 1) Patterns in policy (e.g. education, land/environmental, language, etc.) for historically underrepresented and underserved populations; 2) The role of families, communities, and place-based pedagogies in formal and out-of-school education; and 3) Creative proposals for educational development, based on Indigenous research and in relation to Indigenous knowledge systems, and that lend themselves towards Indigenous self-determination. Students are asked to critically examine the role of education under local, national and international pressures and amidst other variables, including environmental degradation and to offer their own proposals toward innovative Indigenous education research agendas that inform education design and practice?meaning, this course aims to provide insights, but most importantly to cultivate dialogue and exchange questions and ideas because there are no singular, closed, or universal solutions to educational design. For students interested in certain topics related to the identified themes, this course introduces but is not limited to Indigenous Knowledge Systems, Traditional Ecological Knowledge, Indigenous community-based education, Indigenous and global languages, decolonial research, and endogenous development. Students are invited to cultivate their own focal areas in relation to prior knowledge and current study interests.

OLPD 5124. Critical Issues in International Education and Educational Exchange. (; 3 cr. ; Student Option; Every Spring)
Analysis of comprehensive policy-oriented frameworks for international education; practices of U.S. and other universities; conceptual development of international education and its practical application to programs, to employment choices, and to pedagogy.

OLPD 5128. Anthropology of Education. (; 3 cr. ; Student Option; Periodic Spring)
Insights from educational anthropology for educators to address issues of culture, ethnicity, and power in schools.

OLPD 5132. Intercultural Education and Training: Theory and Application. (; 3 cr. ; Student Option; Periodic Fall, Spring & Summer)
Introduction to the field of intercultural education and related field of multicultural education; analyzes the field through a critical lens; examines diverse meanings of education, including cultural knowledge.

OLPD 5201. Strategies for Teaching Adults. (; 3 cr. ; A-F or Audit; Periodic Fall, Spring & Summer)
Psychological theories of adult learning; learning styles and personality types; teaching styles; group and team learning; moderating and study circles; teaching technologies and distance learning; gender, race, and cultural communication. Applications of strategies. prereq: Grad student only

OLPD 5202. Perspectives of Adult Learning and Development. (; 3 cr. ; Student Option; Periodic Fall, Spring & Summer)
Emphasis on major adult development theorists, theories, and current applications. Transformative learning, self-directed learning, experiential learning, and cooperative learning provide theoretical framework for exploring physiological, psychological, sociological, and cultural aspects of adult development through the life span.

OLPD 5204. Designing the Adult Education Program. (; 3 cr. ; A-F or Audit; Periodic Spring)
Designing and implementing educational programs for adults. Application of concepts, theories, and models in different adult learning situations.

OLPD 5211. Introduction to the Undereducated Adult. (; 1 cr. ; A-F or Audit; Every Summer)
Definitions of literacy in workplace, community, and family. Issues: poverty/welfare, ethnicity, cultural diversity, social class, language/ learning, immigrants.

OLPD 5296. Field Experience in Adult Education. (1-6 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Supervised fieldwork and practice. Presentations and evaluations of adult education practices.

OLPD 5309. Culturally Responsive School Leadership. (3 cr. ; A-F only; Periodic Fall, Spring & Summer)
This course will cover the histories, contexts, and major strands of culturally responsive school leadership. Module 1 begins with an overview of some of the primary sources of oppression in the West and the Global South. Here, we cover material on varying epistemologies, the nature of bias, critical self-reflection, and schools, space, and identity. In Module 2, we will examine how these oppressive practices and systems exist in the modern era. We look then at how they enter institutions and how they are reproduced. This includes an examination of various types of bigotry and discrimination in school. In Module 3, we begin to look at how these histories and complex, dynamic systems of power, privilege, and oppression enter and express in schools and communities. We move from the individual to the collective as we explore the many divides between school and community people and perspectives. In Modules 4 and 5, we finally look at emancipatory, liberatory, and culturally responsive models of schooling. In this last part of the course, we look at how community-based and indigenous knowledge can be used to inform schooling. Here, we dig deep into culturally responsive leadership practice, spending time unpacking 4 major strands of culturally responsive school leadership. We look at how curriculum, instructional leadership, PDs, and other resources are structured to improve equity in

a building. We take up the community-based approaches to education.

OLPD 5321. The Principal as Leader of High-Performing Schools. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Theory and practice for educational leadership that is specifically applied to the principalship. Overview competencies in AR 3512 required for MN K-12 principal licensure. Examines roles of the principal as a leader and manager. prereqs: OLPD 5385 Licensure Seminar: Program Policies and Inclusionary Leadership or concurrent registration and OLPD 5386 Leadership Portfolio or concurrent registration.

OLPD 5322. Leaders in the Superintendency and Central Office. (; 3 cr. ; Student Option; Periodic Fall, Spring & Summer)
Role/responsibility of superintendent in school district. Real life experiences, leadership potential as CEO. Purposes, power, politics, practices of position. Interplay of internal school forces, community forces. Leadership in public, high-profile appointment. Addresses competencies required under MN AR 3512 for administrative licensure. Grad students working on K-12 Administrative Licensure, MA, MED or PHD prereqs: OLPD 5385 Licensure Seminar: Program Policies and Inclusionary Leadership or concurrent registration and OLPD 5386 Leadership Portfolio or concurrent registration.

OLPD 5324. Strategic Financial Planning and Policy for Educational Leaders. (; 3 cr. ; Student Option; Periodic Fall, Spring & Summer)
State-local school finance systems, budgeting, governmental fund accounting. Interpretation of financial information. Addresses competencies required under MN AR 3512 for administrative licensure Grad students working on K-12 Administrative Licensure, MA, MED or PHD prereqs: OLPD 5385 Licensure Seminar: Program Policies and Inclusionary Leadership or concurrent registration and OLPD 5386 Leadership Portfolio or concurrent registration.

OLPD 5344. School Law. (; 3 cr. ; Student Option; Every Spring & Summer)
Legal foundations of elementary/secondary education. Statutory themes, relevant case law, emergent policy issues. Implications for educational organizations and for administrative practice. Addresses competencies required under MN AR 3512 for administrative licensure. Grad students working on K-12 Administrative Licensure, MA, MED or PHD prereqs: OLPD 5385 Licensure Seminar: Program Policies and Inclusionary Leadership or concurrent registration and OLPD 5386 Leadership Portfolio or concurrent registration.

OLPD 5346. Politics of Education. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Political dimensions of policy formulation/ implementation in education. Use of power/ influence in shaping educational policies and in resolving conflicts over educational issues. Analysis of consequences/cross-impacts. prereq: postbac, MEd, or grad student

OLPD 5348. Leaders of Human Resources Administration. (; 3 cr. ; Student Option; Periodic Fall, Spring & Summer)
Skills for administrator/leader. Human resources administration, employee recruitment, selection, orientation/support, supervision, performance appraisal of school district personnel. Addresses competencies required under MN AR 3512 for administrative licensure. prereqs: OLPD 5385 Licensure Seminar: Program Policies and Inclusionary Leadership or concurrent registration and OLPD 5386 Leadership Portfolio or concurrent registration.

OLPD 5356. Disability Policy and Services. (; 3 cr. ; Student Option; Every Spring & Summer)
Policy, research, and current practices related to education, health, and social services that support children, youth, and adults with special needs, and that support their families. Federal, state, and local perspectives.

OLPD 5361. Project in Teacher Leadership. (; 3 cr. ; Student Option No Audit; Periodic Fall, Spring & Summer)
Create, implement, evaluate, and present a leadership project designed to initiate positive change in educational environments. Review of related literature, proposal development, project development, implementation and evaluation, critical reflection, sharing learning outcomes. . If Administrative Licensure candidate see advisor. prereqs: Grad students working on K-12 Administrative Licensure and/or Master in Education (Leadership in Education)

OLPD 5364. Context and Practice of Educational Leadership. (; 3 cr. ; A-F or Audit; Every Fall & Summer)
Current research/practice on educational leadership. Focuses on creating school cultures conducive to continuous improvement/ change. Strategies for personal/organizational leadership in PK-12 settings.

OLPD 5368. Leadership for Special Education Services. (; 3 cr. ; Student Option; Periodic Fall, Spring & Summer)
Legislative, procedural, executive, and judicial actions that affect services, families, and children with special needs at federal, state, and local levels. Overview of cultural competence, conflict management, due process, supplemental programs. Addresses competencies required under MN AR 3512 for administrative licensure Grad students working on K-12 Administrative Licensure and/or Master in Education (Leadership in Education) prereqs: OLPD 5385 Licensure Seminar: Program Policies and Inclusionary Leadership or concurrent registration and OLPD 5386 Leadership Portfolio or concurrent registration.

OLPD 5374. Leadership for Professional Development. (; 4 cr. ; Student Option; Every Fall)
Designing, implementing, evaluating staff development in preK-12 settings. Research-based standards for effective staff development. Need for embedded time for collaborative learning, evaluating staff/student outcomes. prereq: Postbaccaleaureate, at least 3 yrs teaching experience

OLPD 5375. Special Education Finance: Program Models, Policy, and Law. (; 2 cr. ; Student Option; Every Summer)
How special education revenue is a resource to accomplish student-related objectives. Revenue sources, compliance, budget monitoring. Key policy, case law, program models from perspective of director of special education. prereq: Grad students working on K-12 Administrative Licensure and/or Master in Education (Leadership in Education)

OLPD 5376. Leading School Tax Elections. (; 1 cr. ; S-N or Audit; Periodic Fall, Spring & Summer)
Comprehensive planning model for conducting school tax elections. Emphasizes systems, strategies, and campaign tactics.

OLPD 5377. Leadership in Community Education Finance and Law. (; 1 cr. ; Student Option; Periodic Fall, Spring & Summer)
Statute 124D and its relationship to each of the categories of community education: early childhood, family education, adult basic education, and ALC funding. Revenues and expenditures, UFARS, and how to access information. Organize financial and legal data for presentation. The course will be approached from the frame of resource development. Prereqs: OLPD 5385, OLPD 5386

OLPD 5384. Special Education Law for Leaders. (; 1 cr. ; Student Option; Every Fall & Summer)
Competencies of leadership, policy, and political influence. Legal/regulatory applications focusing on special education law. Addresses competencies required under MN AR 3512 for administrative licensure prereq: Grad students working on K-12 Administrative Licensure and/or Master in Education (Leadership in Education)

OLPD 5385. Licensure Seminar: Program Policies and Inclusionary Leadership. (; 1 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Overview of the rules and requirements of the U of M and MN AR, completion of the required individual pre-assessment, development of the learner?s individualized program plan. Discussion of beliefs and values that guide administrative leadership, and completion of the Intercultural Conflict Style Inventory.

OLPD 5386. Leadership Portfolio Seminar. (; 1 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Development of electronic administrative licensure portfolio to use throughout Administrative Licensure program. Address competencies as mandated in the LEAPS Act. Addresses competencies required under MN AR 3512 for administrative licensure. prereq: OLPD 5385 or concurrent registration is required.

OLPD 5387. Leadership for Teaching and Learning. (; 3 cr. ; Student Option; Periodic Fall, Spring & Summer)
Multiple aspects of administrating teaching/ learning. Administration of teaching/learning as system in inclusive schools. Questions

administrator must ask as leader of learning for students/adults. Addresses competencies required under MN AR 3512 for administrative licensure. prereqs: OLPD 5385 Licensure Seminar: Program Policies and Inclusionary Leadership or concurrent registration and OLPD 5386 Leadership Portfolio or concurrent registration.

OLPD 5388. Leadership for Master(ful) Scheduling. (; 2 cr. ; Student Option; Periodic Fall, Spring & Summer)
Work of high-performing professional learning communities. Implications for moving from building master schedule to leadership for master(ful) scheduling of time, space, motion, people. Addresses competencies required under MN AR 3512 for administrative licensure. prereqs: OLPD 5385 Licensure Seminar: Program Policies and Inclusionary Leadership or concurrent registration and OLPD 5386 Leadership Portfolio or concurrent registration.

OLPD 5389. Community Education Leadership. (; 3 cr. ; Student Option; Periodic Fall, Spring & Summer)
Competencies of leadership, community relations, communication, community assessment, program development, program evaluation. Philosophy/administration of community/alternative education programs. Addresses competencies required under MN AR 3512 for administrative licensure. prereqs: OLPD 5385 Licensure Seminar: Program Policies and Inclusionary Leadership or concurrent registration and OLPD 5386 Leadership Portfolio or concurrent registration.

OLPD 5396. Field Experience in PK-12 Administration: Authentic Practice in Leadership. (; 3 cr. [max 12 cr.] ; S-N or Audit; Every Fall & Spring)
Field experience or internship arranged for students seeking licensure as PK-12 principal/ superintendent. Content/credit depend on licensure requirements specified in individual field experience agreement prereqs: OLPD 5385 Licensure Seminar: Program Policies and Inclusionary Leadership or concurrent registration and OLPD 5386 Leadership Portfolio or concurrent registration.

OLPD 5501. Principles and Methods of Evaluation. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Introduction to program evaluation. Planning an evaluation study, collecting and analyzing information, reporting results; evaluation strategies; overview of the field of program evaluation.

OLPD 5502. Comparative evaluation theory for practice. (; 3 cr. ; A-F only; Every Fall & Summer)
This class will give students the foundation in evaluation theory necessary for high-quality and ethical practice in evaluation, consulting, or other forms of organizational change Recommend 5501 or equivalent (can be taken concurrently)

OLPD 5521. Cost and Economic Analysis in Educational Evaluation. (; 3 cr. ; Student Option; Every Fall)
Use and application of cost-effectiveness, cost-benefit, cost-utility, and cost-feasibility in evaluation of educational problems and programs.

OLPD 5601. Introduction to Human Resource Development. (; 3 cr. ; Student Option; Periodic Fall, Spring & Summer)
This course introduces the primary foci of the MHRD program classes as an introduction to the theory and the current practices in human resource development that will be dealt with in more detail in the other ten (10) graduate classes that support the MHRD degree. The primary focus of the theory and practice will be: ? Organization Development and Change ? Training and Development with a specific focus on design aspects of in-person, online, and leadership development programs ? Career planning

OLPD 5604. Systems Foundation of Human Resource Development. (; 1 cr. ; Student Option; Every Fall, Spring & Summer)
Introduction to system theory as a core discipline supporting the theory and practice of human resource development. prereq: 5601

OLPD 5605. Strategic Human Resource Development. (; 3 cr. ; A-F or Audit; Periodic Fall, Spring & Summer)
Strategic nature of organizations. How HRD can align its goals with those of organization. Strategic planning, systems thinking. Ways HRD managers can become strategic players in organization. prereq: 5607 or 5615 or HRD 5201 or HRD 5301

OLPD 5606. Human Resource Development Evaluation Strategies. (; 3 cr. ; A-F or Audit; Periodic Fall, Spring & Summer)
This class will focus on the exploration of evaluation methods for human resource development programs and projects. This includes the systematic collection of data needed to make decisions related to the strengths and weaknesses of selection, adoption, value, and implementation of programs and projects.

OLPD 5607. Organization Development. (; 3 cr. ; A-F or Audit; Periodic Fall, Spring & Summer)
Introduction to major concepts, skills, and techniques for organization development/ change. prereq: Grad student only

OLPD 5611. Facilitation and Meeting Skills. (; 1 cr. ; Student Option; Every Fall, Spring & Summer)
Introduction to the disciplines of planning and running effective meetings. Tools and methods for meeting management and evaluation are presented within the context of organization development.

OLPD 5612. International Human Resource Development. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Problems, practices, programs, theories, and methodologies in human resource development as practiced internationally. prereq: Grad students only; ugrd seniors with instr consent

OLPD 5613. Survey of Research Methods and Emerging Research in Human Resource Development. (; 3 cr. ; A-F or Audit; Periodic Spring)
Role of research in HRD. Standards/criteria for evaluating research, critique of conference research papers, identification of emerging research themes. Offered in conjunction with the annual conference of Academy of HRD. prereq: [Registered, in attendance] at conference of Academy of HRD

OLPD 5615. Training and Development of Human Resources. (; 3 cr. ; A-F or Audit; Periodic Fall, Spring & Summer)
Training/development of human resources in organizations. Process phases of analysis, design, development, implementation, and evaluation. prereq: Grad student only

OLPD 5616. Instructional Design for e-Learning. (; 3 cr. ; Student Option; Periodic Fall, Spring & Summer)
Major concepts, skills, and techniques for giving and receiving training on the Internet. prereq: Grad student only

OLPD 5617. Diversity, Equity, Inclusion, and Belonging. (; 3 cr. ; A-F only; Periodic Fall, Spring & Summer)
This class will focus on two elements of DEI&B: 1) awareness and 2) skill building/behavior training. The first half on the semester is focused on the awareness of important DEI&B issues facing people and organizations in a global workplace. This includes defining the global workplace and how it may be the same and different from smaller local organizations. The second half of the semester will be focused on building skills and behaviors needed in purpose-driven global workplaces. This will be an interactive and engaged set of activities that include role play, virtual reality, and case studies. The primary audience for this class will be graduate students who plan to be HRD leaders and those that are in the online MHRD program.

OLPD 5618. Leadership Development Training. (; 3 cr. ; A-F only; Periodic Fall, Spring & Summer)
The focus of this class is to introduce best practices in leadership development training leveraging adult learning and training theories to develop effective organizational leaders. While this class will look at leadership styles, it will also focus on training strategies that support strong skills in leadership (e.g. developing vision and mission in a purpose driven organizations, developing people and organization-level strategies, and finally creating skills that support the implementation of these strategies). Along with training topics, students will develop expertise in individual leadership assessment instruments commonly used in leadership training functions. The primary audience will be HRD people who develop and implement leadership training programs globally.

OLPD 5619. Planning and Decision-Making Skills. (; 1 cr. ; Student Option; Every Fall, Spring & Summer)
Introduction to the disciplines of planning and decision making typically used in process improvement interventions. Tools and methods for facilitating group decisions and problem solving.

OLPD 5696. Internship: Human Resource Development. (; 1-10 cr. ; S-N or Audit; Periodic Fall & Spring)
Students apply/contract for human resource development positions. prereq: [[3901 or HRD 3601, [3696 or HRD 3196], [3620 or 3640 or HRD 3201 or HRD 3301], [3202 or ADED 3101], undergrad] or [[5607 or 5615 or HRD 5201 or HRD 5301], [5801 or WHRE 5001], grad student]], instr consent

OLPD 5701. U.S. Higher Education. (; 3 cr. ; Student Option; Every Fall & Summer)
U.S. higher/postsecondary education in historical/contemporary perspective. Emphasizes structure, history, and purposes of system as a whole.

OLPD 5702. Higher Education in Global Contexts. (3 cr. ; A-F only; Periodic Fall, Spring & Summer)
This course is an introductory overview of higher education in the international context and the processes of internationalization in which higher education institutions engage. It addresses contemporary issues facing regions, countries, and higher education institutions across the world and focuses on how higher education institutions approach their global work. The outcomes sought for students in this course include the following: Understanding of broad historical events, including the political, cultural, religious, psychological, and economic factors that shaped higher education in regions and countries across the world; Knowledge about the role of the federal government in shaping the structure of the higher education system in specific countries; Understanding of the process of internationalization as it relates to institutions across the world; Identification of the motivating factors that influence international activity related to higher education institutions; Identification of the cultural and sociopolitical factors that drive internationalization in higher education institutions. No single course can address all of the topics related to international higher education. In this course, the following seven primary questions serve as the focus for an analysis of international higher education: 1) What are the most significant historical factors that shaped higher education in a specific country, and to what extent do those country-specific historical factors help understand higher education in the region? 2) What is the role of the federal government in a country, and to what extent are within-country differences analogous to differences among states in the United States? 3) How is higher education financed within a country, and are there regional economic forces that affect countries in the region? 4) What is the structure of higher education in the country (e.g., public institutions, private non-profit institutions, and for-profit institutions)? 5) What sociocultural, political, and institutional aspects of institutions? global initiatives.

OLPD 5703. College Student Mental Health and Wellbeing. (3 cr. ; A-F only; Periodic Fall, Spring & Summer)
College counseling centers across the U.S. report that the number of students with significant mental health and wellness issues is an increasing concern. For example, 21 percent of counseling center students present with severe mental health concerns, while another 40 percent of students exhibit mild mental health problems. These numbers will be exacerbated as a result of the ongoing Covid-19 pandemic. An unknown number of students receive support from college staff who work in student support roles. College Student Mental Health and Wellness, will critically explore research and practice describing the mental and emotional concerns of students on college campuses and the types of interventions designed to address them. Topics in the course will include ? but will not be limited to ? types of mental health concerns, ways in which multicultural issues influence how students express mental health concerns, working with students in crisis, structures of referral sources, ethical and legal issues, managing mental health in Covid-19, and self-care for those working with these students on college campuses. Components on effective strategies for providing psychological support will assist students in the development of their communication skills. We will also explore a range of wellness issues that intersect with mental health and wellness concerns. Note: this class will focus on the exploration of mental health issues from higher education and student affairs perspectives (e.g. how can higher education professionals and student affairs staff best support students with mental health concerns across individual and institutional levels?).

OLPD 5704. College Students Today. (; 3 cr. ; Student Option; Every Spring & Summer)
Issues involving population of students in colleges/universities. College student development theory, students' expectations/ interests. How college affects student outcomes. Role of curricular/extracurricular activities. Student-faculty interaction.

OLPD 5709. Critical Issues in Higher Education. (; 3 cr. ; A-F or Audit; Every Spring)
Issues/opportunities facing American higher education. Financial, demographic, athletics, for-profit, changing public opinion. Framework for analysis.

OLPD 5712. College Student Development Theory and Practice. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Multicultural student development theories/ theorists. Implications for teaching/learning. Students reflect on The Student Personnel Point of View and Learning Reconsidered: Campus-wide Focus on the Student Experience and other collaborative efforts.

OLPD 5721. Race and Ethnicity in Higher Education. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Review of research. Theoretical frameworks, methodological perspectives, and research strategies used to study students, staff, and faculty. Historical perspectives.

OLPD 5724. Leadership and Administration of Student Affairs. (; 2-3 cr. ; Student Option; Periodic Fall & Spring)
Scope, administration, coordination, and evaluation of programs in college and university student affairs.

OLPD 5732. The Law and Postsecondary Institutions. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Analysis of court opinions and federal regulations affecting postsecondary educational institutions.

OLPD 5736. Public Engagement and Higher Education. (; 3 cr. ; A-F only; Every Fall)
Study/practice of public engagement in higher education. Civic roles of post-secondary education institutions.

OLPD 5796. Supervised Practicum in Multicultural Postsecondary Teaching and Learning. (; 3 cr. ; S-N only; Every Fall, Spring & Summer)
Postsecondary teaching experience in supervised settings. Weekly group supervision session. Classroom experiences, learning centers, and other postsecondary teaching venues. prereq: Grad student in PsTL certificate program or admitted to PsTL master's program

OLPD 5801. Survey: Human Resource Development and Adult Education. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Overview of fields of human resource development and adult education. Societal context, theories, processes, definitions, philosophies, goals, sponsoring agencies, professional roles, participants, and resources. Unique characteristics and ways fields overlap and enhance one another. prereq: Grad student only

OLPD 5812. Consulting for Organization Change. (; 3 cr. ; Student Option No Audit; Periodic Fall, Spring & Summer)
This course is an introduction to major theories, concepts, skills, and techniques of consulting for industry, education, and government

OLPD 5819. Evaluating and Using Research in Organizations and Education. (; 3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Role of educational research in professional practice. Problems of practice for research. Alternative modes of research. Synthesis/ application of results of research. prereq: Grad student

OLPD 5893. Directed Study in OLPD. (1-4 cr. ; Student Option; Every Fall, Spring & Summer)
Self-directed study, with faculty advice, in areas not covered by regular courses.

OLPD 5902. Leading Change in Private Colleges. (; 3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Theories of organizational change process/ application for leading private colleges with unique cultures/distinctive missions. Factors impacting change process/implications for leading private colleges. prereq: Must have Bachelors degree awarded prior to taking this course.

OLPD 6402. Integrative Leadership: Leading Across Sectors to Address Grand

Challenges. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Are you interested in working across government, business, and the non-profit sector for public good? Are you wondering how you can create sustainable shared leadership on challenges that can best be addressed together? This course explores multisector leadership and related governance and management challenges from a variety of perspectives and provides an opportunity for students to work together to apply what they are learning individually and in teams through in-class exercises and a final team project. The course is taught by a team of interdisciplinary faculty and considers different contexts, forms, and specific examples of multisector leadership that can enable transformative action to tackle a significant societal issue and achieve lasting change. prereq: Doctoral or master's student Credit will not be granted if credit has been received for: GCC 5023, LAW 6623, OLPD 6402PA 5105, PA 5130

OLPD 6490. Managing Civic Engagement. (3 cr. ; Student Option; Every Spring)
Practice/critical assessment of methods for managing participatory/inclusive public policy/program development. Readings, case discussions, analyses of community-based observations.

OLPD 8002. Critical Issues in Contemporary Education. (; 3 cr. ; Student Option; Every Fall & Spring)
Meanings of difference from sociological, psychological, historical and philosophical perspectives as related to current and emerging critical issues in education. Participants help design, facilitate, and present the course. prereq: EdD or PhD student

OLPD 8011. Doctoral Research Seminar I. (; 1 cr. ; S-N or Audit; Every Fall & Summer)
Introduction/planning for individual program development, preliminary examinations, and dissertation prospectus. Modes of inquiry used in current research in education, databases relating to education, recent writings on literature synthesis, key contributions to education literature. prereq: EdPA or WHRE doctoral student

OLPD 8012. Doctoral Research Seminar II. (; 1 cr. ; S-N or Audit; Every Spring & Summer)
Introduction to quantitative/qualitative research approaches/methods. Nature of research, role of researcher, philosophical perspectives on research, ethical issues in conducting research. prereq: EdPA doctoral student

OLPD 8013. Doctoral Research Seminar III. (; 1 cr. ; S-N or Audit; Every Fall & Spring)
Introduction to most important quantitative/ qualitative approaches employed in educational policy research. prereq: EdPA doctoral student

OLPD 8015. Inquiry strategies in educational and organizational research. (3 cr. ; A-F only; Every Fall)
Logic of research design, from research questions and audience considerations to selecting a design for collecting/analyzing quantitative, qualitative, and mixed-method data. prereq: [8011 or EDPA 8011], OLPD PhD student

OLPD 8016. Research Design and Educational Policy. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall)
Logic of research design, from research questions to selecting a design for collecting/ analyzing quantitative, qualitative, and mixed-method data. Writing proposals that build a reasoned statement of research problem. prereq: [8015 or EDPA 8015], CEHD doctoral student, instr consent

OLPD 8021. Leadership: From Theory to Reflective Practice. (3 cr. ; A-F or Audit; Periodic Fall)
Leadership theory. Emphasizes seminal scholars' work from related social science disciplines. Implications of theory for practice of leadership. Knowledge, behaviors, values, and skills needed in educational and other public settings.

OLPD 8022. Education and Globalization: Anthropological Perspectives. (; 3 cr. ; A-F or Audit; Periodic Fall, Spring & Summer)
Contemporary educational institutions are characterized by rapid movements of people, knowledge, ideologies, and media, and are increasingly shaped by market-based reforms. Populism and stricter migration controls further prompt a rethinking of globalization and its effects on formal and non-formal education. This course enhances students' theoretical and contextual knowledge of globalization and demonstrates the advantages of a translocal view of educational processes and problems.

OLPD 8087. Seminar: Organizational Leadership, Policy, and Development. (; 1-3 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Topical issues.

OLPD 8095. Problems: Organizational Leadership, Policy, and Development. (1-3 cr. [max 24 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Independent study on issues of educational policy/administration. Arranged with instructor.

OLPD 8096. Internship: Organizational Leadership, Policy, and Development. (1-9 cr. [max 24 cr.] ; Student Option; Every Fall & Spring)
Internship on issues of educational policy/ administration. Arranged with instructor.

OLPD 8101. International Education and Development. (3 cr. ; A-F or Audit; Periodic Fall, Spring & Summer)
This seminar explores theories, debates, discourses, and practices that have historically linked international development (or simply ? development?) and education (both formal? schooling?and non-formal education). We will consider this linkage from different disciplinary perspectives, including anthropology, economics, history, political science, and sociology as well as interdisciplinary research that seeks to transcend these boundaries. We will examine the intertwined histories of colonialism, development, and education; efforts to promote national development through the expansion of schooling; the role of development institutions in shaping education policy and practice; and several current issues in the field of IED today. Throughout, we will consider different perspectives on how, and whether, education can foster better lives for people around the world.

OLPD 8102. Dynamics of Intercultural Communication in Education. (3 cr. ; A-F only; Periodic Fall, Spring & Summer)
This course provides participants with a background to the history, approaches, theories, and applications in the field of intercultural communication. The principal goal is for each participant to be able to better apply theory and research from intercultural communication to inform participant?s own research, to improve a current project or program, or to enhance the ability to make an impact in a variety of organizational contexts.

OLPD 8103. Comparative Education. (; 3 cr. ; A-F or Audit; Periodic Fall, Spring & Summer)
Doctoral-level course. History, methodologies, and major debates in the field of comparative education. Major research paper or extensive literature review.

OLPD 8104. Innovative Systems Thinking in Education and Culture. (3 cr. ; Student Option; Every Fall)
Critical aspects of historical/contemporary systems philosophy, thinking, and analysis. Development of concepts/skills applicable to understanding multiple dimensions of educational systems in diverse contexts. Implications for leadership and fostering organizational and systemic change.

OLPD 8105. Qualitative Longitudinal Research Methods and Analysis in Education. (3 cr. ; A-F only; Periodic Fall, Spring & Summer)
This course introduces students to paradigmatic assumptions, approaches, and the knowledge and skills, needed to undertake qualitative longitudinal research and analyses in education. The course first introduces students to the distinctions of qualitative longitudinal research, and the types of research problems and questions that this approach can address. The course explores the unique contributions of longitudinal research to understanding change, time and continuity. The course then focuses on several research methods' ethnography, life histories, and multiple interviews/observations that are used in qualitative longitudinal research, and the distinct and unique questions that longitudinal approaches using these methods can address. Using existing qualitative longitudinal datasets, students will then engage in different approaches and levels of qualitative longitudinal analyses. The course supports students in the analysis processes of qualitative data that they may use for their own research studies. Students will also produce a final paper of a mini-research project, including the qualitative longitudinal research questions, theoretical framework, approach and analyses they have used. prereq: Graduate Student. Requires foundational qualitative research knowledge eg., OLPD 5056 Case Studies; OLPD 5061 Ethnographic Research Methods

or CI 8148 Conducting Qualitative Studies in Educat Contexts

OLPD 8121. Doctoral Seminar: Comparative and International Development Education. (; 1-6 cr. ; S-N or Audit; Every Fall & Spring)
Three-semester sequence beginning the second semester of PhD program aimed at guiding students through the development of a critical issue for the dissertation; review of relevant literature; and methodology for doctoral research; supports students as they prepare for written and oral qualifying examinations and prospectus meeting. prereq: OLPD PhD candidate

OLPD 8302. Educational Policy Perspectives. (; 3 cr. ; Student Option; Periodic Fall, Spring & Summer)
Public policy issues in education. Historical, international, political, research perspectives. Current policy strategies for reforming U.S. public schools.

OLPD 8314. Data Analysis for Educational Management. (; 3 cr. ; Student Option; Periodic Fall, Spring & Summer)
Managers of educational organizations are faced with problems that require analysis of a wide range of information. Outlines a frame for data analysis and introduces a set of computer-based tools suited to the practice of educational administration.

OLPD 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

OLPD 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

OLPD 8502. Advanced Evaluation Theory and Theory crafting. (; 3 cr. ; A-F only; Every Spring)
This advanced course will provide students with an in-depth understanding of major evaluation theories, systems for organizing evaluation theories, and propose ways of expanding current theory. prereq: Doctoral standing OR instructor?s permission (enforced) Recommend OLPD 5502 (can be taken concurrently)

OLPD 8595. Evaluation Problems. (; 1-6 cr. [max 24 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent study of an issue in theory or practice of program evaluation. prereq: [5501 or EDPA 5501 or EPSY 5243], instr consent

OLPD 8596. Evaluation Internship. (; 1-9 cr. [max 24 cr.] ; Student Option; Every Fall, Spring & Summer)
Hands-on experience in conducting program evaluation in real-world setting under supervision of evaluation professional. prereq: [5501 or EDPA 5501 or EPSY 5243], instr consent

OLPD 8601. Advanced Training and Development of Human Resources. (; 3 cr. ; A-F or Audit; Periodic Fall)
Personnel training/development research. Critical review of selected/innovative practices. prereq: 5615 or HRD 5201

OLPD 8602. Advanced Organization Development. (; 3 cr. ; A-F or Audit; Periodic Spring)
Organization development research. Critical review of selected, innovative practices.

OLPD 8603. HRD Capstone Research Experience. (3 cr. [max 6 cr.] ; A-F only; Every Fall & Spring)
The goal of this course is to assist doctoral students in developing their ability to conduct research and theory building in human resource development (HRD). Designed as a capstone experience for students in their second year of doctoral studies, the course will not only strengthen their understanding of approaches to disciplined inquiry and knowledge of current theories and advanced scholarly work in HRD, but will also provide them with an opportunity to develop practical research skills, by developing proposals for research projects aimed at addressing real-life needs of various organizations, and conducting these projects. Through this course students will be able to: 1. Further develop their understanding of the philosophical foundations of theory and theory development 2. Understand and discuss current approaches to research and theory building, used in HRD and related fields 3. Examine different perspectives on research and theory building 4. Develop and demonstrate critical thinking skills necessary to understand, interpret, and evaluate research and theories in HRD 5. Identify, compare and critique examples of cutting-edge HRD research and theory building efforts 6. Become part of a community of scholars and contribute to the viability and productivity of this community 7. Understand issues of research ethics and apply ethics principles in their own scholarly work 8. Gain hands-on experience conducting HRD research in organizations 9. Learn how to write successful research proposals and practice developing proposals for dissertation research 10. Understand how to develop research reports for submission to industry clients and to academic publications, and practice writing and submitting papers to academic publications. This course will be offered over two semesters. During the fall semester sessions will consist of lectures and discussions, and during spring semester, in addition to regular class meetings, students will be working on their field research projects on-site with client organizations. Students will be expected to make one presentation in each of the two semesters: present a proposal for a dissertation research project in fall, and present the results of the field project at the end of the spring semester.

OLPD 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Pre-thesis credit prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

OLPD 8702. Administration and Leadership in Higher Education. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Leadership, governance, and administration in higher education through theoretical perspectives and practical analysis. Planning, change, decision making, organizational culture, budgets, conflict. prereq: [5001 or EDPA 5001], [5701 or EDPA 5701]

OLPD 8703. Public Policy in Higher Education. (3 cr. ; A-F or Audit; Every Fall)
Theories, analytic methods, and critical issues in postsecondary education policy at national/state levels. Equality of educational opportunity, affirmative action, system governance/coordination, research funding, student financial aid, public accountability. prereq: [5001 or EDPA 5001], [5701 or EDPA 5701]

OLPD 8715. Plan B Capstone Seminar. (; 3 cr. ; S-N only; Every Fall, Spring & Summer)
Determining topic, creating timeline, and initiating project in conjunction with year 2 internship. prereq: 5206, grad student admitted to master's program in multicultural college teaching/learning; if Plan B project includes research with human subjects, application to Institutional Review Board is required

OLPD 8721. Instruction and Learning in Higher Education. (; 2-3 cr. ; Student Option; Every Spring)
Theory/practice of teaching strategies. Implications of student differences (learning style, ethnicity, gender, age) for teaching. Evaluation and professional development of teaching. Context/nature of faculty work, ethical issues, teaching portfolio development.

OLPD 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

OLPD 8796. Supervised Internship in Postsecondary Teaching and Learning. (3-12 cr. ; S-N only; Every Fall, Spring & Summer)
Classroom-based or online group supervision. Weekly supervised experiences. Internship settings based on students' interests/goals. prereq: 5196, [grad student admitted to Multicultural College Teaching and Learning MA or College Student Development and Counseling Psychology PhD]

OLPD 8800. Organizational Leadership, Policy, and Development Colloquium. (1-3 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Selected topics regarding work/human resource education professionals. Topics based on interest/demand.

OLPD 8801. Advanced Theory in Human Resource Development and Adult Education. (; 3 cr. ; A-F or Audit; Periodic Fall)

Theory of individuals/organizations as adaptive entities. Roles of human resource development and adult education in mediating complex demands. prereq: 5801 or ADED 5001 or WHRE 5001

OLPD 8812. Quantitative Research in Education. (3 cr. ; Student Option; Every Fall)
Assumptions, procedures for, considerations in planning/conducting quantitative research in education.

OLPD 8815. Ethics and Responsible Research. (; 1 cr. ; A-F or Audit; Periodic Fall, Spring & Summer)
Introduction to ethical/legal issues involved in practicing responsible educational research. Key issues, formal/informal codes of conduct, ethical reasoning.

OLPD 8841. Foundations of Organizational Leadership, Policy, and Development. (3 cr. ; Student Option; Periodic Fall)
Key historical/philosophical concepts in work, career, adult development. Individual/ organizational change. Learning through experience.

OLPD 8842. Comparative Systems in Organizational Leadership, Policy, and Development. (3 cr. ; Student Option; Periodic Spring)
Looking critically across/within countries/ regions at structures intended to deliver work-/ career-relatd education/training. prereq: 8141 or WHRE 8141

OLPD 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

OLPD 8890. Research Seminar. (1 cr. [max 6 cr.] ; S-N or Audit; Periodic Fall)
Developing, reporting, and evaluating research. Participants make/react to presentations. prereq: [[8811 or WHRE 8911] [8812 or WHRE 8912 or WHRE 8913 or WHRE 8914]] or instr consent

OLPD 8896. Internship. (; 1-10 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Student applies for position in professional practice; individual arrangements describe specific responsibilities during internship. Ed.D. program requirement.

Orthodontics (OTHO)

OTHO 7101. Growth & Development. (; 0-5 cr. ; A-F or Audit; Every Summer)
Head growth, development, osteology, and myology. Both normal and abnormal morphology and function, with emphasis on cephalometric methods. prereq: Admission to graduate orthodontic program.

OTHO 7102. Growth & Development. (; 0-5 cr. ; A-F or Audit; Every Fall & Spring)
Head growth, development, osteology, and myology. Both normal and abnormal morphology and function, with emphasis on cephalometric methods.

OTHO 7103. Growth & Development. (; 0-5 cr. ; A-F or Audit; Every Spring)
Head growth, development, osteology, and myology. Both normal and abnormal morphology and function, with emphasis on cephalometric methods.

OTHO 7111. Diagnosis & Treatment Planning. (; 0-5 cr. ; A-F or Audit; Every Summer)
Etiology, treatment and prognosis of clinical orthodontic patients. prereq: Admission to graduate orthodontic program.

OTHO 7112. Diagnosis & Treatment Planning. (; 0-5 cr. ; A-F or Audit; Every Fall)
Etiology, treatment and prognosis of clinical orthodontic patients. prereq: Admission to graduate orthodontic program.

OTHO 7113. Diagnosis & Treatment Planning. (; 0-5 cr. ; A-F or Audit; Every Spring)
Etiology, treatment and prognosis of clinical orthodontic patients. prereq: Admission to graduate orthodontic program.

OTHO 7201. Clinical Orthodontics. (; 0-5 cr. ; A-F or Audit; Every Spring & Summer)
Students assigned patients for complete management of orthodontic and orthodontically related occlusal problems under direct staff supervision. prereq: Admission to graduate orthodontic program.

OTHO 7202. Clinical Orthodontics. (; 0-5 cr. ; A-F or Audit; Every Fall & Spring)
Students assigned patients for complete management of orthodontic and orthodontically related occlusal problems under direct staff supervision. prereq: Admission to graduate orthodontic program.

OTHO 7203. Clinical Orthodontics. (; 0-5 cr. ; A-F or Audit; Every Spring)
Students assigned patients for complete management of orthodontic and orthodontically related occlusal problems under direct staff supervision. prereq: Admission to graduate orthodontic program.

OTHO 8121. Orthodontic Seminar. (; 0-5 cr. ; A-F or Audit; Every Summer)
Evaluating orthodontic literature, including preparation and presentation of literature reviews. prereq: Orthodontic grad student

OTHO 8122. Orthodontic Seminar. (; 0-5 cr. ; A-F or Audit; Every Fall)
Evaluating orthodontic literature, including preparation and presentation of literature reviews. prereq: Orthodontic grad student

OTHO 8123. Orthodontic Seminar. (; 0-5 cr. ; A-F or Audit; Every Spring)
Evaluating orthodontic literature, including preparation and presentation of literature reviews. prereq: Orthodontic grad student

OTHO 8131. Topics in Orthodontics. (; 0-5 cr. ; A-F or Audit; Every Spring & Summer)
Theoretical aspects of kinematics and biological reactions to orthodontic forces, risk management and jurisprudence, public health aspects of orthodontics, practice management. prereq: Orthodontic grad student

OTHO 8132. Topics in Orthodontics. (; 0-5 cr. ; A-F or Audit; Every Fall & Spring)
Theoretical aspects of kinematics and biological reactions to orthodontic forces, risk management and jurisprudence, public health aspects of orthodontics, practice management. prereq: Orthodontic grad student

OTHO 8133. Topics in Orthodontics. (; 0-5 cr. ; A-F or Audit; Every Spring)
Theoretical aspects of kinematics and biological reactions to orthodontic forces, risk management and jurisprudence, public health aspects of orthodontics, practice management. prereq: Orthodontic grad student

OTHO 8141. Research in Orthodontics. (; 0-5 cr. ; A-F or Audit; Every Summer)
Required for all degree candidates. Preparation, execution, and evaluation of all ongoing research projects and pertinent literature. prereq: Orthodontic grad student

OTHO 8142. Research in Orthodontics. (; 0-5 cr. ; A-F or Audit; Every Fall & Spring)
Required for all degree candidates. Preparation, execution, and evaluation of all ongoing research projects and pertinent literature. prereq: Orthodontic grad student

OTHO 8143. Research in Orthodontics. (; 0-5 cr. ; A-F or Audit; Every Fall & Spring)
Required for all degree candidates. Preparation, execution, and evaluation of all ongoing research projects and pertinent literature. prereq: Orthodontic grad student

Orthopaedic Surgery (ORSU)

ORSU 7180. Orthopaedics I. (; 3-6 cr. ; H-N or Audit; Every Fall, Spring & Summer)
A brief survey course with exposure to a large number of patients, rather than a didactic and highly structured course. Instruction is given by audiovisual technique, conference, and seminars, in addition to teaching primarily in the outpatient clinic. There are opportunities for participation in the inpatient service and in surgery for the student interested in this additional experience. To round out the somewhat limited experience inherent in a three week rotation, independent study of the text, Disorders and Disease of the Musculoskeletal System, by Robert B. Salter, is strongly recommended.

ORSU 7185. Acting Intern Orthopaedic Surgery. (; 2-4 cr. ; H-N only; Every Fall, Spring & Summer)
This course provides a more comprehensive, detailed exposure to orthopaedics for those students who are interested in orthopaedics or another surgical specialty, or who desire more experience in preparation for a career in family practice.

ORSU 7186. Orthopaedic Surgery Research. (; 4-8 cr. [max 16 cr.] ; H-N only; Every Fall, Spring & Summer)
This course will initiate or extend the student's experience in medical research projects in skeletal-muscular related areas.

ORSU 7188. Acting Intern Pediatric Orthopaedics. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
This course provides an opportunity for students with a special interest in pediatric

orthopaedics and the care of the multiply-handicapped child.

ORSU 7190. Acting Intern General, Reconstructive, and Geriatric Orthopaedics. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
This course consists of supervised clinical experience in the primary care of both adult inpatients and outpatients with an emphasis on reconstructive types of orthopaedic surgery. The student has a great deal of individual ward and surgical responsibility and is expected to present their cases. The student functions at the junior resident level. While the student does not take call individually, they may choose to take call with the resident to whom they are assigned. Recommended for the student interested in an orthopaedic surgery career and for the student choosing a non-orthopaedic surgery career. Primary text for externship: Salter RB: Textbook of Disorders and Injuries of the Musculoskeletal System, Baltimore, Williams & Wilkins.

ORSU 7191. Acting Intern Orthopaedic Trauma Surgery. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
This course provides detailed exposure to orthopaedic reconstruction and trauma.

ORSU 7192. Primary Care Orthopaedics. (; 4 cr. ; P-N only; Every Fall, Spring & Summer)
The students will be observing and assisting orthopaedic surgeons in a general orthopaedic practice. The student's interest and initiative will determine the level of responsiblities and the extent of participation in surgical procedures. Students are responsible for weekly case conference presentations.

ORSU 7194. Orthopaedic Externship-MC. (; 3-6 cr. ; H-N or Audit; Every Fall & Spring)
An introductory course to outpatient orthopaedic patient evaluation and treatment in a private office setting. The student observes and, under direct supervision, participates in efficient evaluation of pediatric and adult patients with musculoskeletal complaints. This includes obtaining pertinent history and doing a complete musculoskeletal exam appropriate to the patient's complaints. Emphasis is on physical diagnosis and evaluation of diagnostic data including x-rays and other imaging modalities. * The student spends most of their time with Dr. Aadalen at his Edina office, but they also accompany him to Children's Health Care-Minneapolis, Fairview-University Medical Center (Riverside Campus) and Shriner's Hospital.

ORSU 7195. Orthopaedics for the Generalist. (; 4 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Provides the opportunity to recognize and treat common orthopaedic problems. The experience consists of emergency room, ambulatory setting, and operating room exposure with an emphasis on problems encountered in primary care. The student may also have an opportunity to work with a sports medicine physician in the office and travel to rural site visits for orthopaedic consultations. Text: Disorders and Disease of the Musculoskeletal System, Robert B. Salter. Texts are available (no charge) through the UMD Department of Family Medicine for students use while on this rotation. SPECIAL INSTRUCTIONS: To request the Duluth site, contact the UMD Department of Family Medicine, 10 University Drive, Duluth, MN 55812 (218-726-7916) at least one month prior to quarterly cancel/add deadline.

ORSU 7200. Surgical Subspecialty Orthopaedics. (; 2-4 cr. ; P-N only; Every Fall, Spring & Summer)
The orthopedic surgery selective consists of a 2 or 4 week rotation concentrating on the areas of general orthopedics, sports medicine, and pediatric orthopedics.

ORSU 7600. Womens Sports Medicine at TRIA. (4 cr. ; H-N only; Every Fall, Spring & Summer)
This four-week advanced selective offers exposure to multi-disciplinary care of the active and athletic female. Students will work with orthopaedic surgery sports medicine and primary care sports medicine physicians, a sports dietitian, physical therapists, and athletic trainers. Students may have the option to work with a physician for sporting event coverage to learn the intricacies of on-field medical care for athletes. There is some flexibility in the exact layout of this course, in particular allowing students to choose whether they wish to spend time in the operating room with a sports medicine orthopedic surgeon, or more time spent in clinic with sports medicine providers. The medical student is not expected to take any call during the rotation. If a sideline coverage opportunity arises, these tend to occur in the evening or on a weekend. Otherwise, there are no overnight or weekend coverage expectations during this rotation. Most weeks will include 4.5 to 5 days of clinical exposure at TRIA Woodbury.

ORSU 7910. Orthopaedic Surgery Medical Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Orthopaedic surgery medical residency.

ORSU 7930. Orthopaedic Surgery Medical Fellowship. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Orthopaedic surgery medical fellowship.

Otolaryngology (OTOL)

OTOL 5101. Introduction to the Basic Sciences in Otolaryngology I: Ear. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Multidisciplinary introduction to the basic sciences of the ear. Acoustics and psychoacoustics, temporal bone anatomy, external and middle ear mechanisms, cochlear physiology, auditory neurophysiology, ear embryology, ear biochemistry, immunology, fine structures, vestibular mechanisms and measurement. S-N grading option for nonmajors only. prereq: Otolaryngology major or instr consent

OTOL 5102. Introduction to the Basic Sciences in Otolaryngology II: Head and Neck. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Multidisciplinary introduction to the basic sciences of the head and neck. Laryngeal anatomy and physiology, nasal anatomy and physiology, immune biology, embryology of head and neck. S-N grading option for nonmajors only. prereq: Otol major or instr consent

OTOL 5993. Directed Studies. (; 1-12 cr. [max 24 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed readings and preparation of reports on selected topics. prereq: instr consent

OTOL 7200. Introduction to Otolaryngology. (; 2 cr. [max 4 cr.] ; P-N only; Every Fall, Spring & Summer)
This elective is intended for early 3rd-year students interested in exploring the specialty of ENT. This course will include clinical experiences in the specialty and interactive presentations emphasizing primary care problems related to the field.

OTOL 7501. Acting Internship Otolaryngology. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
This advanced elective is designed for the late third-year or early fourth-year student wanting to be competitive for residency selection. Working closely with residents, the student will have increased responsibility in patient care and management.

OTOL 7503. Otolaryngology Research. (2-8 cr. [max 16 cr.] ; H-N only; Every Fall, Spring & Summer)
Opportunities are provided to work with otolaryngology faculty and basic scientists within the Department of Otolaryngology. Additional opportunities for clinical otolaryngology are provided if relevant.

OTOL 7910. Otolaryngology Medical Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Otolaryngology medical residency.

OTOL 7930. Otolaryngology Medical Fellowship. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Otolaryngology medical fellowship.

OTOL 8230. Clinical Otorhinolaryngology. (; 4 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Diagnostic and management instruction and experience in all phases of clinical otorhinolaryngology. Both inpatient and outpatient services are provided at Fairview-University Medical Center, St. Paul Ramsey Medical Center, Veterans Administration Medical Center, and Hennepin County Medical Center. Clinical practica and weekly special group conferences. prereq: Grad otol major

OTOL 8231. Surgery of the Ear, Nose, and Throat. (; 3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Surgical training and experience with broad scope of surgical problems encountered in otorhinolaryngology provided at Fairview-University Medical Center, St. Paul Ramsey Medical Center, Veterans Administration

Medical Center, and Hennepin County Medical Center. Clinical practica and weekly special group conferences. prereq: Grad otol major

OTOL 8232. Maxillofacial Surgery. (; 1 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Basic science and management principles of maxillofacial diseases. Problems of maxillofacial trauma. Experience with these problems in the hospitals of the training program, especially the county hospitals. prereq: Grad otol major

OTOL 8233. Plastic and Reconstructive Surgery: Head and Neck. (; 1 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Otolaryngologic cosmetic surgery emphasizing rhinoplasty and otoplasty. prereq: Otol major

OTOL 8234. Anatomy of the Head and Neck and Temporal Bone Dissection. (; 2 cr. ; Student Option; Every Fall, Spring & Summer)
Head and neck anatomy studied from cadaver through programmed learning. Temporal bones dissected to learn anatomy and to practice otologic surgical procedures. S/N for nonmajors only. prereq: Grad otol major or instr consent

OTOL 8235. Roentgenology of the Head and Neck. (; 1 cr. [max 12 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Principles and procedures in roentgenology for otolaryngologic and head and neck problems. prereq: Grad otol major

OTOL 8236. Pharmacology in Otolaryngology. (; 1 cr. [max 12 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Principles of pharmacology as they relate to otolaryngology. prereq: Grad otol major

OTOL 8237. Endoscopy. (; 1 cr. [max 12 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Didactic and practical instruction in laryngoscopy, esophagoscopy, bronchoscopy, and mediastinoscopy. General management principles emphasized. prereq: Grad otol major

OTOL 8238. Pathology of the Ear, Nose, and Throat. (; 1 cr. [max 12 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Gross pathology and histopathology of diseases of the ear, nose, throat, and related regions. prereq: Grad otol major

OTOL 8239. Otoneurology. (; 1-2 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Instruction and experience in diagnosis and management of otoneurologic problems, including training in electronystagmographic analysis of vestibular function. prereq: Grad otol major or instr consent

OTOL 8240. Allergy. (; 1 cr. [max 12 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Concepts and management of otolaryngologic allergy. prereq: Grad otol major

OTOL 8241. Cancer of the Head and Neck. (; 1 cr. [max 12 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Clinical head and neck oncology; etiology, treatment (both surgical and nonsurgical), and other principles of management. prereq: Grad otol major

OTOL 8242. Audiology and Speech Pathology. (; 2 cr. ; Student Option; Every Fall & Spring)
Clinical audiology and speech-language pathology, including diagnosis and treatment of conductive, sensorineural, and central hearing loss; voice disorders; swallowing disorders; velopharyngeal insufficiency related to cleft lip/palate and craniofacial anomalies; alaryngeal speech; and speech disorders related to head and neck cancer. prereq: Grad otol major or instr consent

OTOL 8243. Introduction to Research Methodology. (; 1 cr. ; Student Option; Every Fall & Spring)
Statistical methods, experimental design, and execution of otolaryngologic research. Ethics of research with human and animal subjects. prereq: Grad otol major or instr consent

OTOL 8244. Seminar: Current Literature. (; 1 cr. ; Student Option; Every Fall, Spring & Summer)
Presentation and discussion of selected articles. Required for all otolaryngology graduate students. prereq: Grad otol major or instr consent

OTOL 8247. Anatomy and Physiology of Hearing and Balance. (; 3 cr. ; Student Option; Every Spring)
Structure and function of auditory and vestibular systems. Network analysis of middle and inner ear mechanics, hair cell biophysics, auditory nerve and CNS electrophysiology, information processing, neural mechanisms subserving balance and gaze, cellular morphology, and computer models. prereq: instr consent

OTOL 8248. Directed Readings in Auditory Physiology. (; 1-2 cr. ; Student Option; Every Fall & Spring)
Current research on biophysics and physiology of auditory system; topics selected for each student. Written reviews prepared and discussed. prereq: instr consent

OTOL 8249. Current Topics in Cochlear Anatomy. (; 1 cr. ; Student Option; Every Fall & Spring)
Review of current research papers concerning cochlear anatomy and pathology. prereq: instr consent

OTOL 8250. Advanced Biochemistry of the Auditory System. (; 1 cr. ; Student Option; Every Fall, Spring & Summer)
Review of recent progress in biochemical aspects of auditory end organs. prereq: MdBc 6100, MdBc 6101 or equiv or instr consent

OTOL 8251. Molecular Carcinogenesis of Head and Neck Squamous Cell Carcinoma. (; 2 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
Current topics in molecular carcinogenesis of head and neck squamous cell carcinoma. prereq: MICA 8009 or concurrent registration is required (or allowed) in MICA 8009 or instr consent

OTOL 8262. Advanced Clinical Audiology. (; 2 cr. ; Student Option; Every Fall, Spring & Summer)
Comprehensive reading and practicum in auditory evaluation of patients. Assumes basic knowledge of clinical audiology. Each session devoted to aspect of auditory evaluation or aural rehabilitation, including behavioral audiometry, electrophysiologic evaluation, hearing aid selection, and cochlear implants. prereq: Grad otol major, 8242 or instr consent

OTOL 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

OTOL 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

OTOL 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Doctoral Pre-Thesis Credits prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

OTOL 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

OTOL 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Pathology (PATH)

PATH 7865. Departmental Seminar. (; 1 cr. [max 2 cr.] ; H-N or Audit; Every Fall, Spring & Summer)

Pediatric Dentistry (PDEN)

PDEN 7000. Directed Research in Pediatric Dentistry. (1 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Completion of senior project, prepare table clinic presentation, and prepare AAPD presentations through regular progress meetings with faculty.

PDEN 7010. Fundamentals of Pediatric Dentistry. (0-2 cr. ; A-F only; Every Summer)
Comprehensive introductory course in pediatric dentistry. Cariology/oral prevention, oral radiology, diagnosis/treatment planning, behavior guidance, analgesia/anesthesia, restorative dentistry, pulpal therapy, nitrous oxide-oxygen inhalation, periodontal disease.

PDEN 7020. Introduction to Pediatric Hosptial Dentistry. (0-2 cr. ; A-F only; Every Summer)
Dental, perioral/maxillofacial trauma. Head/neck radiology. Child abuse/neglect. Oral

surgical techniques. Hospital policies/infection control. Odontogenic infections. How to triage, manage, document common clinical situations.

PDEN 7030. Parenteral and Oral Moderate Sedation for Children and Young Adults in Dental Settings. (0-2 cr. ; A-F only; Every Fall)
Learn to provide evidence-based, safe, effective mild/moderate sedation to children/adolescents. Patient case selection for office based sedation, pre-sedation pediatric physical examination/history taking, parenteral/enteral administration, physiology/monitoring, pharmacology, emergency planning/simulation, post-operative management.

PDEN 7040. Primer in Pediatric Medicine. (0-2 cr. ; A-F only; Every Fall)
Provides foundation knowledge in pediatric patient assessment, history taking, communication with pediatric healthcare community. Arranged as 8 modules covering topics of medical home care, health history taking, physical examination, diet/nutrition, health screening, prevention of injury/disease, management of disease, hospital admission.

PDEN 7100. Advanced Clinical Pediatric Dentistry. (1-6 cr. [max 36 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Faculty-supervised treatment of patients, including treatment of difficult or unusual pediatric dentistry problems.

PDEN 8010. Pediatric Dentistry Diagnosis and Treatment Planning. (1 cr. [max 5 cr.] ; S-N only; Every Fall, Spring & Summer)
Systematic approach to diagnosis of and treatment planning for various pediatric dentistry problems. Faculty/peer review of selected patient cases managed by students. Patient care is reviewed/discussed to ensure appropriate treatment protocols and quality of care.

PDEN 8031. Independent Study in Pediatric Dentistry. (; 2 cr. ; S-N only; Every Fall, Spring & Summer)
Independent readings from pediatric dentistry textbooks in preparation for an oral exam. May include additional clinical experiences.

PDEN 8100. Hospital Pediatric Dentistry. (; 1 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Faculty-supervised diagnosis/treatment of pediatric dentistry problems at Fairview-University Medical Center and Hennepin County Medical Center. Rotation seminars in pediatrics/anesthesia. Pre-post-operative discussion/evaluation of treatment plans.

PDEN 8110. Pediatric Dentistry Outreach Experiences. (1 cr. [max 3 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Faculty-supervised diagnosis and treatment of pediatric dentistry problems at Hennepin County Medical Center, the CUHCC Clinic, and other off-site locations. Participation on a rotation basis in seminars in pediatrics and anesthesia. Pre/postoperative seminar discussion and evaluation of treatment plans.

Pediatrics (PED)

PED 6121. Conflict, Anger, Aggression, Violence. (; 2 cr. ; A-F or Audit; Spring Even Year)
Current studies of biological bases (e.g., evolutionary adaptation, genetic, physiological substrates), behavioral expression (e.g., roles of environment, development, learning/motivation, personality, psychopathology), and social interactions (e.g., culture, criminal violence, warfare, genocide). prereq: Ped 6121/PubH 6121

PED 6996. Department of Pediatrics-Summer Internship in Pediatrics. EPAC Explore Students Only.. (0 cr. ; No Grade Associated; Every Summer)
Exposure to clinical general pediatrics early in medical school. Two-week preceptorship with general pediatrician during summer hiatus between first/second year of medical school. Only available to students part of EPAC Explore group. Participating students need to be in academic good standing at the medical school.

PED 7000. New Parent/Caregiver Elective. (; 2-4 cr. ; P-N only; Every Fall, Spring & Summer)
This flexible rotation is designed to allow medical students who become new parents or further grow their family with the addition of a new child to spend additional time learning from and benefiting from the early days with their new child.

PED 7091. Independent Study in the Neural Basis of Anger, Tantrums, and Aggression. (; 2 cr. ; A-F only; Periodic Fall)
Neural and other biological bases for emotional expression of anger and for tantrum/aggression. prereq: instr consent

PED 7501. Pediatric Clerkship. (; 4 cr. ; P-N only; Every Fall, Spring & Summer)
Provides basic pediatric skills and knowledge necessary for each student, no matter what field of medicine they select.

PED 7512. Pedicatric Acting Internship. (; 2-6 cr. ; H-N or Audit; Every Fall, Spring & Summer)
An intensive learning experience focusing on children with diseases treated by subspecialty services, generally cardiology, nephrology, or oncology. The student functions as an acting intern. prereq: 7501

PED 7531. Pediatrics-Psychology Internship. (; 12 cr. [max 48 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
The aim of the University of Minnesota Medical School Psychology Internship is to prepare interns to meet the mental health needs of children and to function as psychologists in academic health centers or other clinical contexts. Interns provide clinical assessments and care for children and their families in a broad mix of clinical settings within a teaching hospital. In addition to extensive supervised clinical experiences, interns participate in a blend of didactics, conferences, and team meetings to further their professional development. The internship year provides ample opportunities for interns to collaborate closely with faculty and develop collegial relationships with our faculty, staff, and each other. The Internship has been continuously accredited since 1965 by the American Psychological Association making it the longest APA-accredited internship in this region, and is known for its quality assessment and improvement activities. William Robiner, PhD, ABPP, is the Internship Director.

PED 7533. Clinical Allergy at Fairview-University Medical Center. (; 3-6 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Emphasizes the practical aspects of allergic and immunologic work-ups and treatments. The particular content of the course is modified depending upon individual needs.

PED 7534. Pediatric Cardiology. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
The elective rotation in Pediatric Cardiology is open to third and fourth year medical students who are interested in pediatric cardiovascular disease. The rotation is primarily an outpatient one.

PED 7535. Pediatric Infectious Disease. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
The student works closely with the infectious disease fellow and pediatric resident on service, and contribute to the diagnosis and management of patients with suspected or proven infections. prereq: Med Student Yr 3 or 4/PED 7501 or equivalent courses/one other pediatric elective

PED 7536. Pediatric Hematology/Oncology/Bone Marrow Transplantation. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
This course provides inpatient and outpatient experience in clinical management of children, adolescents and young adults with various blood, cancer, immunologic, or other diagnoses.

PED 7537. Pediatric Endocrinology & Diabetes. (4 cr. ; H-N only; Every Fall, Spring & Summer)
The student works with faculty, fellows, and residents in a small group. This course is particularly suitable for students planning to pursue residency programs in Internal Medicine and in Pediatrics.

PED 7538. Pediatric Gastroenterology and Nutrition. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
The student sees GI and nutrition consults on the pediatric stations, attends clinic and observes all diagnostic and biopsy procedures pertaining to gastrointestinal patients.

PED 7539. Acting Intern Neonatal Medicine. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
This course offers the student an opportunity to be an extern in one of the neonatal intensive care units. For assigned patients, the student will assume the responsibility of a first-year resident: the student will make rounds with the house officers and attending staff on all patients, write orders and progress notes on assigned patients, and carry out necessary procedures under supervision.

PED 7540. Pediatric Neurology. (; 4 cr. ; H-N or Audit; Every Fall, Spring & Summer)

Successful completion of this rotation satisfies the Department of Neurology 7-510 requirement. Pediatric neurology patients have a variety of problems ranging from coma, muscular dystrophy, epilepsy to learning disabilities; from inborn errors of metabolism, metabolic neurologic dysfunction to behavior disorders.

PED 7541. Children's Hospitals and Clinics of MN Pediatric ENT Elective. (4 cr. ; P-N only; Every Fall, Spring & Summer)
This rotation would be geared towards those with strong interest in ENT or strong interest in Pediatrics with the objectives to improve ENT assessment of the pediatric patient and gain proficiency in head and neck exam. Reading about pertinent issues that the student is encountering in clinic, rounds or the operating room will be expected.

PED 7542. Pediatric Palliative Medicine and Hospice. (4 cr. ; H-N only; Every Fall & Summer)
This course is designed to introduce students to the fields of pediatric hospice and palliative medicine. Students will primarily spend time with the Pain and Advanced/Complex Care Team (PACCT), the pain and palliative consult service at the University of Minnesota Masonic Children's Hospital (UMMCH), as well as its broader interdisciplinary team members (nurse practitioners, social workers, child life specialists, music therapists, and spiritual health providers). Students will also spend at least one day with the interdisciplinary pediatric home hospice and palliative care team teams at Fairview Homecare and Hospice. Depending on availability, students may also rotate in the outpatient clinic at UMMCH. They will be expected to engage in patient care planning, including family meetings and interdisciplinary team collaborations.

PED 7543. Pediatric Nephrology. (; 2 cr. ; H-N only; Every Fall, Spring & Summer)
Daily working rounds with the staff will be made, and the team will make formal rounds with the students to discuss the patients in hospital. Outpatient management of a wide variety of problems, both nephrologic and urologic, are considered in clinics.

PED 7544. Pediatric Pulmonary Disease. (; 2-4 cr. ; H-N only; Every Fall, Spring & Summer)
This pediatric course will focus on care of pulmonary problems of patients with diverse lung diseases and will include work with the pediatric pulmonary health care team.

PED 7545. Acting Intern General Pediatrics Outpatient Elective. (2-4 cr. ; H-N only; Every Fall, Spring & Summer)
This is a general pediatric primary care elective. It will allow students to work closely with an outpatient clinical practice team to provide care for patients and families seeking ongoing pediatric primary care.

PED 7547. Children's Hospitals and Clinics of MN Pediatric Sleep Medicine Elective. (2 cr. ; P-N only; Every Fall, Spring & Summer)
Pediatric sleep disorders are common in all ages and populations. There is limited exposure during medical school and residency to sleep medicine in general and pediatric sleep medicine specifically. This rotation will explore the common pediatric sleep disorders that every pediatrician should be aware of.

PED 7548. Clinical Genetics. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
This course will be valuable for students interested in any discipline and allows exposure to patients in pediatrics, medicine, and obstetrics/perinatology.

PED 7550. Children's Hospitals and Clinics of MN Pediatric Ethics Elective. (4 cr. ; H-N only; Every Fall, Spring & Summer)
Clinical ethics is an integral part of the practice of medicine ? medicine by definition is an ethical practice. Taking the time to understand how the ethical principles work in day to day clinical decision making is paramount to the development of ethically astute clinicians. In order to provide students with an immersive experience in clinical ethics this elective has been created for those who seek more directive knowledge on how ethics affects patient care.

PED 7553. Adolescent Medicine. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
This elective involves two adolescent interviewing workshops and one adolescent pelvic exam workshop. Special emphasis is placed on acquisition of effective clinical communication skills. Students are exposed to a variety of community-based services for youth, including general adolescent medicine clinics, programs for at-risk youth, and for youth in foster care.

PED 7555. Neonatal Clerkship - Marshfield, WI. (; 4 cr. ; H-N or Audit; Every Summer)
This elective revolves primarily around medical problems related to the newborn, including neonatal infections, metabolic problems, cardiovascular problems, shock, pulmonary insufficiency, central nervous system asphyxia and hemorrhage. prereq: 7512,enrolled yr 4 med

PED 7556. Pedicatrics Clerkship - Marshfield, WI. (; 4 cr. ; H-N or Audit; Every Fall & Summer)
The student functions as a house officer on the pediatric ward and in the emergency room and has night call every third or fourth night. prereq: 7501,enrolled yr 4 med

PED 7557. Children's Hospitals and Clinics of MN Pediatric/Adolescent Gynecology Elective. (4 cr. ; H-N only; Every Fall & Spring)
Pediatric and Adolescent Gynecology (PAG) is an important aspect of clinical education for Pediatrics training programs. Furthermore, PAG is an integral part of Pediatrics and Adolescent Medicine licensing exams. Specific PAG learning objectives, like those found in the American Board of Pediatrics must be fulfilled. Residents have indicated that they do not feel they get enough exposure to PAG topics and have expressed a desire to learn more about this population during their training.

PED 7559. Acting Internship in Pediatric Intensive Care. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
The student works as a member of the resident-fellow-attending physician team in assessing and treating all medical and surgical patients on the pediatric intensive care unit.

PED 7560. Pediatric Research. (; 2-8 cr. [max 16 cr.] ; H-N only; Every Fall, Spring & Summer)
A research experience in pediatrics can be arranged on an individual basis with various members in the Pediatrics Department. This course affords the student opportunity to work with a pediatric faculty member on a predetermined research project.

PED 7566. Evolution of American Pediatrics. (; 6 cr. ; H-N or Audit;)
This course explores the evolution of American Pediatrics from the post-Civil War period to the present. American Pediatrics may be divided into several distinct eras based on the forces which defined its boundaries and identity. These include societal and governmental influences, changing norms of medical practice, emerging scientific knowledge, and reforms in medical education. The course will also examine Pediatrics' contribution to medical knowledge and the influence of pediatrics on the attitudes of government and society toward children. Team teaching format combines formal lectures, assigned readings, and student/faculty discussion.

PED 7583. Fundamentals of Clinical Oncology. (; 4 cr. ; H-N or Audit; Every Fall, Spring & Summer)
This multidisciplinary course provides an introduction to the fundamentals of clinical oncology (adult and pediatric) and is designed for the medical student interested in entering any specialty. prereq: Med 7500 or 7501

PED 7700. Primary Care Selective - Pediatrics. (; 4 cr. ; P-N only; Every Fall, Spring & Summer)
A 4-week ambulatory experience with a focus on both the specialty specific content areas and the process-of-care in the ambulatory setting.

PED 7800. Acting Intern Pediatrics. (2-4 cr. ; H-N only; Every Fall, Spring & Summer)
The Advanced Selective in Pediatrics is an opportunity for students to serve patients in a community-based general inpatient setting. Advanced selective students will take on the responsibility of an acting intern on the general pediatrics inpatients team. They will collaborate with pediatric and medicine-pediatric interns and medical students in their foundational training. They will be supervised by pediatric and medicine-pediatric senior residents and faculty attendings.

PED 7910. Pediatric Medical Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Pediatric medical residency.

PED 7930. Pediatric Medical Fellowship. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Pediatric medical fellowship.

Periodontics (PERO)

PERO 5123. Practice Management Externship. (; 1 cr. ; Student Option; Every Spring)
Familiarizes periodontal students with the private practice environment and prepares them to select the type of practice they want to purchase or build and successfully manage their office. prereq: Resident in advanced education program in periodontology

PERO 7321. Periodontics/Orthodontics Seminar. (; 1 cr. ; S-N only; Every Fall & Spring)
Seminar related to postdoctoral work in periodontics/orthodontics.

PERO 7322. Multidisciplinary Treatment Seminar in Dentistry Related to Periodontics. (; 1 cr. ; S-N or Audit; Every Summer)
Series of multidisciplinary treatment seminars related to specialized fields in periodontology, endodontics, pediatric dentistry, AEGD/GPR, and prosthodontics dentistry. prereq: Resident enrolled in [periodontology, endodontics, pediatric dentistry, AEGD/GPR, prosthodontics]

PERO 8000. Advanced Clinical Periodontology. (; 1-3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Clinical training in examination, diagnosis, treatment planning, and various phases of prevention and treatment of periodontal diseases in patients. prereq: Resident in advanced education program in periodontology

PERO 8200. Clinical Seminars. (; 1 cr. ; Student Option; Every Fall, Spring & Summer)
tbd prereq: Resident in advanced education program in periodontology

PERO 8250. Anatomy of the Periodontium. (; 1 cr. ; A-F or Audit; Fall Odd Year)
Gingival tissues, cementum, periodontal ligament, and alveolar bone discussed from histological, physiological. and pathological point of view. prereq: Resident in advanced education program in periodontology

Pharmaceutics (PHM)

PHM 5200. New-Drug Development Process. (; 1 cr. ; Student Option; Periodic Fall & Spring)
New-drug development process in the U.S. pharmaceutical industry.

PHM 6738. Pharmacokinetics. (0 cr. ; A-F or Audit; Every Fall)
Designed to give generalist practitioners fundamental skills to solve pharmacokinetically-based problems in patient care, particularly in regards to dosage regimen design/adjustment. Follows path of drug molecule from incorporation into dosage form to release/disposition in biological system. Requires instructor consent.

PHM 8100. Seminar: Pharmaceutics. (; 1 cr. [max 4 cr.] ; S-N or Audit; Every Fall & Spring)
tbd prereq: Grad Phm major

PHM 8110. Readings in Pharmaceutics. (; 1 cr. [max 4 cr.] ; S-N or Audit; Every Fall & Spring)
Current literature. prereq: Grad Phm major

PHM 8120. Readings in Central Nervous System (CNS) Drug Delivery. (; 1 cr. [max 4 cr.] ; S-N only; Periodic Fall & Spring)
Weekly discussion of recent publications or new techniques, methods, and analyses on delivery of drugs to central nervous system. Topics vary. Informal presentations from CNS drug delivery researchers. prereq: instr consent

PHM 8150. Pharmacokinetics Research Seminar. (; 1 cr. [max 12 cr.] ; S-N or Audit; Every Fall & Spring)
Current concepts and literature review. prereq: Grad Phm major

PHM 8210. Pharmacokinetics Module. (1 cr. [max 2 cr.] ; S-N only; Every Fall)
Foundational materials in pharmacokinetics for pharmaceutics graduate students.

PHM 8220. Physical Pharmacy Module I. (1 cr. [max 2 cr.] ; S-N only; Every Fall)
First course in a two course sequence which provides foundational materials in physical pharmacy for pharmaceutics graduate students.

PHM 8230. Physical Pharmacy Module II. (1 cr. [max 2 cr.] ; S-N only; Every Spring)
Second course in a two course sequence which provides foundational materials in physical pharmacy for pharmaceutics graduate students.

PHM 8240. Biopharmaceutics Module. (1 cr. [max 2 cr.] ; S-N only; Every Spring)
Foundational materials in biopharmaceutics for pharmaceutics graduate students.

PHM 8295. Research Problems in Pharmaceutics. (1-12 cr. [max 72 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Experimental investigation of problems in pharmaceutics. prereq: instr consent

PHM 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

PHM 8411. Stabilization of Pharmaceuticals. (; 3 cr. ; Student Option; Periodic Fall)
Application of physicochemical principles (e.g., chemical kinetics) to elucidate and minimize stability problems in pharmaceutical systems. prereq: Physical and organic chem survey courses

PHM 8421. Advanced Pharmacokinetics. (; 4 cr. ; A-F or Audit; Spring Even Year)
Topics in kinetics of drug absorption, distribution, metabolism, and excretion. Instructor consent required.

PHM 8431. Controlled Drug and Gene Delivery: Materials, Mechanisms, and Models. (; 4 cr. ; A-F or Audit; Every Spring)
Physical, chemical, physiological, cell biological, mathematical principles underlying design of delivery systems for drugs. Small molecules, proteins, genes. prereq: Differential equations course including introduction to partial differential equations or instr consent

PHM 8441. Solubility and Solid-State Properties of Drugs. (; 4 cr. ; A-F or Audit; Periodic Fall & Spring)
Physical/physicochemical properties of drugs in solid state as related to drug delivery. prereq: Physical chem survey course or instr consent

PHM 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

PHM 8481. Advanced Neuropharmaceutics. (4 cr. ; A-F or Audit; Fall Even Year)
Delivery of compounds to central nervous system (CNS) to activate proteins in specific brain regions for therapeutic benefit. Pharmaceutical/pharmacological issues specific to direct drug delivery to CNS. prereq: instr consent

PHM 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

PHM 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

PHM 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

PHM 8900. Special Topics in Pharmaceutics. (; 1-4 cr. ; Student Option; Periodic Fall & Spring)
Special topics in Pharmaceutics

PHM 8940. Advanced Topics: Regulatory Science and Affairs. (1 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
This course will introduce students to the roles and responsibilities of key partners in ensuring regulatory compliance in a variety of settings. It will cover animal and human research as well as drug development. Speakers will delve into how research and development regulations are communicated, applied, and enforced in both academic Institutions and in Industry settings. The goal of this course is to provide an overview of how regulations shape key roles and enlighten students as to potential career paths in the field of regulatory science.

PHM 8990. Curricular Practical Training (CPT). (; 1 cr. [max 3 cr.] ; S-N only; Every Fall, Spring & Summer)
Industrial work assignment involving pharmaceutical science. Reviewed/approved by faculty advisor and director of graduate studies. Grade based on report covering working assignment. Prereq: PHM grad student and instructor consent.

Pharmacology (PHCL)

PHCL 5108. Introduction to Laboratory Research. (4 cr. ; A-F only; Every Fall)
In this course, students will gain practical experience working in a biomedical research laboratory. Students will develop and refine skills required for productive and safe lab work. Topics covered in this class include lab safety, proper equipment usage, making solutions and related calculations, and fundamental concepts and techniques in molecular biology and signal transduction. Key course concepts and content will be reinforced by conducting experiments in the lab under the supervision of an experienced instructor.

PHCL 5109. Introduction to Scientific Communication. (; 1-18 cr. ; Student Option; Every Fall, Spring & Summer)
This course is an interactive classroom experience focused on developing student communication skills. The primary emphasis is on student presentations of their research projects. In addition to making verbal presentations, students are expected to provide constructive criticism and feedback to their peers. Students also work on scientific writing skills by preparing a one-page NIH-style Specific Aims page outlining their research project. Prerequisites: student in the Graduate Program in Pharmacology (MS program) or approval from the Director of Graduate Studies Keywords: Pharmacology, Directed, Independent Study, Biomedical, Basic Science, Research, Drug

PHCL 5110. Introduction to Pharmacology. (; 3 cr. ; A-F or Audit; Every Fall)
This is a course for first-year students in the Graduate Program in Pharmacology. The course introduces students to the basic principles of pharmacology and focuses on molecular mechanisms of drug action. Topics covered include pharmacokinetics, pharmacodynamics, signal transduction, toxicology pharmacogenomics, and drug discovery. Prerequisites: student in the Graduate Program in Pharmacology or approval from the Course Director(s) Keywords: Introduction, Pharmacology, Molecular, Drug, Pharmacokinetics, Pharmacodynamics, Protein, Pharmacokinetics

PHCL 5111. Pharmacogenomics. (; 3 cr. ; A-F or Audit; Every Spring)
Human genetic variation, its implications. Functional genomics, pharmacogenomics, toxicogenomics, proteomics. Interactive, discussion-based course. prereq: Grad student or instr consent Keywords: Pharmacology, Pharmacogenomics, Toxicogenomics, Proteomics, Genetics, Drug

PHCL 5112. Foundations of Biomedical Research. (; 1-2 cr. ; A-F only; Every Fall)
This is a course for first-year students in the Graduate Program of Pharmacology. This course will introduce graduate students to the basic operating principles and techniques of a scientific research laboratory, general concepts surrounding experimental design and experimental controls, and familiarity with common laboratory calculations. Discussion of scientific techniques will include recombinant DNA and molecular biology techniques, protein expression and purification, protein assays, biochemical data analysis and fitting methods, transcriptomics and proteomics studies, and cell culture & mouse models of disease. Methods are presented in the context of highlighting general principles in experimental design. Prerequisites: student in the Graduate Program in Pharmacology Keywords: Basic Science, Pharmacology, Personnel, Writing, Presentation, Protein, DNA, Molecule, Microscope, Bioinformatics, Drug

PHCL 5462. Neuroscience Principles of Drug Abuse. (; 2 cr. ; Student Option; Periodic Spring)
Current research on drugs of abuse, their mechanisms of action, characteristics shared by various agents, and neural systems affected by them. Offered biennially, spring semester of even-numbered years. prereq: instr consent

PHCL 8014. Small RNA Biology. (; 2 cr. ; A-F or Audit; Every Spring)
Small RNAs as major regulators of gene/protein expression. MicroRNAs and their potential use in diagnosis/prognosis of various disease conditions, including cancers. Biology of small RNAs and their role in health and disease. prereq: BIOC 8002 or MICA 8004 or equiv or instr consent

PHCL 8026. Neuro-Immune Interactions. (; 3 cr. ; Student Option; Every Fall)
Regulatory systems (neuroendocrine, cytokine, autonomic nervous systems) linking brain/immune systems in brain-immune axis. Functional effects of bidirectional brain-immune regulation. prereq: MICA 8001 or equiv or instr consent

PHCL 8100. Laboratory Research in Pharmacology. (; 4 cr. [max 8 cr.] ; S-N only; Every Fall & Spring)
Supervised independent research in pharmacology. Modern biomedical/pharmacology research methodology, data generation/analysis. Formulation/testing of basic science hypotheses. prereq: Grad student or instr consent Keywords: Pharmacology, Lab, Research, Data, Analysis, Benchwork, Hypothesis, Basic Science

PHCL 8200. SciComm I: Critical Analysis & Publishing. (1-2 cr. [max 8 cr.] ; A-F only; Every Fall)
The mission of the course is to increase the students? ability to critically evaluate and comprehend the scientific literature, properly present scientific literature/figures, and critique presentations related to the field of pharmacology. After the course is completed, the students will be able to understand and differentiate the six components of a scientific paper, quickly identify the hypothesis and objective of a scientific paper, recognize the key figure(s), with controls, that support the hypothesis, how to present scientific data, how to submit journal articles and navigate the submission and publication process, and critique presentations. Prerequisites: student in the Graduate Program in Pharmacology Keywords: Pharmacology, Seminar, Presentation, Lecture, Research, Basic Science

PHCL 8208. Neuropsychopharmacology. (; 3 cr. ; A-F or Audit; Fall Even Year)
Relationships between drugs/biochemical, behavioral, neurophysiological consequences. Functional biogenic amine, peptidergic. How manipulations alter neuronal function or behavior. Feedback mechanisms, induction, inhibition. Reinforcement of, tolerance to, or dependence on drugs. prereq: [5212, Psy 5021, Psy 5061] or instr consent

PHCL 8209. Substance Abuse at the Bedside. (; 1 cr. ; S-N only; Every Fall & Spring)
Clinical management of addictive diseases. Students discuss how observed clinical interactions can influence a basic science project in which they are involved. prereq: Grad student in any basic-science program

PHCL 8211. Advanced Pharmacology. (; 5 cr. ; A-F only; Every Spring)
This hybrid course offers a combination of online and in-class lectures coupled with interactive literature discussion/flipped classroom components. The course has three sections focusing on 1) pharmacology of the autonomic, cardiovascular, and respiratory systems, 2) anti-cancer and anti-microbial therapeutics and 3) pharmacology of the nervous system. Course Instructors will highlight key features of currently utilized therapeutic agents and underscore recent advances in basic and clinical research that underpin emerging or potential approaches to pharmacotherapy. student in the Graduate Program in Pharmacology, or Course Director consent Keywords: Pharmacology, Drug, Therapy, Medical, Biomedical, Clinic

PHCL 8220. The Ethical Scientist. (1 cr. ; S-N only; Every Spring)
This course focuses on scientific integrity in research and medicine. Topics to be discussed include best practices for experimental design, data collection, and analysis, regulatory requirements for human and animal studies, collaboration and authorship practices, and other social and ethical issues. Prerequisite: student in the Graduate Program in Pharmacology (GPP), or Course Director consent

PHCL 8221. SciComm II: Writing & Research Presentation. (; 2-3 cr. ; A-F only; Every Fall)
In collaboration with their mentors, students will develop thesis projects and scientific communication skills. Specifically, students will learn the principles of oral presentation, hone speaking style and slide content, and prepare for the departmental second-year talk. They will prepare sections of an NIH-style fellowship proposal in time for those eligible to submit an F31 NRSA application for the December deadline. This proposal will also comprise the written component of the preliminary exam. Students will also learn the elements of the closed-door component of the preliminary exam and how best to prepare. Throughout the class, students will provide feedback to their peers, develop critical thinking skills, and practice self-advocacy with their mentors, colleagues, and classmates in soliciting constructive criticism. Prerequisites: student

in the Graduate Program in Pharmacology (PhD program) Keywords: Pharmacology, Basic Science, Writing, Presentation, Practice, Thesis, Dissertation

PHCL 8222. Transdisciplinary Tobacco Research. (; 1 cr. [max 2 cr.] ; S-N or Audit; Fall Odd Year)
Transdisciplinary science, its application to nicotine/tobacco research. Transdisciplinary theories/methods, examples of their application/integration. Draws on TTURC/local investigators, public health advocates. Offered every other year. prereq: instr consent

PHCL 8320. Readings in Neurobiology. (; 1-4 cr. ; Student Option; Every Fall & Spring)
Topics in neurobiology/neurophysiology. prereq: instr consent

PHCL 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

PHCL 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

PHCL 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

PHCL 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

PHCL 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Pharmacy (PHAR)

PHAR 5201. Applied Medical Terminology. (; 2 cr. ; Student Option; Every Fall, Spring & Summer)
Interested in learning the difference between an antigen and an antibiotic? During this course, you will not only increase your medical vocabulary by more than 2500 words at your own pace, you will also learn to identify and articulately describe a wide variety of medical conditions and processes. Communication related to disease states, procedures, and diagnostics in health care can sometimes seem like another language. This course will help you recognize medical abbreviations, relate terms to procedures and diagnostics, and comprehend the meaning of medical terminology by using word elements. If you are interested in the health care field or would like to understand more about your own medical care, this course is a great place to start. prereq: Basic knowledge of human anatomy/ physiology

PHAR 5204. Drugs and the US Healthcare System. (; 3 cr. ; Student Option; Every Fall & Spring)
Being an empowered patient is important when discussing ethics-driven issues within the U.S. healthcare system. This course will expose students to current controversial issues surrounding medications and national healthcare and help students examine their own role as a participant in this system. Students will learn to draw comparisons between medication use systems around the world and analyze other controversies related to access, choice, and quality of healthcare. During this course, students will explore how their choices, ethics, and behavior affect societal decisions surrounding the availability of medications in the U.S. and what their rights are as a citizen-participant during the healthcare debate. Students are expected to have completed the first-year writing requirement (https://cla.umn.edu/writing-studies/first-year-writing), or equivalent, prior to registering for this class. This is a completely online course with weekly due dates and is offered each Fall and Spring term. For more information, contact phar4204@umn.edu or 612-624-7976.

PHAR 5205. Obesity: Issues, Interventions, Innovations. (; 2 cr. ; Student Option; Every Spring)
This course will focus on the role of the pharmacist in treating obesity. Students will learn the pharmacology of past and current medications to treat obesity, as well as the pathophysiology of the disease to understand why more options aren?t available. Students will explore drug information sources for dietary supplements for weight loss, discuss the care of an obese patient including non-pharmacologic treatments for obesity, as well as recognizing the potential for bias and its effect on patient care. Finally, students will look at bariatric surgery and discuss some specific adjustments in care for bariatric patients. This is a completely online course with weekly due dates offered each Fall and Spring term. For more information, contact phar5205@umn.edu or 612-624-7976. Prereq: Second or third year pharmacy student, or student enrolled in a graduate science or health-related program. Biochemistry and physiology suggested.

PHAR 5212. Survey of Pediatric Metabolic, Genetic, and Oncologic Disease. (; 2 cr. ; A-F only; Every Fall & Summer)
Appraisal of major genetic/metabolic disorders and oncologic diseases of childhood. Disease state epidemiology, pharmacotherapy, monitoring, practical applications. prereq: Second year or higher in College of Pharmacy or instr consent

PHAR 5230. Principles of Clinical Pharmacology Research. (2 cr. ; A-F only; Every Fall)
Drug therapy investigation. Topics include experimental design of drug studies in human research subject volunteers. Topics related to individualization of therapy including effects of genetic polymorphisms, demographic variables, physiologic variables, age on drug disposition treatment outcomes. prereq: 3rd Year Pharmacy Student or instr consent

PHAR 5270. Therapeutics of Herbal and Other Natural Medicinals. (; 2 cr. ; A-F or Audit; Every Spring)
Herbal products/supplements. Pharmacology/ clinical indications/drug interactions of common products in nontraditional complementary health care. Historical significance/evidenced-based role of products in health care. Case studies of clinical applications. prereq: organic chemistry, pathophysiology of disease states, 3rd or 4th yr PHAR

PHAR 5310. Topics in Pharmacy Ethics (Pandemics). (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Using COVID-19 as a pandemic model, students in this elective course will explore the ethical considerations informing personal, public policy, and biomedical research decisions during a pandemic. Students will apply ethical principles and selected schools of ethical thought to discuss and debate those decisions.

PHAR 5700. Applied Fundamentals of Pharmacotherapy. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Pharmacotherapy, the treatment of disease through the administration of medications, is a field particularly interesting to many health care workers. This course is designed to introduce students to some of the main drug classes available for the treatment of particular diseases. Students will also learn about basic pharmacology, recognize brand and generic drug names, and explore their common uses and therapeutic classes. A basic understanding of treatment options available for common disease states will also be developed during this course. Additionally, the course develops basic proficiency in the use of drug information resources. This is a completely online course with due dates throughout the semester, though students have the option to work ahead if they choose. This course is offered each Fall, Spring, and Summer term. For more information, contact phar3700@umn.edu or 612-624-7976. Prereq: Medical terminology recommended

PHAR 5800. Pharmacotherapy for the Health Professions. (; 3 cr. ; A-F only; Every Fall)
Pharmacotherapy, the treatment of disease through the administration of medications, is a topic central to the practice of nursing. This course is designed to introduce you to the main drug classes available for the treatment of particular diseases and the monitoring parameters for patients taking these medications. You will also learn about basic pharmacology, recognize brand and generic drug names, and explore their common uses and therapeutic classes. A basic understanding of contraindications and precautions related to various classes of medications will also be covered. Additionally, the course develops basic proficiency in the

use of drug information resources. This is a completely online course with weekly due dates offered each Fall term. For more information, contact phar5800@umn.edu or 612-624-7976. Prereq: Anatomy and physiology

PHAR 6122. Pharmacotherapy II: Patient-Centered Pathophysiologic Approach. (; 5 cr. ; A-F only; Every Spring)
Pathophysiology/pharmacotherapy of common cardiovascular, endocrine, gastrointestinal disorders. prereq: 6121, concurrent registration is required (or allowed) in 6131, 6154, 6163, 6173, PHCL 5101, PHCL 5102

PHAR 6123. Pharmacotherapy III: Patient-centered Pathophysiologic Approach. (; 5 cr. ; A-F only; Every Fall)
Pathophysiology/pharmacotherapy of common neurologic, psychiatric, pulmonary, geriatric disorders. prereq: 6122, 6163, concurrent registration is required (or allowed) in 6175, PHCL 5101, PHCL 5102

PHAR 6124. Pharmacotherapy IV: Patient-centered Pathophysiologic Approach. (5 cr. ; A-F only; Every Spring)
Pathophysiology/pharmacotherapy of common infectious diseases, oncologic/toxicologic disorders. prereq: 6121, 6122, 6123, 6155, 6163

PHAR 6131. Pharmacy and the Health Care System. (; 3 cr. ; A-F only; Every Spring)
Delivery of pharmaceuticals/pharmacy services in U.S. health care system. Issues in hospital/community practice, characteristics of pharmaceutical industry. Economic/financial issues in delivering pharmaceutical services. prereq: 2nd year pharmacy student

PHAR 6135. Pharmacy Outcomes. (; 2 cr. ; A-F only; Every Spring)
How to integrate knowledge of basic sciences, pharmacotherapy, pharmacy practice management, pharmaceutical care, written communication, literature evaluation, drug information retrieval, law/ethics, and pharmacoeconomics to manage patients with multiple medical conditions. prereq: 6123, 6175

PHAR 6137. Ethics in Pharmacy Practice. (; 1 cr. ; A-F only; Every Spring)
Theories of ethics, ethical analysis of practical ethical issues experienced by pharmacists. Relationship of ethical reasoning to public policy and law. Readings from peer-reviewed publications and popular media. Case studies. prereq: 3rd yr pharmacy student

PHAR 6150. CoP Honors: Medicinal Chemistry Seminar. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall & Spring)
Current topics in medicinal chemistry. prereq: instr consent

PHAR 6151. Biochemistry of Medicinals I. (3 cr. ; A-F only; Every Fall)
Biochemistry topics required for understanding pharmacodynamic action/therapeutic use of medicinal agents. prereq: 1st yr PHAR, 6171

PHAR 6153. Pharmaceutical Immunology. (; 2 cr. ; A-F only; Every Spring)
Basic biological mechanisms of immune system. Emphasizes drug allergies, immunosuppressives, monoclonal antibodies, and preparation/use of immunologic derived agents in diagnosing/treating disease. prereq: 6151

PHAR 6155. Medicinal Agents II. (; 2 cr. ; A-F only; Every Spring)
Chemical/biological properties and therapeutic uses of drugs affecting central nervous, endocrine, and intermediary metabolism systems. prereq: 6154, concurrent registration is required (or allowed) in 6174 and Phcl 5102

PHAR 6156. Medicinal Agents III. (4 cr. ; A-F only; Every Fall)
Therapeutic properties/uses of antiviral, anti-infective, antineoplastic agents. prereq: 6151, 6141

PHAR 6157. Human Nutrition and Drug Therapy. (; 3 cr. ; A-F only; Every Spring)
Basic concepts of human nutrition and clinical application. prereq: 6152

PHAR 6158. Recombinant DNA-Derived Drugs. (; 1 cr. ; A-F only; Every Spring)
Biotechnology as it relates to basic/clinical pharmaceutical sciences. Emphasizes recombinant DNA techniques and preparation/use of biotechnology-derived agents in diagnosing/treating disease. prereq: 6151

PHAR 6160. CoP Honors: Experimental and Clinical Pharmacology Seminar. (; 1 cr. [max 3 cr.] ; A-F only; Every Fall & Spring)
Selected topics in experimental/clinical pharmacology. prereq: instr consent

PHAR 6164. Biopharmaceutics. (3 cr. ; A-F only; Every Fall)
Applied theory of dosage form design for optimal drug activity/bioavailability for all routes of drug administration. prereq: 6161, 6162, 6163

PHAR 6174. Pharmaceutical Care Skills IV. (; 2 cr. ; A-F only; Every Spring)
Basic/clinical science curriculum in lab setting. Longitudinal care in lab setting. prereq: concurrent registration is required (or allowed) in 6122

PHAR 6175. Pharmaceutical Care Skills V. (2 cr. ; A-F only; Every Fall)
Integrates basic/clinical science curriculum lab setting. prereq: [concurrent registration is required (or allowed) in 6171, 6172, 6173, 6174, 6111, 6112] or instr consent

PHAR 6181. Pharm.D. Paper & Seminar. (1 cr. ; A-F only; Every Fall & Spring)
Research paper/research project plan. Professional behavior, patient confidentiality, universal precautions. prereq: 3rd yr Pharmacy student

PHAR 6182. Pharm.D. IV Seminar. (; 1 cr. ; S-N only; Every Fall)
Students present thesis topics to peers and faculty evaluators. prereq: 4th yr pharmacy student, 6181

PHAR 6183. Pharm.D. IV Paper. (2 cr. ; S-N only; Every Fall, Spring & Summer)
Final paper describing hypothesis-driven research project, patient-care oriented project, management project, drug-usage evaluation, or extensive literature review. prereq: 6181

PHAR 6203. College of Pharmacy Community Outreach. (; 1-2 cr. [max 3 cr.] ; A-F only; Every Fall, Spring & Summer)
Apply knowledge gained in classroom and teaching laboratories to community-based patient care activities. prereq: Current student pharmacist in College of Pharmacy

PHAR 6205. Interprofessional Teamwork for the Health Professions. (; 1 cr. ; A-F only; Every Fall)
Interprofessional education that provides an introductory experience to interprofessional teamwork skills with a focus on patient-centered care, especially end of life care. prereq: Major in [public health or nursing or medicine or dentistry or social work or pharmacy]

PHAR 6208. Community-based Immunization Delivery. (; 1 cr. ; S-N or Audit; Every Fall)
Students will learn about, plan, and implement influenza immunization clinics.

PHAR 6211. Non-Prescription Drug Therapy: Focus on Patient Self-Care. (; 2 cr. ; A-F or Audit; Every Spring)
Over-the-counter medications. Diagnostic/durable medical equipment available in community pharmacies. Use of alternative medications. prereq: 6112

PHAR 6212. Dermatology. (1 cr. ; A-F or Audit; Every Fall)
Pathophysiology/pharmacotherapy of dermatologic disorders. prereq: 3rd yr Pharmacy student

PHAR 6215. Applied Pharmacokinetics. (; 2 cr. ; A-F or Audit; Every Spring)
Applying clinical pharmacokinetics and assay methodologies to patient care. Assessing drug therapy outcomes. prereq: 6163

PHAR 6217. Advanced Pharmaceutical Care Clinic. (; 1-2 cr. ; Student Option; Every Spring)
Expanded, direct patient care opportunities. Students conduct comprehensive pharmaceutical care assessments in presence of practitioners. Weekly student case presentations/discussions. prereq: [6230] or 3rd yr pharmacy student

PHAR 6219. Building a Pharmaceutical Care Practice. (2 cr. ; A-F only; Every Spring)
Initiating pharmaceutical care practice. Building personal practice plan. prereq: 2nd or 3rd year pharmacy student

PHAR 6220. Pediatric Drug Therapy. (; 2 cr. ; A-F only; Every Spring)
Pathophysiology/therapeutics of disease states. Common issues encountered in providing pharmaceutical care to pediatric patients.

PHAR 6222. Advanced Pharmaceutical Compounding. (; 2 cr. ; A-F only; Every Fall & Spring)
Expands skills gained in pharmaceutical care lab. prereq: 2nd or 3rd year pharmacy student

PHAR 6223. Pharmacokinetics Research Seminar. (; 1 cr. [max 2 cr.] ; A-F or Audit; Every Fall & Spring)

Evaluate literature in pharmacokinetics/ pharmacodynamics/drug metabolism. prereq: 6163 with grade of "B" or better

PHAR 6224. Advanced Pharmacogenomics and Precision Medicine. (2 cr. ; A-F only; Every Spring)
This course is for individuals wanting advanced knowledge in PGx and an introduction to the broader field of precision medicine. It consists of lectures, homework assignments and class discussions designed to introduce precision medicine as it relates to the impact of genetic variation on health and the advanced practice of pharmacogenomics. Students will learn diagnostic methods to identify germline and somatic mutations, how algorithms and equations are used for predictions and the relationships between genes and environment. How these concepts apply in the clinical settings, forecast health and drug response will be presented. Emerging tools in genetics and pharmacogenomics will be presented. The course will also address clinical implementation and the ethical, legal, and social issues presented by precision medicine and PGx. Prerequisite: 3rd year PharmD student, graduate student in healthcare or related program, or equivalent experience or instructor consent

PHAR 6226. Interprofessional Diabetes Experience. (; 2 cr. ; A-F only; Every Spring)
Diabetes mellitus through active, hands-on learning in interprofessional environment. Participate in week-long experience of living with diabetes. Online learning activities. prereq: 2nd year or later pharmacy student

PHAR 6227. Leading Adaptive Change. (2 cr. ; S-N only; Every Fall)
Hands-on experience leading change initiative. Create vision for change, plan approach, implement plan, evaluate outcomes. Project focuses on area of pharmacy practice or education.

PHAR 6230. Ambulatory Pharmaceutical Care Clinic. (; 2 cr. ; Student Option; Every Spring)
How to conduct pharmaceutical care assessments, for patients with actual drug-related needs, in a controlled clinic setting. prereq: Enrolled pharmacy student

PHAR 6231. Community Pharmacy Management. (; 2 cr. ; A-F only; Every Spring)
Management techniques needed in community pharmacy practice. Emphasizes marketing/ service.

PHAR 6232. Health System Pharmacy Management. (; 2 cr. ; A-F only; Every Spring)
Management techniques needed in various institutional pharmacy settings. Integrating distributive/clinical components of institutional practice. prereq: 2nd or 3rd yr pharmacy student

PHAR 6233. Drug Use Review and Management. (; 2 cr. ; A-F only; Every Fall)
Principles of drug use review in various health care settings. Optimizing quality, minimizing cost. prereq: second or third year PharmD student

PHAR 6234. Pharmaceutical Economics and Public Policy. (; 2 cr. ; A-F only; Every Spring)
Economic and public policy aspects of the U.S. health care system. Health economic principles and trends applied to the pharmaceutical market.

PHAR 6235. Pharmaceutical Industry: Business and Policy. (; 2 cr. ; A-F or Audit; Every Spring)
Developing, manufacturing, distributing, economically evaluating, purchasing, managing, and ordering pharmaceuticals in health sector. Unique market characteristics, complex regulatory processes, rapid technological change, high expense growth, public policy issues.

PHAR 6236. Clinical/Pharmacy Management in Modern U.S. Health-Care and Regulatory Landscape. (; 2 cr. ; A-F only; Every Fall)
This interactive course provides diverse introductory exposure to key non-traditional pharmacy topics within the broader, complex, and evolving US healthcare and managed care landscape. Class entails expertise and critical evaluation of clinical and pharmacy management topics such as utilization & care management, formulary, clinical planning, HEOR, healthcare policy and strategy, clinical account management, specialty pharmacy, Medicare, benefits consulting, pharmaceutical industry, business issues in managed care, and clinical pharmacy leadership. Relevant regulatory topics such as drug development are included as complementary topics, time permitting.

PHAR 6237. Leading Change in Pharmacy I. (; 2 cr. ; S-N only; Every Fall)
Mini-curriculum. Leadership development, its relation to advancing the profession of pharmacy.

PHAR 6238. Leading Change in Pharmacy II. (; 2 cr. ; S-N or Audit; Every Spring)
Mini-curriculum. Leadership development, its relation to advancing the profession of pharmacy.

PHAR 6250. CoP Honors: Social and Administrative Pharmacy Seminar. (; 1 cr. [max 2 cr.] ; A-F or Audit; Every Fall & Spring)
Current topics in hospital pharmacy. prereq: instr consent

PHAR 6260H. CoP Honors: Pharmaceutics Seminar. (; 1 cr. [max 2 cr.] ; A-F or Audit; Every Fall & Spring)
Contemporary topics in pharmaceutics research. prereq: instr consent

PHAR 6272. Shaping an Antiracist Future for Healthcare. (2 cr. ; Student Option No Audit; Every Fall, Spring & Summer)
The goal of this course is to provide a safe space for study and raising self-awareness of racism and antiracism in the US, sharing and discussion of personal development, how racism plays out in healthcare, and how to combat it through evidence-based allyship.

PHAR 6293. Directed Research I. (; 1-5 cr. [max 10 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed research in pharmacy practice, pharmaceutics, medicinal chemistry, or experimental and clinical pharmacology. prereq: instr consent

PHAR 6294. Directed Study I. (1-5 cr. ; Student Option; Every Fall, Spring & Summer)
Directed studies in pharmacy practice, pharmaceutics, medicinal chemistry, experimental or clinical pharmacology.

PHAR 6301. Veterinary Pharmacotherapy. (; 1 cr. ; A-F only; Every Spring)
Pharmacotherapy of common medical conditions of small animals. prereq: 3rd year pharmacy student

PHAR 6310. Topics in Pharmacy Ethics (Pandemics). (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Using COVID-19 as a pandemic model, students in this elective course will explore the ethical considerations informing personal, public policy, and biomedical research decisions during a pandemic. Students will apply ethical principles and selected schools of ethical thought to discuss and debate those decisions.

PHAR 6393. Directed Research II. (1-5 cr. [max 10 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed research in pharmacy practice, pharmaceutics, medicinal chemistry, or experimental and clinical pharmacology. prereq: instr consent

PHAR 6394. Directed Study II. (1-5 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Directed studies in pharmacy practice, pharmaceutics, medicinal chemistry, and experimental or clinical pharmacology.

PHAR 6493. Directed Research III. (1-5 cr. [max 10 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed research in pharmacy practice, pharmaceutics, medicinal chemistry, or experimental and clinical pharmacology. prereq: instr consent

PHAR 6494. Directed Study III. (1-5 cr. ; S-N only; Every Fall, Spring & Summer)
Directed studies in pharmacy practice, pharmaceutics, medicinal chemistry, and experimental or clinical pharmacology.

PHAR 6700. Becoming a Pharmacist. (2 cr. ; S-N only; Every Fall)
Introduction to knowledge, skills, attitudes necessary for success in professional pharmacy curriculum/practice of pharmacy.

PHAR 6701. CoP Community Outreach. (0 cr. ; No Grade Associated; Every Fall, Spring & Summer)
Teaching laboratories to community/clinic-based interprofessional patient care model.

PHAR 6702. Integrated Biochemical Sciences. (4.5 cr. ; A-F only; Every Fall)
Foundation in structure/function of medicinals. Familiarize students with structural/physical properties of proteins, nucleic acids, lipids, carbohydrates, ligands/drugs. Basic concepts central to structure-function relationships of

therapeutics. prereq: Successful completion of Becoming a Pharmacist (BaP)

PHAR 6704. Foundations of Social and Administrative Pharmacy. (2.5 cr. ; A-F only; Every Fall)
Foundation for how one should think about rational use of drugs in system of care. Content/skills learned will be applied in subsequent courses continuing through 4th year of curriculum. Module focused on Drug Literature Evaluation(DLE). prereq: Successful completion of Becoming a Pharmacist (BaP)

PHAR 6706. Foundations of Pharmaceutical Care. (1.5 cr. ; A-F only; Every Fall)
How pharmacist should think about rational use of drugs in caring for patients. Content/skills learned will be applied in/provide framework for all subsequent courses continuing through 4th year of curriculum/lifelong into practice. prereq: Successful completion of Becoming a Pharmacist (BaP)

PHAR 6708. Drug Delivery I. (2.5 cr. ; A-F only; Every Fall)
Fundamental physicochemical principles applicable to dosage forms. Foundational scientific principles (continued in DDII) illuminated with examples of solution drug dosage forms. Concepts relevant to current/ future dosage forms. prereq: Successful completion of Becoming a Pharmacist (BaP)

PHAR 6710. Pharmaceutical Care Skills Lab I. (2 cr. ; S-N only; Every Fall)
Introduction to profession/building skills necessary to become competent, caring pharmaceutical care practitioner. Course consists of laboratory section and lecture. prereq: Successful completion of Becoming a Pharmacist (BaP)

PHAR 6715. Career and Professional Foundations I. (1 cr. ; A-F only; Every Spring)
Knowledge acquisition. Career/professional development. prereq: Successful completion of Becoming a Pharmacist

PHAR 6716. Applied Pharmaceutical Care. (2.2 cr. ; A-F only; Every Spring)
Common medical conditions/medications students are likely to encounter during their introductory pharmacy practice experiences (IPPEs). prereq: Successful completion of Becoming a Pharmacist

PHAR 6718. Drug Delivery II. (2.4 cr. ; A-F only; Every Spring)
Builds on Drug Delivery I. Dosage forms, mostly solid/ dispersed. Chemical kinetics, chemical stability, buffer systems, polymers/ proteins, rheology. Physiochemical principles relevant to design, preparation, storage, use, efficacy, evaluation of pharmaceutical dosage forms. prereq: Successful completion of Drug Delivery I

PHAR 6720. Pharmaceutical Care Skills Lab II. (2 cr. ; S-N only; Every Spring)
Part of pharmaceutical care learning center curriculum spanning six semesters. Introduction to profession. Begin building skills necessary to become competent/caring pharmaceutical care practitioner. prereq: Successful completion of Pharmaceutical Care Skills Lab I

PHAR 6722. Principles of Medicinal Chemistry. (2.1 cr. ; A-F only; Every Spring)
Discipline of medicinal chemistry. Principles of drug design/drug metabolism. prereq: Successful completion of Integrated Biochemical Sciences

PHAR 6724. Immune System and Infectious Disease. (3.1 cr. ; A-F only; Every Spring)
Immunological, epidemiological, pathogenic basis of viral, bacterial, protozoal, fungal, helminthic disease. Biological composition of vaccines/immunologic response to live attenuated pathogens/microbial extracts. Chemical, cellular, biological principles of immune system. prereq: Successful completion of Integrated Biochemical Sciences

PHAR 6726. Principles of Pharmacology. (2.3 cr. ; A-F only; Every Spring)
Builds on information in basic science courses offered in first semester of PharmD program. Foundational content necessary for comprehension/application of all subsequent pharmacotherapy modules that require application of pharmacological concepts/ knowledge. prereq: Successful completion of Foundations of SAPh

PHAR 6728. Pharmaceutical Calculations. (0.7 cr. [max 3.1 cr.] ; A-F only; Every Spring)
Accurately performing pharmaceutical calculations is a critical component of patient care in every pharmacy practice environment. Calculations contribute just as much to good patient outcomes as the newest methods and guidelines for diagnosis, treatment, and prevention. The challenge of pharmacy calculations lies not in the cutting edge of science or their mathematical complexity, but in the need for consistent accuracy to prevent patient harm and possible fatality. To obtain this level of accuracy, an understanding of methods and deliberate, undivided attention to detail is required. Students must understand and master the basic concepts of pharmaceutical calculations with organization, consistency, and accuracy in order to provide optimal care to their future patients every day. Students should be committed to becoming a competent generalist practitioner who assumes responsibility and is willing to be held accountable for their patients? medication outcomes. prereq: enrolled in the Pharm.D. program, successful completion of Phar 6700

PHAR 6730. Career and Professional Foundations II. (0.5 cr. ; A-F only; Every Fall)
Emphasis on reinforcing, supporting, developing, assessing competencies/skills exercised in multiple courses. Includes work in career/professional development. prereq: PDconcurrent registration is required (or allowed) in A I

PHAR 6732. Medicinal Chemistry and Pharmacology of Cardiovascular Agents. (2.3 cr. ; A-F only; Every Fall)
Builds upon foundational concepts learned in Principles of Pharmacology/Principles of Medicinal Chemistry, applies them to drug classes primarily used for treatment of cardiovascular diseases. prereq: Principles of Pharmacology, Principles of Medicinal Chemistry

PHAR 6734. Cellular Metabolism and Nutrition. (2.8 cr. ; A-F only; Every Fall)
Basic principles of intermediary metabolism/ how such processes are used by body. Basic nutrients used by body/their roles as OTC products in community pharmacies. prereq: Integrated Biochemical Sciences

PHAR 6736. Cardiovascular Pharmacotherapy. (1.9 cr. ; A-F only; Every Fall)
Key topics critical to preparing generalist practitioner to have input on optimizing care of patients with common conditions such as hypertension, dyslipidemia, ischemic heart disease (angina, acute myocardial infarction) supraventricular arrythmias (atrial fibrillation), chronic heart failure. prereq: All PharmD year one coursework, Physiology Competency Exam

PHAR 6738. Pharmacokinetics. (3.7 cr. ; A-F only; Every Fall)
Designed to give generalist practitioners fundamental skills to solve pharmacokinetically-based problems in patient care, particularly in regards to dosage regimen design/adjustment. Builds on concepts learned in Drug Delivery I/II. Follows path of drug molecule from incorporation into dosage form to release/ disposition in biological system. prereq: Drug Delivery I concurrent registration is required (or allowed) in II

PHAR 6740. Pharmaceutical Care Skills Lab III. (2 cr. ; S-N only; Every Fall)
Designed for second year pharmacy students to continue to build skills necessary to become pharmaceutical care practitioner. Laboratory section/discussion. prereq: Pharmaceutical Care Skills Lab I concurrent registration is required (or allowed) in II, Applied Pharmaceutical Care

PHAR 6742. Evidence based problem analysis I. (1 cr. ; S-N only; Every Spring)
Practice skills necessary to research, prepare, present scholarly paper/seminar. Builds on Biostatistics/Drug Literature Evaluation material from "Becoming a Pharmacist, Foundations of Social/Administrative Pharmacy, Foundations of Pharmaceutical Care." prereq: Becoming a Pharmacist, Foundations of Social and Administrative Pharmacy, Foundations of Pharmaceutical Care

PHAR 6745. Career and Professional Foundations III. (0.5 cr. ; A-F only; Every Spring)
For the second year of the Professional Development and Assessment Sequence, the emphasis is on knowledge comprehension. Class includes work in career and professional development. prereq: Successful completion of Professional Development and Assessment I concurrent registration is required (or allowed) in II

PHAR 6748. Biopharmaceutics. (2.6 cr. ; A-F only; Every Spring)
Biopharmaceutics is the final course in a four-course sequence that comprises the curriculum in pharmaceutics. Biopharmaceutics integrates core knowledge obtained in

the previous three courses (Drug Delivery I & II and Pharmacokinetics), and also relies on general knowledge in anatomy, physiology, mathematics, general chemistry, and pharmacology. prereq: Courses and/or content: Calculus, thermodynamics, viscosity, sedimentation, diffusion, chemical kinetics, novice to developing level understanding of dosage forms, developing understanding of pharmacokinetics/ pharmacodynamics, physiology, general chemistry, physics, biochemistry, enzyme kinetics, and metabolic pathways. It is strongly recommended that students review course materials in Drug Delivery I concurrent registration is required (or allowed) in II and Pharmacokinetics as well as anatomy, physiology, calculus, and physics with consideration of the application of the concepts to the delivery of drugs to patients.

PHAR 6750. Pharmaceutical Care Skills Lab IV. (2 cr. ; S-N only; Every Spring)
This course is designed for second-year pharmacy students to continue to build the skills necessary to become a competent, caring pharmaceutical care practitioner. prereq: Students must have successfully completed Pharm Care Skills 1, 2, and 3, and Applied Pharmaceutical Care. Students must be concomitantly registered in all required PD2 courses in order to have the content required to complete integrated activities, e.g., students must be enrolled in Diabetes in order to successfully complete the patient care sequence utilizing diabetes content in this course. Exceptions may be made on a case by case basis.

PHAR 6752. Integrated Endocrinology. (2.1 cr. ; A-F only; Every Spring)
This course will integrate all pertinent endocrinology topics (excluding diabetes) into one course. Specifically, the pathophysiology, medicinal chemistry, pharmacology and the therapeutic application of the this knowledge will be covered in an integrated approach via specific modules. All major endocrine pathways will be taught including: hypothalamic/pituitary, steroids, female sex hormones, hormonal contraception, menopause/hormone therapy, bone health, male gonadal hormones, drugs in pregnancy and lactation, sexual dysfunction and thyroid hormone. prereq: Students will need to have successfully completed: - Cellular Metabolism/Nutrition, - Cardiovascular Pharmacotherapy - Pharmaceutical Care Skills Labs 1-3. Students should be concurrently enrolled in Kidney, Fluids, and Electrolytes, and Diabetes and Metabolic Syndrome. Students should be able to describe the function of the overall endocrine systems and the multiple roles of hormones in the body.

PHAR 6754. Diabetes and Metabolic Syndrome. (2.1 cr. ; A-F only; Every Spring)
In this course, students will learn the principles of the pathophysiology of diabetes, pharmacology of the antidiabetic agents, evaluate key research on diabetes, interpret and apply clinical guidelines for diabetes, assess socioeconomic aspects of diabetes, and apply this information to patient cases. Special populations with diabetes will also be discussed including pediatric, gestational, and geriatric diabetes. Students will also learn the the pathophysiology of metabolic syndrome, pharmacology of obesity treatments, nonpharmacological and pharmacological ways to treat metabolic syndrome, including the implications of bariatric surgery on use of pharmacologic agents in general, and apply this information to patient cases. prereq: Students will need to have successfully completed: Molecular Metabolism/Nutrition, Cardiovascular Pharmacotherapy concurrent registration is required (or allowed) in Pharmaceutical Care Skills Lab 1-3. Students should be able to describe the physiology of insulin action, incretin hormones, amylin, and the fasting and fed states. Students should be able to describe how insulin is designed and manufactured. Students should be able to describe the following biochemistry topics: carbohydrate metabolism and lipid metabolism, and protein. Students should be able to assess a patient and determine most appropriate pharmacotherapy treatment options for a patient's hypertension and dyslipidemia treatments, including ability to describe, interpret and apply evidence-based guidelines. Students should be able to describe how nutrition impacts energy production, utilization and storage, and obesity. Students need to be able to describe the caloric content of carbohydrates, proteins and lipids and be able to apply that knowledge to reading food labels and evaluating a patient's nutritional status.

PHAR 6756. Kidney, Fluid, and Electrolytes. (2.1 cr. ; A-F only; Every Spring)
About 75% of new cases of chronic kidney disease (CKD) are due to diabetes and hypertension. Patients with CKD often experience congestive heart failure and anemia. In addition, the kidney is the main excretory route for many drugs. Thus, this course offers an opportunity to integrate material learned in previous and concurrent courses. In this course, students will learn key concepts and develop specific skills in the management of common fluid and electrolyte and single acid/base disorders and in prevention and management of chronic kidney disease and associated conditions. prereq: Students must have completed the following courses successfully: - Applied Pharmaceutical Care, - Foundations of Social and Administrative Pharmacy, - Medicinal Chemistry and Pharmacology of Cardiovascular Agents, - Pharmacokinetics, - Cardiovascular Pharmacotherapy, - Cellular Metabolism and Nutrition See the course syllabus for more detailed prerequisites.

PHAR 6758. Pulmonary Pharmacotherapy. (1.1 cr. ; A-F only; Every Spring)
This course will provide students with the requisite pathophysiology and pharmacotherapeutic knowledge to care for patients with common pulmonary diseases. It will integrate concepts of pediatric and geriatric pulmonary dosing and infectious diseases. prereq: Students must have completed the following courses successfully: - Applied Pharmaceutical Care - Foundations of Social and Administrative Pharmacy - Medicinal Chemistry and Pharmacology of Cardiovascular Agents - Pharmacokinetics, - Cardiovascular Pharmacotherapy, - Cellular Metabolism and Nutrition See the course syllabus for more detailed prerequisites.

PHAR 6760. Career and Professional Foundations IV. (0.5 cr. ; A-F only; Every Fall)
For the third year of the Professional Development and Assessment sequence, the emphasis will be on deeper exploration into career options, as well as the tools needed for contemporary pharmacy practice. Students will have the opportunity to engage with their peers as well as practicing pharmacists as they learn about the expectations of contemporary professional practice. prereq: Phar 6715, 6730, 6745

PHAR 6762. Medicinal Chemistry and Neuropharmacology. (2.8 cr. ; A-F only; Every Fall)
Neuropharmacology and Medicinal Chemistry of Neurological Treatments builds upon the foundational concepts learned in Principles of Pharmacology and Principles of Medicinal Chemistry, and applies them to drug classes primarily used for the treatment of central nervous system (CNS) and peripheral nervous system (PNS) dysfunction. prereq: Phar 6722, 6726, and 6732

PHAR 6766. Biotechnology-Derived Drugs. (1 cr. ; A-F only; Every Fall)
Biotechnology-derived drugs are where the future is, and pharmacy students need to understand how they are made, how they act and what special considerations are involved. This course will provide the foundational knowledge necessary to dispense current biotechnology-derived drugs and provide the basis for self-education needed to understand the biotechnology-derived drugs of the future. prereq: Phar 6702, 6722, 6726, 6724, 6734, and 6752

PHAR 6768. Infectious Diseases. (3 cr. ; A-F only; Every Fall)
Course will focus on the pharmacology, pharmacokinetics, and pharmacodynamics of antibiotics and the pharmacotherapy of infectious diseases. prereq: Phar 6702, 6706, 6718, 6724, 6736, 6738, 6748, 6756, 6758

PHAR 6770. Pharmaceutical Care Skills Lab V. (2 cr. ; S-N only; Every Fall)
This course is designed for third year pharmacy students to continue to build the skills necessary to become a competent, caring pharmaceutical care practitioner. The course consists of two components: a laboratory section and a discussion. prereq: Pharmaceutical Care Skills Labs I, II, III, and IV, and Applied Pharmaceutical Care

PHAR 6772. Topics in Pharmacotherapy and Pharmacogenomics. (; 1.6 cr. ; A-F only; Every Fall)
Course provides students with the pharmacologic, pharmacotherapeutic, and pharmaceutics knowledge they need to understand therapies for dermatologic, gastrointestinal, and genitourinary conditions, and arthritis and gout. Prepares future generalist pharmacists to be knowledgeable

about common conditions of aforementioned topics and appropriate pharmacotherapy options for treatment. It will focus primarily on pharmacotherapy, but will have an overview of pathophysiology of these conditions. Students will be expected to apply knowledge to design and monitor a patient-centered pharmaceutical care plan and to appropriately educate patients regarding proper use of medications covered in the course. This course prepares students to identify clinically relevant information in the modern healthcare setting, learn it at a depth beyond memorization, and apply and interpret its application to relevant patient case vignettes. prereq: All required PharmD year two coursework

PHAR 6774. Pharmacotherapy of Neurologic and Psychiatric Disorders. (3.1 cr. ; A-F only; Every Fall)
Course prepares future generalist pharmacists to be knowledgeable about common psychiatric and neurologic disorders and about the appropriate use of medications used to treat them. Course primarily focuses on the pharmacotherapies used to treat psychiatric and neurologic disorders. This course will additionally provide an overview of the presentation and pathophysiology of specific psychiatric and neurologic disorders, an overview of the differences between the practices of psychiatry and neurology and a discussion of stigmas associated with mental illness. An overview of non-pharmacologic therapies will be introduced to the extent relevant to the generalist pharmacists. At the conclusion of the course students will be expected to apply knowledge learned in the course in order to design and monitor a pharmacotherapeutic plan for specific patients and to appropriately counsel patients regarding proper use of the various psychiatric and neurologic medications covered in the course. prereq: All required PharmD year two coursework

PHAR 6778. Pharmacy Law. (; 0.7 cr. [max 1 cr.] ; A-F only; Every Spring)
The course covers both federal and state laws that impact and regulate the practice of pharmacy including federal regulation of medications, regulation of controlled substances, and the Minnesota Pharmacy Practice Act. The course will be offered entirely online.

PHAR 6780. Pharmacy Outcomes. (2.5 cr. ; A-F only; Every Spring)
Course facilitates integration of knowledge of basic sciences, pharmacotherapy, pharmacy practice management, pharmaceutical care, written communication, literature evaluation, drug information retrieval, law and ethics, and pharmacoeconomics to manage patients with multiple medical conditions. This course is where students are required to perform and demonstrate knowledge during curricular assessments. prereq: Phar 6700, 6702, 6704, 6706, 6708, 6710, 7310, 6716, 6718, 6720, 6722, 6724, 6726, 7325, 6732, 6734, 6736, 6738, 6740, 6742, 7330, 6748, 6750, 6752, 6754, 6756, 6758, 7340, 7345, 6770, 6774, 6768, 6762

PHAR 6782. Evidence Based Practice. (1.8 cr. ; A-F only; Every Fall)
The Evidence Based Practice has been designed to facilitate acquisition and application of evidence based practice knowledge and skills. Evidence based practice involves the use fo the best available evidence, clinical expertise and patients' values to make complex pharmacy related decisions. prereq: Phar 6700, 6704, 6706, 6742

PHAR 6784. Integrated Oncology. (2.8 cr. ; A-F only; Every Spring)
This course focuses on the etiology and molecular biology of tumorigenesis, medicinal agents, and pharmacology of anticancer agents, treatment of the most common cancers, supportive care of the patient with cancer, and social and ethical considerations of the treatment of the patient with cancer including end of life directives. prereq: PD3 in good academic standing, students will find it helpful to review the following topic areas: Principles of Biochemistry (Lipids [Structure/Function], Proteins [Folding/ Conformation]), Cellular Physiology Molecular Biology, Genetics (Cell Biology [signal transduction, DNA replication, transcription, protein translation, cell cycle, apoptosis], Immunology, Tumorigenesis, Angiogenesis, Genetics principles, Anatomy/Physiology [GI tract, pulmonary, hormone and feedback regulation])

PHAR 6786. Acute Patient Care Pharmacotherapy. (3.4 cr. ; A-F only; Every Spring)
Course prepares students to approach patients with multiple medical problems and the dynamic changes that patients can experience in the acute care settings. Students will then learn about the pharmacotherapy approach related to managing those disease states/ conditions. Students will be expected to develop therapeutic plans for patient case scenarios at the onset of a hospital admission as well as additional problem that could present over the course of a hospitalization or result in readmission. Additional scenario problems will be incorporated into the cases as the course progresses and the cases and problems will become more complex. By the end of the course, students will have had an opportunity to address multiple medical problems and make pharmacotherapy decisions and will be evaluated based on those decisions. Knowledge gained in this course will prepare students for the APPE acute care/institutional rotation. prereq: successful completion of all 1st year, 2nd year, and fall 3rd year coursework

PHAR 6797. Advanced Pharmacy Practice Learning Experience 1. (2 cr. ; S-N only; Every Fall, Spring & Summer)
This course is the first in a series of 3 courses (summer, fall, and spring) designed to align with and augment learning occurring on Advanced Pharmacy Practice Experiences (APPEs). In the first course (summer semester), students will complete the top 200 drug modules and drug administration CORE Readiness modules to solidify learning from year 1-3 of the curriculum. In addition to these requirements, students will complete additional activities specific to their current rotation placement. For example, students completing their ambulatory care rotation will participate in topic discussions specific to ambulatory care practice with faculty. Additionally, various optional learning activities will be made available to students to complement their rotations based on students? personal interests or based on direction from their preceptor.

PHAR 6798. Advanced Pharmacy Practice Learning Experience (APPLE) 2. (; 2 cr. ; S-N only; Every Fall)
This course is the second in a series of 3 courses (summer, fall, and spring) designed to align with and augment learning occurring on Advanced Pharmacy Practice Experiences (APPEs). In the first course (summer semester), students will complete the top 200 drug modules and drug administration CORE Readiness modules to solidify learning from year 1-3 of the curriculum. In this second course (fall semester), students will focus on preparing for residency/job searching and health inequities. In addition to these requirements, students will complete additional activities specific to their current rotation placement. For example, students completing their ambulatory care rotation will participate in a journal club specific to ambulatory care practice. Additionally, various optional learning activities will be made available to students to complement their rotations based on students? personal interests or based on direction from their preceptors.

PHAR 6799. Applied Pharmacy Practice Learning Experiences 3. (2.1 cr. ; S-N only; Every Spring)
This course is the third in a series of three courses (summer, fall, and spring) designed to align with and augment learning occurring on Advanced Pharmacy Practice Experiences (APPEs). This course focuses on preparing students for the beginning of their career as a pharmacist. Students will design a study plan for licensure, review law content, and reflect on their journey in pharmacy education. In addition to these requirements, students will complete additional activities specific to their current rotation placement. For example, students completing their ambulatory care rotation will participate in a journal club specific to ambulatory care practice. Additionally, various optional learning activities will be made available to students to complement their rotations based on students' personal interests or based on direction from their preceptors. Prerequisite: Successful completion of APPLE 1 and APPLE 2

PHAR 6800. Rehabilitation Pharmacotherapy. (; 2 cr. ; A-F only; Every Summer)
The goal of this course is to equip physical therapy students with a general understanding of the impact of medications on rehabilitation and how rehabilitation affects medication use. Students will practice applying content through patient cases and writing a patient care plan. This is a completely online course with weekly

due dates offered each Summer term. For more information, contact phar6800@umn.edu or 612-624-7976.

PHAR 6900. Curricular Studies for Internship and Pharmacy Employment. (1 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
This course is designed for students pursuing an internship or pharmacy-related employment to receive course credit (typically for visa requirements). The course does NOT count toward elective credit requirements. If applicable, students must remain visa compliant and are solely responsible for doing so. The vast majority of the course is the hours a student spends at their internship/ employment site. A written assignment is required at the end of the course. Students will meet once during the semester, which is arranged with instructors.

PHAR 6901. Pharmaceutical Care Experience. (1 cr. ; S-N only; Every Spring)
The Pharmaceutical Care Experience builds on Foundations of Pharmaceutical Care and provides an early opportunity to practice pharmaceutical care in a primary care clinic setting. This elective will allow students to assess each patient?s unique medication experience and drug-related needs through patient interviews. Students will use this information to develop a patient-centered care plan under the guidance of a practitioner mentor. The pharmaceutical care process will be applied and assessed in all future coursework, including, but not limited to, pharmacotherapy patient case work-ups, applied learning in the Pharmaceutical Care Learning Center, and during experiential education experiences.

PHAR 6902. Foundations for Integrative Mental Health and Psychiatric Practice. (; 2 cr. ; A-F only; Every Fall)
This course is design to allow students to examine concepts, theories, and paradigms foundational to psychiatric/mental health practice and interprofessional integrative mental health care. Students develop clinical interviewing methods that elicit a client?s health narrative and facilitate the therapeutic relationship. Students also practice techniques that promote beginning skills important in reflective clinical practice. The course is primarily online, with 3 required 3-hr patient care simulations. There will be content posted on the course website for student learning. Activities and assessments include quizzes, patient scenario cases, reflective papers (upon re-watching the video of their interactions with the interprofessional teams and standardized patients during the simulation sessions), and individual and interprofessional group. Pharmacy students need to be PD3 students committed to earning the Interprofessional Integrative Mental Health Focus Area designation. We ask pharmacy students to commit to the entire series (fall and spring electives, and mental health APPE)

PHAR 6903. Assessment and Management of Psychiatric Disorders. (2 cr. ; A-F only; Every Spring)
This course is design to allow students to apply advanced concepts from integrative mental health theory and research, social sciences, neuropsychology, and neurophysiology in the differentiation and explanation of psychiatric symptoms and disorders across the age continuum.

PHAR 6904. Health Coaching for Pharmacists: Creating a Culture of Change for Patients. (1 cr. ; S-N only; Every Spring)
Health coaching for Pharmacists will examine current foundations for health and wellbeing, including definitions and standards. Students will learn health coaching models, theories and associated components. We will develop students' self-awareness through mindfulness exploration and self-assessments. Students will learn skills and techniques for coaching patients such as motivational interviewing, non-violent communication, active listening, appreciative inquiry, emotional intelligence, and coaching presence. Students will apply learned skills through peer practice during in-person sessions.

PHAR 6905. Applied Psych Pharmacotherapy. (2 cr. ; A-F only; Every Spring)
This course provides a semester-long application of the PD3 fall semester psych pharmacotherapy content through complex scenarios and exploration of advances psychiatric pharmacy topics. Students developed case presentations will be worked-up using a standardized format, and shared with a designated visiting expert prior to class session. Class session each week will begin with a discussion of the case and work-up that is primarily student-led, with a visiting psych/ behavioral health clinician providing expert feedback and guidance for the second half of the class session. The course will be structured to make visiting clinician involvement as simple and non-disruptive as possible, including participating from office at work with online video conference option Cisco Meeting Server (formerly Acano). Pharmacy students need to be PD3 students who have passed the Core Psychiatric and Neurology Pharmacotherapy with a grade of B or better. Student must be in good academic standing within the pharmacy program.

PHAR 6906. Introduction to Pharmacy Research. (1 cr. ; A-F only; Every Fall)
This course will provide an overview of principles to research in particular research topic areas. It will also provide a forum for scientists involved in research in particular topic areas to discuss their research, environment, and careers with students.

PHAR 6907. Interprofessional Collaborative Practice in HIV Care. (1 cr. ; A-F only; Every Spring)
Interprofessional Collaborative Practice has the potential to positively affect the lives of persons living with HIV/AIDS. This short-semester course is designed to provide learners with foundational knowledge of HIV prevention and care and to develop the ability to work as a member of an interprofessional collaborative health care team. Learners will explore options for involvement in HIV care as part of their health care career and will be inspired to lifelong learning related to HIV care and interprofessional collaborative practice. The methods of instruction include lectures with small group discussion incorporated throughout. The course exercises are designed to provide hands on experience with some of the tools and concepts covered in the course.

PHAR 6908. Drugs of Abuse. (2 cr. ; S-N only; Spring Odd Year)
Basic medicinal chemistry of substances of abuse, associated paraphernalia. Prereq: Organic chemistry I and Phar 6702

PHAR 6909. Applied Cultural Competence in Patient Care and Pharmacy Practice. (1 cr. ; A-F only; Every Spring)
This course builds on content learned in PharmD program - to provide students with fundamental knowledge, skills and attitudes required of culturally competent, caring general pharmacist practitioners. Content is integrated with didactic courses and prepares students for IPPE and APPE experiences, as well as for their future careers. Steady changes in the demographics of the U.S. and the state of Minnesota highlight the demand for cultural awareness and sensitivity in the clinical environment as the percentage of racial, ethnic and cultural minorities in America is projected to continue to outpace the number of minority health care professionals. Racial and ethnic disparities in health and health care access have been recognized in the United States for over 30 years. Despite an improved life expectancy for all races and ethnicities, inequities in morbidity and mortality rates and utilization of preventative and necessary health care services persist for various segments of the population. As the United States? population becomes increasingly diverse, pharmacists are becoming progressively more responsible for the health care management of people from various races, ethnicities, languages and cultures. Providing culturally and linguistically competent health care to these patients has the potential to reduce ever important disparities in health and health care services and to improve the nation?s overall health outcomes.

PHAR 6910. Foundations of Biomedical Natural Language Processing. (3 cr. ; Student Option; Periodic Fall & Spring)
The course will provide a systematic introduction to basic knowledge methods used in natural language processing (NLP) research. It will introduce biomedical NLP tasks and methods as well as their resources and applications in the biomedical domain. The course will also provide hands-on experience with existing NLP tools and systems. Students will gain basic knowledge and skills in handling with main biomedical NLP tasks. Recommended: basic understanding of data mining concepts, basic knowledge of computational linguistics. Students should have taken HINF 5502 Python for Health Sciences or have equivalent experience.

PHAR 6911. CI Cooper, RPh: Equity, Diversity, Inclusion & Antiracism

GoodReads. (; 2 cr. ; A-F only; Every Fall & Spring)
This course is designed to support students in finding ways to actively participate in equity, diversity, inclusion (EDI), and antiracism work in healthcare and life through reading and critical thinking. Students examine concepts, theories, and paradigms foundational to EDI and antiracism and apply what they have learned to real-life situations. One title is assigned to students in their enrolling semester followed by three subsequent books of their choice. Each student will create their own study plan and progress through the course at a contracted pace. Students have up to one year to complete the course. Learning is primarily self-directed to meet unique interests and career goals. This course is remote online with one arranged Zoom session in the first semester. Students are invited to enroll in the fall or spring semester; there is no summer registration.

PHAR 6913. The Science and Spirit of Wellbeing. (; 1 cr. ; A-F only; Every Spring)
Care, in general, and healthcare in particular, requires a certain degree of wellbeing on the part of the provider. This elective survey course introduces students to evidence based wellbeing. The course explores individual wellbeing as well as implications for practice and the health and wellbeing of others. prereq: instr consent

PHAR 6937. Foundations of Leadership. (2 cr. ; A-F only; Every Fall & Spring)
Leadership development/its relation to advancing the profession of pharmacy. prereq: PDII or PDIII Pharmacy student

PHAR 6938. Developing Adaptive Leadership. (1 cr. ; A-F only; Every Spring)
Directed Study: Developing Adaptive Leadership prereq: Pharm.D. student

PHAR 6939. Leading Change Experience I. (2 cr. ; S-N only; Every Fall)
In collaboration with a faculty advisor, students implement a change that requires adaptive leadership. Work will focus on building a "short term win" and a team that can continue efforts into the future. Students will also gain experience in collecting and managing data to assist the change process (e.g., needs assessment and/or outcomes assessment). In addition, working with their faculty advisor, students will create and implement an individualized plan for their own personal leadership development. Students will also gain experience in supporting the leadership development of others. To support individualized development, a leadership networking partner (pharmacist) is assigned and periodic networking events and/or meetings are held. prereq: PHAR 6937 and 6938

PHAR 6940. Leading Change Experience II. (2 cr. ; S-N only; Every Spring)
Continues leading change and development work initiated in Leading Change Experience I. During this term, students continue with their networking partners, present their leading change work, facilitate transition of the work to new leaders, conduct a critical appraisal of their leadership development, and support second year students as they initiate their projects. Students will also evolve their roles into shifting from personal development to the development of others. Assisting in a mentoring role in several capacities 1) transitioning new leaders into the leading change experience and 2) providing guidance, ideas and encouragement to those students interested in change initiatives. prereq: PHAR 6937 and 6938

PHAR 6941. Leadership Best Sellers for Pharmacists. (2 cr. ; A-F only; Every Fall & Spring)
Part of the leadership track in pharmacy.

PHAR 6942. Leadership Capstone. (; 2 cr. ; S-N only; Every Fall, Spring & Summer)
Supports completion of Leadership Emphasis Designation. Documentation/self-reflection of leadership learning experiences pursued inside/outside of classroom. Prerequisites: This course is for students who are in the fourth year of the Leadership Emphasis Area. Successful completion of Phar 6937, 6938, 6939 and 6940. Completion or concurrent enrollment in 6941 (Leadership Best Sellers).

PHAR 6961. Women's Health. (; 2 cr. ; A-F or Audit; Every Spring)
During this course, students will have the opportunity to actively learn and discuss women's health issues taught in the core curriculum to a greater extent. The core curriculum focuses on the pharmacotherapy around women's health, we will focus on the patient's perspective, pathophysiology, and other quality care considerations specific to women including cultural, religious, psychosocial, and socioeconomic factors effecting health. Health topics will range from social issues to menstrual health, breast cancer to eating disorders, with a specific focus on preparing students for professional practice and the pharmacist's role. prereq courses: Endocrinology pharmacotherapy sequence in the PD2 year; prereq topics: Contraceptive agents, emergency contraception, hormonal contraception.

PHAR 6962. Ethics in Pharmacy Practice. (2 cr. ; A-F only; Every Spring)
Ethical principles, selected schools of ethical thought. Students discuss/debate ethical dilemmas in pharmacy practice/health care. prereq: Pharm.D. 3rd year student

PHAR 6964. Clinical Toxicology. (1 cr. ; A-F only; Spring Odd Year)
This course will cover the clinical signs/symptoms, general management and treatment of poisonings and toxicologic emergencies that are not covered in the main curriculum. It will also cover decontamination and laboratory principles associated with poisonings and toxicologics emergencies. This class will be comprised of lecture format presentations. Students will be given 1 hour to complete the final exam and midterm. prereqs: All students will have successfully completed the first year professional pharmacy program, as well as successfully completed fall semester of the second year. All students will have also successfully completed or be in the process of completing anatomy, physiology, pathophysiology, and pharmacology. The student is responsible for this material to the extent necessary as a framework for toxicologic therapeutics. Thus, students are encouraged to review basic anatomy and physiology and specifically encouraged to review the section of the pharmacology textbook relevant to the classes of drugs covered.

PHAR 6966. Food Medicine: Contemporary Issues. (1 cr. ; Student Option No Audit; Every Fall & Spring)
Food contributes to the prevention, and conversely, the development of disease processes. I n order to better understand the interrelatedness of food and health, this course offers a critical perspective on how the ubiquity of food; race, class, gender; and indigeneity; colonization and corporatization affect people? s food experiences; and subsequently, individual and population health. Students will examine modern food systems and describe implications for social determinants of health, health promotion, chronic disease management and IP collaborative practice. We will address questions such as: How do food systems impact our health? What makes food a political and environmental issue? Are we what we eat? Why do we categorize things that are not food as food? What is food sovereignty?

PHAR 6968. Critical Care. (1 cr. [max 2 cr.] ; A-F only; Spring Even Year)
Critical Care is an elective that consists of two main components: a faculty/clinician presentation on an important topic to contemporary critical care practice, followed by a student evaluation and presentation on a selected primary literature topic that applies and integrates the presentation with current practice challenges. Key topics that are covered include discussion of the Surviving Sepsis Guidelines with discussion on the role of corticosteroids, identification and management of the anxious or delirious ICU patient, and application of the updated PAD guidelines, systems of the second 50-minutes a student (or pair of students) present the faculty-selected study using PowerPoint slides, and encourage group discussion of the paper?s merits and application to current critical care practice or future research. Challenges of critical care research are incorporated into the weekly discussions. prereq: Successful completion of P1, P2, and Fall of P3 professional pharmacy program. Interest in critical care pharmacy practice and/or clinical research.

PHAR 6970. Immunization Tour. (1 cr. ; A-F or Audit; Every Fall)
Role of health care practitioners. Population based disease prevention. Planning/delivering influenza vaccination clinics. Collaborative public health intervention. prereq: 6175, Completion of CPR

PHAR 6971. Geriatric Pharmacotherapy. (; 2 cr. ; S-N only; Every Spring)
Pharmacokinetic/pharmacodynamic changes and their implications in elders. Effects of

drug-drug/drug-disease interactions. Drug adherence barriers to provide optimum pharmacotherapy to elderly persons. Prerequisite: 3rd year Pharmacy student

PHAR 7001. Early Pharmacy Practice Experience I. (; 1 cr. ; A-F only; Every Fall)
First in series of four courses. Focuses on patient perspective in managing/living with chronic conditions/ chronic medication use. Community-based instruction, mentor program. prereq: Criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7002. Early Pharmacy Practice Experience II. (; 1 cr. ; A-F only; Every Spring)
Patient perspective in managing/living with chronic conditions/chronic medication use. Community-based instruction, mentor program. prereq: 7001 or instr consent, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7003. Early Pharmacy Practice Experience III. (; 0.5 cr. ; A-F only; Every Fall)
Third in series of four courses. Patient perspective in managing/living with chronic conditions/chronic medication use. Community-based instruction, mentoring. prereq: 7002 or instr consent, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7004. Early Pharmacy Practice Experience IV. (; 0.5 cr. ; A-F only; Every Spring)
Patient perspective in managing/living with chronic conditions/chronic medication use. Community-based instruction, mentoring. Upcoming patient care opportunities. prereq: 7003 or instr consent, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7005. Introductory Community-Practice Pharmacy Experience. (2.5 cr. ; S-N only; Every Spring)
Experience in patient care at community practice setting. Three weeks, 40 hrs/week. prereq: 6111, 6171, 7001, 1st year pharmacy student

PHAR 7006. Introductory Institutional-Pharmacy Practice Experience. (2.5 cr. ; S-N only; Every Spring)
Experience in patient care in hospital setting. Three-week, 40 hours/week. prereq: College of Pharmacy student completed 6121, 6122, 6131, 6132, 6173, 6174, 7003 and 7004 with passing grade, registered with Minnesota Board of Pharmacy as intern

PHAR 7010. APPE Continuing Professional Development Portfolio. (; 1.5 cr. ; S-N only; Every Spring)
Continuing professional development. Systematic maintenance, development, and broadening of knowledge, skills, and attitudes. Students self-assess performance/learning needs and create/follow/evaluate a learning plan. Documentation for peer review/support, regulatory review. prereq: 3rd yr pharmacy student

PHAR 7128. Acute Patient Care Practice Experience II. (4 cr. ; A-F only; Every Fall, Spring & Summer)
Experience in an inpatient setting. Students responsible for all drug-related needs of individual patients. Full-time for five weeks. prereq: Pharm.D. I-III, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7213. Elective Practice Experience III. (4 cr. ; A-F only; Every Fall, Spring & Summer)
Experience in inpatient or outpatient pharmacy practices where direct patient contact/ care occurs for 5 weeks, or experience in non-patient care setting. Sites vary widely from governmental agencies to pharmacy associations to specialized practices for 5 weeks. prereq: Pharm.D. I-III, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7214. Elective Practice Experience IV. (4 cr. ; A-F only; Every Fall & Spring)
Experience in inpatient or outpatient pharmacy practices where direct patient contact/ care occurs for 5 weeks, or experience in non-patient care setting. Sites vary from governmental agencies to pharmacy associations to specialized practices for 5 weeks. prereq: Pharm.D. IV, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7310. Introduction to Community Health and Interprofessional Engagement. (1 cr. ; S-N only; Every Fall)
Course builds on content learned in Becoming a Pharmacist to provide students with fundamental knowledge, skills, and attitudes required of competent, caring general pharmacist practitioners. Content is integrated with concurrent first year didactic courses and prepares students for Pre-APPE. prereq: Successful completion of Becoming a Pharmacist (BaP)

PHAR 7325. Introductory Community-Practice Pharmacy Experience. (3 cr. ; S-N only; Every Summer)
The purpose of the Community IPPE is to introduce you to the fundamentals of pharmacy practice and developing professional attitude and behavior in the community pharmacy setting. The course will build upon knowledge gained in the first year didactic curriculum, specifically Foundations of SAPh and Foundations of Pharmaceutical Care. The format of the IPPE course includes: in person, online and an experiential components. The experiential component is a combination of observation, application of current knowledge, and feedback and assessment between you, the preceptor, and others. prereq: College of Pharmacy students must complete PHAR 6700 (Becoming a Pharmacist), 6706 (Foundations in Pharmaceutical Care), 6716 (Applied Pharmaceutical Care), 6728 (Pharmaceutical Calculations), 6710 (Pharmaceutical Care Skills Lab 1), 6720 (Pharmaceutical Care Skills lab 2), 6704 (foundations of SAPh), 6730 (first year seminar), 6718 (drug delivery), 6722 (med chem), 6726 (pharmacology) with a passing grade. You must be registered with the Minnesota Board of Pharmacy as an intern prior to the onsite experiential component of this course.

PHAR 7330. Community Teachers I. (0.4 cr. ; S-N only; Every Fall)
EPhECT is a service learning experience which pairs second year students with a volunteer Community Teacher (CT). Students develop a working/professional relationship with their CT and learn from CT's health and life experiences. Students will work with their CT to choose and complete activities unique to each CT's health profile. CTs benefit by gaining better understanding of their health by discussing and evaluating their health profile with professional students. CTs will also better understand the pharmacist's role in healthcare. prereq: Students must have completed or be currently enrolled in the following courses: Becoming a Pharmacist, Foundations of Pharmaceutical Care, Applied Pharmaceutical Care, Pharmaceutical Skills Lab I and II

PHAR 7340. Community Teacher Experience II. (0.4 cr. ; S-N only; Every Spring)
EPhECT is a service learning experience which pairs second year students with a volunteer Community Teacher (CT). Through this course students develop a working/professional relationship with their CT and learn from their CT???s health and life experiences. Students will work with their CT to choose and complete activities unique to each CT???s health profile. prereq: Students must have completed or be currently enrolled in the following courses: Becoming a Pharmacist, Foundations of Pharmaceutical Care, Applied Pharmaceutical Care, Pharmaceutical Skills Lab I, II, and III, EPhECT I, and Foundations of SAPh

PHAR 7345. Introductory Institutional-Practice Pharmacy Experience. (3 cr. ; S-N only; Every Fall & Spring)
The purpose of the Institutional IPPE is to introduce students to the fundamentals of pharmacy practice in the institutional pharmacy setting. The course will build upon knowledge gained in the first two years of the didactic curriculum. The student will spend 120 hours at the institutional site with their preceptor (who is approved by the MN BOP) and the College. An Additional 36 hours is allocated between assignments and online course materials. prereq: Students must have successfully completed Phar 7325 (Community IPPE), Phar 6730 (Professional Development and Assessment II), Phar 6736 (Cardiovascular Pharmacotherapy), Phar 6738 (Pharmacokinetics), Phar 6740 (Pharmaceutical Care Skills III), Phar 6742 (Colloquium I: Scholarly Presentation Skills). Students must be enrolled concurrently in PD2

Spring semester courses. Students must also be registered interns in the state of Minnesota.

PHAR 7351. Introductory Pharmacy Practice Experience 1 - Community. (1 cr. ; S-N only; Every Fall)
The purpose of the Community IPPE is to introduce students to the fundamentals of pharmacy practice, and professional attitude and behavior in the community pharmacy setting. The course will build upon knowledge and skills gained in the first year didactic curriculum, particularly Pharmaceutical Care Skills Lab, Foundations of Pharmaceutical Care, and Applied Pharmaceutical Care. While there is significant overlap across semesters, there will be greater concentration on different topics by semester driven by the activities in workbooks. The fall semester will focus more on patient education and pharmacy workflow. The spring semester will focus more OTC medications and self-care, and pharmacy operations.

PHAR 7352. Introductory Pharmacy Practice Experience 2 - Community. (1 cr. ; S-N only; Every Spring)
The purpose of the Community IPPE is to introduce students to the fundamentals of pharmacy practice, and professional attitude and behavior in the community pharmacy setting. The course will build upon knowledge and skills gained in the first year didactic curriculum, particularly Pharmaceutical Care Skills Lab, Foundations of Pharmaceutical Care, and Applied Pharmaceutical Care. While there is significant overlap across semesters, there will be greater concentration on different topics by semester driven by the activities in workbooks. The fall semester will focus more on patient education and pharmacy workflow. The spring semester will focus more OTC medications and self-care, and pharmacy operations.

PHAR 7353. Introductory Pharmacy Practice Experience 3 - Institutional. (1 cr. ; S-N only; Every Fall)
The purpose of the Institutional Introductory Pharmacy Experiences (I-IPPE) is to introduce pharmacy students to the fundamentals of pharmacy practice in the hospital setting. To complement their didactic curriculum, experiential experiences allow them to see pharmacy in action. The I-IPPE should be their opportunity to focus on the distributive and operational side of hospital pharmacy. While exposure to clinical services is an important part of hospital pharmacy, we can all agree even the most appropriately designed medication regimen is of no benefit to the patient, if it cannot be safely dispensed and administered.

PHAR 7354. Introductory Pharmacy Practice Experience 4 - Institutional. (1 cr. ; S-N only; Every Spring)
The purpose of the Institutional Introductory Pharmacy Experiences (I-IPPE) is to introduce pharmacy students to the fundamentals of pharmacy practice in the hospital setting. To complement their didactic curriculum, experiential experiences allow them to see pharmacy in action. The I-IPPE should be their opportunity to focus on the distributive and operational side of hospital pharmacy. While exposure to clinical services is an important part of hospital pharmacy, we can all agree even the most appropriately designed medication regimen is of no benefit to the patient, if it cannot be safely dispensed and administered.

PHAR 7355. Introductory Pharmacy Practice Experience 5 ? AS/IMUS. (2 cr. ; S-N only; Every Fall)
Improving Medication Use Systems Introductory Pharmacy Practice Experience (IMUS-IPPE) is an 80-hour early experiential offering that exposes and advances student understanding of quality improvement in patient care in one of many possible pharmacy practice settings. All students will complete an IMUS-IPPE during one of the semesters during their P3 year. The purpose of the IMUS-IPPE is to give students the opportunity to develop continuous quality improvement (CQI) knowledge and skills via self-directed learning and participation in CQI initiatives projects in practice under the preceptorship of a pharmacist. Students will contribute to CQI initiatives improving patient care by participating on a project while learning about the organizations collective efforts related to quality improvement. Advanced Selective Introductory Pharmacy Practice Experience (AS-IPPE) is an 80-hour early experiential offering that exposes and advances student understanding of direct patient care in one of many possible pharmacy practice settings. All students will complete an AS-IPPE during one of the semesters during their P3 year. The purpose of the AS-IPPE is to introduce pharmacy students to direct patient care unique from dispensing functions in any pharmacy setting providing direct patient care. To complement their didactic curriculum, experiential rotations allow students to see pharmacy in action. Students completing an AS-IPPE will have the opportunity to focus their learning on a specific pharmacy interest area and related patient care clinical skills under the guidance of a preceptor.

PHAR 7401. Acute Patient Care Practice Experience. (12 cr. ; S-N only; Every Fall, Spring & Summer)
Experience in an inpatient setting. Students responsible for all drug-related needs of individual patients. Full-time for twelve weeks. prereq: Pharm.D. I-III, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7411. Ambulatory Patient Care Practice Experience I. (5 cr. ; S-N only; Every Fall, Spring & Summer)
Experience in an ambulatory setting. Students responsible for drug-related needs of individual patients. Full-time for five weeks. prereq: Pharm.D. IV, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7412. Ambulatory Care 2. (5 cr. ; S-N only; Every Fall, Spring & Summer)
Experience in an ambulatory setting. Students responsible for drug-related needs of individual patients. Full-time for five weeks. prereq: Pharm.D. IV, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7413. Community Pharmacy Practice Experience. (5 cr. ; S-N only; Every Fall, Spring & Summer)
Students assigned to participating community pharmacies. Community practice activities full-time for 5 weeks. prereq: Pharm.D. IV, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7431. Elective Experience 1. (5 cr. ; S-N only; Every Fall, Spring & Summer)
Patient care experience in any setting. Students responsible for drug-related needs of individual patients. Full-time for five weeks. prereq: Pharm.D. I-III, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7432. Elective Experience 2. (5 cr. ; S-N only; Every Fall, Spring & Summer)
Patient care experience in any setting. Students responsible for drug-related needs of individual patients. Full-time for five weeks. prereq: Pharm.D. I-III, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, negative Mantoux test (or explanation of positive test), chicken pox immunity

PHAR 7433. Elective Experience 3. (5 cr. ; S-N only; Every Fall, Spring & Summer)
Patient care experience in any setting. Students responsible for drug-related needs of individual patients. Full-time for five weeks. prereq: Pharm.D. I-III, MN Board of Pharmacy intern, criminal background check, BLS CPR certification, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity

PHAR 7501. Advanced Pharmacy Practice Experience 1. (4 cr. ; S-N only; Every Fall, Spring & Summer)
This course is an experiential rotation in any setting (acute care, institutional practice, community practice, ambulatory care, and electives). Students are responsible for drug-related needs of individuals (patients, etc.). Full-time for four weeks. Prereq: PharmD I-III; MN Board of Pharmacy intern; criminal background check; BLS CPR certification; negative Mantoux test (or explanation of positive test); chicken pox immunity

PHAR 7502. Advanced Pharmacy Practice Experience 2. (4 cr. ; S-N only; Every Fall, Spring & Summer)
This course is an experiential rotation in any setting (acute care, institutional practice, community practice, ambulatory care, and

electives). Students are responsible for drug-related needs of individuals (patients, etc.). Full-time for four weeks. Prereq: PharmD I-III; MN Board of Pharmacy intern; criminal background check; BLS CPR certification; negative Mantoux test (or explanation of positive test); chicken pox immunity

PHAR 7503. Advanced Pharmacy Practice Experience 3. (4 cr. ; S-N only; Every Fall, Spring & Summer)
This course is an experiential rotation in any setting (acute care, institutional practice, community practice, ambulatory care, and electives). Students are responsible for drug-related needs of individuals (patients, etc.). Full-time for four weeks. Prereq: PharmD I-III; MN Board of Pharmacy intern; criminal background check; BLS CPR certification; negative Mantoux test (or explanation of positive test); chicken pox immunity

PHAR 7504. Advanced Pharmacy Practice Experience 4. (4 cr. ; S-N only; Every Fall, Spring & Summer)
This course is an experiential rotation in any setting (acute care, institutional practice, community practice, ambulatory care, and electives). Students are responsible for drug-related needs of individuals (patients, etc.). Full-time for four weeks. Prereq: PharmD I-III; MN Board of Pharmacy intern; criminal background check; BLS CPR certification; negative Mantoux test (or explanation of positive test); chicken pox immunity

PHAR 7505. Advanced Pharmacy Practice Experience 5. (4 cr. ; S-N only; Every Fall, Spring & Summer)
This course is an experiential rotation in any setting (acute care, institutional practice, community practice, ambulatory care, and electives). Students are responsible for drug-related needs of individuals (patients, etc.). Full-time for four weeks. Prereq: PharmD I-III; MN Board of Pharmacy intern; criminal background check; BLS CPR certification; negative Mantoux test (or explanation of positive test); chicken pox immunity

PHAR 7506. Advanced Pharmacy Practice Experience 6. (4 cr. ; S-N only; Every Fall, Spring & Summer)
This course is an experiential rotation in any setting (acute care, institutional practice, community practice, ambulatory care, and electives). Students are responsible for drug-related needs of individuals (patients, etc.). Full-time for four weeks. Prereq: PharmD I-III; MN Board of Pharmacy intern; criminal background check; BLS CPR certification; negative Mantoux test (or explanation of positive test); chicken pox immunity

PHAR 7507. Advanced Pharmacy Practice Experience 7. (4 cr. ; S-N only; Every Fall, Spring & Summer)
This course is an experiential rotation in any setting (acute care, institutional practice, community practice, ambulatory care, and electives). Students are responsible for drug-related needs of individuals (patients, etc.). Full-time for four weeks. Prereq: PharmD I-III; MN Board of Pharmacy intern; criminal background check; BLS CPR certification; negative Mantoux test (or explanation of positive test); chicken pox immunity

PHAR 7508. Advanced Pharmacy Practice Experience 8. (4 cr. ; S-N only; Every Fall, Spring & Summer)
This course is an experiential rotation in any setting (acute care, institutional practice, community practice, ambulatory care, and electives). Students are responsible for drug-related needs of individuals (patients, etc.). Full-time for four weeks. Prereq: PharmD I-III; MN Board of Pharmacy intern; criminal background check; BLS CPR certification; negative Mantoux test (or explanation of positive test); chicken pox immunity

PHAR 7509. Advanced Pharmacy Practice Experience 9. (4 cr. ; S-N only; Every Fall, Spring & Summer)
This course is an experiential rotation in any setting (acute care, institutional practice, community practice, ambulatory care, and electives). Students are responsible for drug-related needs of individuals (patients, etc.). Full-time for four weeks. Prereq: PharmD I-III; MN Board of Pharmacy intern; criminal background check; BLS CPR certification; negative Mantoux test (or explanation of positive test); chicken pox immunity

PHAR 7510. Advanced Pharmacy Practice Experience 10. (4 cr. ; S-N only; Every Fall, Spring & Summer)
This course is an experiential rotation in any setting (acute care, institutional practice, community practice, ambulatory care, and electives). Students are responsible for drug-related needs of individuals (patients, etc.). Full-time for four weeks. Prereq: PharmD I-III; MN Board of Pharmacy intern; criminal background check; BLS CPR certification; negative Mantoux test (or explanation of positive test); chicken pox immunity

PHAR 7511. Advanced Pharmacy Practice Experience 1. (5 cr. ; S-N only; Every Summer)
This course is an experiential rotation in a pharmacy practice setting (acute care, institutional, community, ambulatory patient care, elective). Students are responsible for drug-related needs of individuals and populations. This is a five-week, full-time rotation. Students must be in good standing in the fourth year of the PharmD program and have met all institutional standards and requirements for practicing on-site prior to the start of their rotation.

PHAR 7512. Advanced Pharmacy Practice Experience 2. (5 cr. ; S-N only; Every Summer)
This course is an experiential rotation in a pharmacy practice setting (acute care, institutional, community, ambulatory patient care, elective). Students are responsible for drug-related needs of individuals and populations. This is a five-week, full-time rotation. Students must be in good standing in the fourth year of the PharmD program and have met all institutional standards and requirements for practicing on-site prior to the start of their rotation.

PHAR 7513. Advanced Pharmacy Practice Experience 3. (5 cr. ; S-N only; Every Summer)
This course is an experiential rotation in a pharmacy practice setting (acute care, institutional, community, ambulatory patient care, elective). Students are responsible for drug-related needs of individuals and populations. This is a five-week, full-time rotation. Students must be in good standing in the fourth year of the PharmD program and have met all institutional standards and requirements for practicing on-site prior to the start of their rotation.

PHAR 7514. Advanced Pharmacy Practice Experience 4. (5 cr. ; S-N only; Every Fall)
This course is an experiential rotation in a pharmacy practice setting (acute care, institutional, community, ambulatory patient care, elective). Students are responsible for drug-related needs of individuals and populations. This is a five-week, full-time rotation. Students must be in good standing in the fourth year of the PharmD program and have met all institutional standards and requirements for practicing on-site prior to the start of their rotation.

PHAR 7515. Advanced Pharmacy Practice Experience 5. (5 cr. ; S-N only; Every Fall)
This course is an experiential rotation in a pharmacy practice setting (acute care, institutional, community, ambulatory patient care, elective). Students are responsible for drug-related needs of individuals and populations. This is a five-week, full-time rotation. Students must be in good standing in the fourth year of the PharmD program and have met all institutional standards and requirements for practicing on-site prior to the start of their rotation.

PHAR 7516. Advanced Pharmacy Practice Experience 6. (5 cr. ; S-N only; Every Fall)
This course is an experiential rotation in a pharmacy practice setting (acute care, institutional, community, ambulatory patient care, elective). Students are responsible for drug-related needs of individuals and populations. This is a five-week, full-time rotation. Students must be in good standing in the fourth year of the PharmD program and have met all institutional standards and requirements for practicing on-site prior to the start of their rotation.

Philosophy (PHIL)

PHIL 5009. Existentialism. (3 cr. ; Student Option; Periodic Fall & Spring)
Existentialism as a French philosophical and artistic movement of the mid-twentieth century, is commonly associated with Jean-Paul Sartre, Albert Camus, or Simone de Beauvoir. Only in retrospect did it become transnational, dating back to at least the 19th century--S?ren Kierkegaard and Friedrich Nietzsche--and comprising figures like Martin Heidegger, Hannah Arendt, Ayn Rand, Silvia Plath, or Franz Fanon. This list already makes it a hard to define a creed or an ethical or political commitment that these writers have

in common. What then will allow us to call them existentialist? To begin with, it is perhaps the focus on individual experience, on the experience of finitude, a heightened awareness of the individual's embeddedness in a here and now, and a quest for the possibility of an unalienated life. Such concerns cannot easily be expressed through a systematic philosophy, a set of definitions and principles that can be passed on. Instead literary writing became a form of philosophical inquiry. Further, how these concerns could lend themselves to the most revolutionary as well as the most conservative, even Fascist politics, will be one of the puzzles we will seek to answer in this course. We will engage with a number of canonical existentialist texts and trace what defines Existentialism as a key mode of modern philosophizing.

PHIL 5010. Ancient Philosophers. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Spring)
Major work of selected ancient philosophers (e.g., Plato's Parmenides, Plato's Sophist, Aristotle's Metaphysics). Works discussed vary. prereq: 3001 or instr consent

PHIL 5040. Rationalists. (3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Major work of selected early modern rationalists (e.g., Descartes' Principles of Philosophy, Spinoza's Ethics, Conway's Principles of the Most Ancient and Modern Philosophy, Leibniz's Discourse on Metaphysics). Works discussed may vary from offering to offering.

PHIL 5055. Kant. (3 cr. ; Student Option; Periodic Fall & Spring)
Immanuel Kant has long been recognized as a particularly systematic thinker, one who wrote foundational texts in epistemology, metaphysics, ethics, politics, aesthetics, religion, teleology, and anthropology, which still resonate and influence contemporary thought. This course studies the wide breadth of Kant's philosophical system, paying especial attention to its relevance today. prereq: 3005 or 4004 or instr consent

PHIL 5085. Wittgenstein. (3 cr. ; Student Option; Periodic Fall & Spring)
In "Philosophical Investigations" Wittgenstein challenged some of the most long-standing and entrenched intuitions of philosophers -- basic intuitions about mind, rationality, linguistic understanding, and the very nature of philosophical/conceptual inquiry. Many of these intuitions remain entrenched, and Wittgenstein's challenge is as relevant today as it was in 1950. In Phil 4805 we examine the text and the secondary literature, and do so in the light of issues and debates that continue to demand attention.

PHIL 5101. Metaphysics. (3 cr. ; Student Option; Fall Even Year)
Broadly speaking, metaphysics is the study of the nature of reality. Metaphysical questions include questions about what kinds of things exist, what is the nature of things, what are persons, what is possible or impossible, what is the nature of time, what is causality, and many other fundamental questions about the world. The aim of this course is to introduce students to some of the central questions of metaphysics to investigate some of their answers. prereq: One course in history of philosophy or instr consent

PHIL 5105. Epistemology. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Epistemology is the study of knowledge. Epistemological questions include questions about the nature of knowledge, the difference between knowledge and true belief, the nature of justification, and the structure of our knowledge about the world. Epistemology is also centrally concerned with understanding and responding to arguments for skepticism, the view that we do not know anything about the world around us. The aim of this course is to introduce students to the some of the main problems of epistemology and to investigate some of their solutions. prereq: 1001 or instr consent

PHIL 5201. Symbolic Logic I. (; 4 cr. ; Student Option; Every Fall & Spring)
Study of syntax and semantics of sentential and first-order logic. Symbolization of natural-language sentences and arguments. Development of deductive systems for first-order logic. Metatheoretic proofs and methods, including proof by mathematical induction and proof of consistency and completeness. prereq: 1001 or instr consent

PHIL 5202. Symbolic Logic II. (; 4 cr. ; Student Option; Every Spring)
Elements of set theory, including the concepts of enumerability and nonenumerability. Turing machines and recursive functions; the results of Church, Godel, and Tarski and the philosophical significance of those results. prereq: 5201 or instr consent

PHIL 5209. Mathematical Methods for Philosophy. (4 cr. ; Student Option; Fall Odd Year)
Introduction to some of the mathematical methods used throughout philosophy, such as sets, graphs, automata, probability and decision theory, statistics, and computer simulation, both explicitly and through example applications. prereq: prior course in mathematics, logic, or mathematics-related discipline or or instr consent

PHIL 5211. Modal Logic. (; 4 cr. ; Student Option; Spring Odd Year)
Axiomatic and semantic treatment of propositional and predicate modal logics; problems of interpreting modal languages. prereq: 5201 or instr consent

PHIL 5221. Philosophy of Logic. (; 3 cr. ; Student Option; Periodic Fall)
In this course, we will look at some of the central topics in philosophical logic, concentrating on issues that motivate the introduction of various non-classical logics as alternatives to the standard classical account of logical consequence. Topics covered include (but are not limited to) the Liar paradox, vagueness, the paradoxes of relevance, and intuitionism. prereq: 5202 or instr consent

PHIL 5222. Philosophy of Mathematics. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Major philosophical questions arising in connection with mathematics. What is mathematics about? How do we know the mathematics we do? What is the relation between mathematics and the natural sciences? Selected readings of leading contributors such as Frege, Dedekind, Russell, Hilbert, Brouwer, Godel, Quine. prereq: College level logic or mathematics course or instr consent

PHIL 5231. Philosophy of Language. (3 cr. ; Student Option; Periodic Fall & Spring)
Theories of reference, linguistic truth, relation of language/thought, translation/synonymy. prereq: 1001 or 5201 or instr consent

PHIL 5311. History of Moral Theories. (3 cr. ; Student Option; Periodic Spring)
Is human nature fundamentally selfish or are we sympathetic creatures? What is free will and do we have it? Do moral principles have a rational basis or are our moral judgments expressions of feelings? Should morality be thought of in terms of acting on principle or producing good outcomes? We will focus on these and other questions as they are explored in primary texts from the early modern history of western philosophy. prereq: 1003W or instr consent or GRAD

PHIL 5320. Intensive Study of a Historical Moral Theory. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Intensive consideration of an author or theory in the history of moral or political philosophy. prereq: 1003 or instr consent

PHIL 5321. Theories of Justice. (3 cr. ; Student Option; Periodic Fall & Spring)
What is justice, understood as a central virtue of our social (e.g., political and legal) institutions? What does justice require in the political realm and what kind of state is best suited to achieve it? Ideally, what image of the just state should regulate our behavior? How do the requirements of justice change, if they do, in non-ideal circumstances, such as in cases of noncompliance with the law or in the context of violent conflict (e.g., in war)? This course is intended to provide upper-level undergraduates and philosophy graduate students with a selective survey of important work in contemporary theory of justice that addresses such questions. prereq: 1003 or 1004 or grad student or instr consent

PHIL 5326. Lives Worth Living: Questions of Self, Vocation, and Community. (4 cr. ; Student Option; Every Summer)
Immersion experience. Students live together as a residential community of learners. Works of philosophy, history, and literature form backdrop for exploring such questions as "How is identity constructed?," "What is vocation?," and "What experiences of community are desirable in a life?" Each student creates a life-hypothesis for a life worth living. prereq: instr consent

PHIL 5331. Contemporary Moral Theories. (3 cr. ; Student Option; Periodic Fall & Spring)
Is morality objective, just a matter of feeling, or something in between? How do we know even the most basic of moral truths? Do I

always have a reason to do what is moral? What motivates people to be moral and why do some people behave immorally? This class looks at these and related questions in metaethics, moral psychology, and other areas of contemporary moral theory. prereq: 1003 or instr consent

PHIL 5350. Catching Lives Worth Living: Participation in the Growth of a Living-Learning Community. (; 1-3 cr. [max 6 cr.] ; Student Option; Every Summer)
Involvement in a democratic living-learning community built by students/instructors. Students participate in community activities and daily instructor meetings. Four seven-day offerings each summer. prereq: Application, instr consent

PHIL 5414. Political Philosophy. (3 cr. ; Student Option; Periodic Fall & Spring)
Works in political philosophy, whether historical or more contemporary, are one central element of the study of philosophy more broadly. As we will address these works, and the issues and concepts they take up, they fall within the larger field of moral philosophy. Like other works in this broad category, discussion in political philosophy typically consider both metaethical and normative questions. Metaethical questions concern the concepts we use as we consider matters of right and wrong or of ethical value. In the realm of political philosophy, authors consider rightness, wrongness and ethical value as they bear on political societies and political leaders, and not only on citizens but on non-citizens who experience the effects of political power. Examples of such questions include: What is justice? What is political power? What are freedom, equality and autonomy? Normative questions, by contrast, concern matters of practice. In the context of moral and political philosophy, they are typically questions about what we must do or refrain from doing if we are to act rightly (as opposed to prudently or efficiently for instance). Examples in the political realm include: What are just standards of criminal punishment? What obligations does a just state have to citizens and to non-citizen residents? What right, if any, do citizens and others have to protest state laws, policies and actions? What rights can citizens or others claim to equality under the law? What grounds or justifies our responses to such questions? Over the course of this semester, we will read both canonical texts in the history of political philosophy and pieces by a variety of authors who are less well known. Our aim will be to improve our ability to understand broad claims and more nuanced points, to compare and critically assess contrasting views, and to appreciate the ways in which political philosophers often draw or expand on others' works even as they challenge them. We will also be working towards improvements in the difficult task of explaining and supporting claims and analyses, in short written pieces, longer essays and oral discussions. prereq: 1004 or instr consent

PHIL 5415. Philosophy of Law. (; 3 cr. ; Student Option; Periodic Spring)
Analytical accounts of law and legal obligation. prereq: 1003 or 1004 or 3302 or social science major or instr consent

PHIL 5510. Philosophy of the Individual Arts. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Aesthetic problems that arise in studying or practicing an art. prereq: 3502

PHIL 5601. History of the Philosophy of Science. (; 3 cr. ; Student Option; Periodic Fall & Spring)
History of logical empiricism, from its European origins in first half of 20th century to its emergence as nearly universal account of science in post-war Anglo-American philosophy. prereq: instr consent

PHIL 5602. Scientific Representation and Explanation. (; 3 cr. ; Student Option; Periodic Fall)
Contemporary issues concerning representation and explanation of scientific facts. prereq: instr consent

PHIL 5603. Scientific Inquiry. (3 cr. ; Student Option; Periodic Spring)
Philosophical theories of methods for evaluating scientific hypotheses. Role of experimentation in science. How hypotheses are accepted within scientific community.

PHIL 5605. Space and Time. (; 3 cr. ; Student Option; Periodic Fall)
Philosophical problems concerning nature/structure of space, time, and space-time. prereq: Courses in [philosophy or physics] or instr consent

PHIL 5606. Philosophy of Quantum Mechanics. (; 3 cr. ; Student Option;)
Problems of interpretation in ordinary (nonrelativistic) quantum mechanics. Two-slit experiment, Schrodinger cat paradox (measurement problem), Einstein-Podolsky-Rosen paradox. Leading approaches to interpretation (Copenhagen, hidden variables, universal wave function) and their connections with philosophical issues.

PHIL 5607. Philosophy of the Biological Sciences. (3 cr. ; Student Option; Periodic Fall & Spring)
Biology dominates the landscape of contemporary scientific research, and yet "biology" consists of a variety of different disciplinary approaches: from protein biochemistry to field ecology, from developmental biology to evolutionary genetics. Many philosophical issues can be found in the concepts and practices of life science researchers from these different disciplines. What is the structure of evolutionary theory? What is a gene? What are the units of selection? What is an individual? What counts as a "cause"? What is the relationship between evolution and development? Are all biological phenomena reducible to genes or molecules? What are adaptations, and how do we identify them? What is an ecological niche? Is there a progressive trend in the history of life? Is there such a thing as 'human nature'? This course is an introduction to these and other related issues in the biological sciences with an emphasis on their diversity and heterogeneity. It is designed for advanced undergraduates with an interest in conceptual questions and debates in biology that are manifested across a variety of majors (e.g., Animal Science; Anthropology; Biochemistry; Biology, Society and Environment; Biosystems and Agricultural Engineering; Chemistry; Ecology, Evolution and Behavior; Genetics, Cell Biology and Development; Microbiology; Neuroscience; Physiology; Plant Biology; Psychology). Some of these issues will appear familiar from previous coursework or opportunities, whereas new issues will be intriguing because of their similarities and differences with those that have been encountered in other contexts. prereq: Courses in [philosophy or biology] or instr consent

PHIL 5615. Mind, Bodies and Machines. (3 cr. ; Student Option; Periodic Fall & Spring)
Mind-body problem. Philosophical relevance of cybernetics, artificial intelligence, computer simulation. Mental phenomena present the philosopher with a number of deep but inescapable puzzles and challenges. We tend to suppose that we know what it is to have a mind, to have beliefs, desires, etc., and we think that we know how to explain our own behavior and that of others -- and all of this without any formal training in the relevant science. All of this is surely amazing; indeed it verges on the outrageous. We admit to not knowing the makeup of the simplest structures, to not knowing how to explain the behavior of the simplest organisms -- we, OF COURSE, leave such issues to scientific investigation. Yet, at the same time, we think we know how to explain the behavior of this most complex of systems; we know how to do it, and we know what we are talking about when we explain behavior by citing the relevant beliefs, desires, etc. And, to repeat, we know all of this with no formal training. Strange indeed. Not only is this initial confidence puzzling, but attempts to articulate the mental story and to integrate it into the larger scientific picture have all proven problematical. We start our investigation with a very brief glance at a mid-century proposal that initiated a very different way of thinking about mind: the proposal by Turing -- one of the great minds of the 20th Century--that machines of a certain kind could exhibit intelligence. A story told in part in the recent movie, The Imitation Game. We then turn to some more traditional approaches to mind: Cartesianism, Behaviorism and Materialism. prereq: one course in philosophy or instr consent

PHIL 5622. Philosophy and Feminist Theory. (; 3 cr. ; Student Option; Periodic Fall)
Encounters between philosophy/feminism. Gender's influence in traditional philosophical problems/methods. Social role of theorist/theorizing as they relate to politics of feminism. This course surveys central debates in feminist philosophy, with a focus on the methods and virtues of resistance. Along the way, we will consider the question of how we should live in an oppressive society. Topics may include intimidation, gaslighting, silencing, epistemic injustice, emotional labor, intersectionality, resistance, anger and violence. prereq: 8 crs

in [philosophy or women's studies] or instr consent

PHIL 5760. Selected Topics in Philosophy. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Philosophical problems of contemporary interest. Topics specified in Class Schedule. prereq: 3xxx-5xxx course in phil or instr consent

PHIL 5993. Directed Studies. (; 1-3 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. prereq: instr consent, dept consent, college consent

PHIL 8010. Workshop in History of Philosophy. (; 1 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
Topics vary by offering. prereq: concurrent registration is required (or allowed) in 4xxx hist of phil course, instr consent

PHIL 8080. Seminar: History of Ancient and Medieval Philosophy. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Topics vary by offering. prereq: instr consent

PHIL 8081. Seminar: History of Philosophy--Ancient Philosophers. (; 3 cr. ; Student Option;)
Major developments in ancient Greek philosophic thought; methods and role of history of philosophy in discipline of philosophy.

PHIL 8085. Seminar: History of Philosophy--Modern Philosophers. (; 3 cr. ; Student Option; Periodic Fall)
Major developments in modern philosophic thought; methods and role of history of philosophy in discipline of philosophy. prereq: instr consent

PHIL 8090. Seminar: History of Modern Philosophy. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Topics vary by offering. prereq: instr consent

PHIL 8100. Workshop in Epistemology and Metaphysics. (; 1 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
Topics vary by offering. prereq: concurrent registration is required (or allowed) in 4xxx [epistemology or metaphysics] course, instr consent

PHIL 8110. Seminar: Metaphysics. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Topics vary by offering. prereq: 4101 or instr consent

PHIL 8130. Seminar: Epistemology. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Problems in the theory of knowledge. Topics specified in [Class Schedule]. prereq: 4105 or instr consent

PHIL 8131. Epistemology Survey. (; 3 cr. ; Student Option;)
Survey, against background of traditional issues, of contemporary developments in theory of knowledge.

PHIL 8133. Feminist Theories of Knowledge. (; 3 cr. ; Student Option;)
Interdisciplinary seminar; feminist approaches to knowledge and criticism of paradigms of knowledge operative in the disciplines. Feminists' use of concepts of subjectivity, objectivity, and intersubjectivity; feminist empiricism, standpoint theory, and contextualism, and postmodern and postcolonial theorizing.

PHIL 8180. Seminar: Philosophy of Language. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall)
Topics vary by offering. prereq: 4231 or instr consent

PHIL 8182. Formal Semantics of Natural Language. (; 3 cr. ; A-F or Audit; Periodic Fall)
Truth-conditional model-theoretic semantics applied to treatment of opacity, intensionality, quantification, and related phenomena in natural language. prereq: Phil 5201 or instr consent

PHIL 8200. Workshop in Logic and Philosophy of Mathematics. (; 1 cr. [max 4 cr.] ; Student Option; Periodic Fall & Spring)
Topics vary by offering. prereq: [concurrent registration is required (or allowed) in 4xxx logic or 4xxx phil of math], instr consent

PHIL 8210. Seminar: Logical Theory. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Topics vary by offering. prereq: [5201, 5205] or instr consent

PHIL 8220. Seminar: Philosophy of Mathematics. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Topics such as significance of limitative metatheorems (Goedel, et al), assessment of major foundational programs (set theoretic, modern Hilbertian, constructivist), modal/structuralist alternatives to standard platonism. prereq: 5202 or [4xxx or 5xxx] math course or instr consent

PHIL 8300. Workshop in Moral and Political Philosophy. (; 1 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
Topics vary by offering. prereq: [concurrent registration is required (or allowed) in 4xxx moral phil or 4xxx pol phil] instr consent

PHIL 8310. Seminar: Moral Philosophy. (; 3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Concepts/problems relating to ethical discourse. prereq: 4310 or 4320 or 4330 or instr consent

PHIL 8320. Seminar on Medical Ethics. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Spring)
Patients' rights/duties, informed consent, confidentiality, ethical issues in medical research, initiation/termination of medical treatment, euthanasia, abortion, maternal/fetal conflicts, allocation of medical resources. prereq: [4xxx or 5xxx] ethics course or instr consent

PHIL 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

PHIL 8410. Seminar: Philosophy of Law. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Primarily for law students and advanced political science, history, or sociology majors or minors. prereq: 5415 or instr consent

PHIL 8420. Seminar: Political Philosophy. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Topics vary by offering. prereq: 4321 or 4414 or instr consent

PHIL 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

PHIL 8500. Workshop in Aesthetics. (; 1 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
Topics vary by offering. prereq: concurrent registration is required (or allowed) in 4xxx aesthetics course, instr consent

PHIL 8510. Seminar: Aesthetics Studies. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Topics vary by offering.

PHIL 8550. Seminar: Philosophy of Religion. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Topics vary by offering. prereq: 4521 or instr consent

PHIL 8600. Workshop in the Philosophy of Science. (; 1 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
Topics vary by offering. prereq: concurrent registration is required (or allowed) in 4xxx phil of sci course, instr consent

PHIL 8602. Scientific Representation and Explanation. (3 cr. ; Student Option; Periodic Fall & Spring)
Contemporary issues concerning representation and explanation of scientific facts.

PHIL 8606. Seminar: Philosophy of Medicine and the Biomedical Sciences. (; 3 cr. ; Student Option; Every Fall & Spring)
Aims and goals of medicine; concepts of health, illness, and disease; nature of reasoning in clinical medicine; theoretical evolution in medicine; and role of values in practice of medicine and healthcare.

PHIL 8610. Seminar: History of Modern Physical Sciences. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Topics specified in [Class Schedule]. prereq: instr consent

PHIL 8620. Seminar: Philosophy of the Biological Sciences. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall)
Topics vary by offering.

PHIL 8640. Seminar: Philosophy of the Cognitive Sciences. (; 3 cr. [max 6 cr.] ; Student Option; Spring Odd Year)
Philosophical framework for analyzing cognitive sciences. Recent developments in metaphysics/epistemology. Nature of scientific theories, methodologies of cognitive sciences, relations among cognitive sciences. Relation

of cognitive science to epistemology and to various philosophical problems. Topics very by offering

PHIL 8660. Seminar: Social and Cultural Studies of Science. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Review of recent work; analysis of theoretical and methodological differences among practitioners; selected responses from historians and philosophers of science.

PHIL 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

PHIL 8670. Seminar: Philosophy of Science. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Topics vary by offering. prereq: instr consent

PHIL 8710. Seminar: Feminist Philosophy. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Fall)
Topics vary by offering. prereq: 4622 or 5622 or WoSt 4122 or WoSt 5122 or instr consent

PHIL 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

PHIL 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

PHIL 8980. Philosophy Proseminar. (1 cr. [max 2 cr.] ; S-N only; Every Fall)
This course will provide a structured forum for introducing new graduate students to the PhD program, to aid integration into the program, and to build community among first and second year students. prereq: first or second year student in Philosophy doctoral program

PHIL 8993. Directed Study. (; 1-3 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
tbd prereq: instr consent

PHIL 8994. Directed Research. (; 1-3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
tbd prereq: instr consent

Physical Med & Rehabilitation (PMED)

PMED 6000. Special Topics for the Transitional DPT: Musculoskeletal. (; 2-8 cr. ; A-F or Audit; Periodic Fall)
Selected pathology, assessment, and rehabilitation of musculoskeletal conditions. Industrial consultation, post fracture management, imaging, surgical options for selected conditions of spine/extremities. Required musculoskeletal case study from clinical internships. prereq: Enrolled in Physical Therapy MS program

PMED 7410. Rehabilitation Medicine for Adults. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
The student learns to evaluate a patient with chronic illness and/or a disability and then helps plan a rehabilitation team's problem-oriented approach to total patient management. Medical student responsibility includes inpatient work-ups and management as well as the opportunity to participate in a variety of specialty clinics.

PMED 7412. Rehabilitation Medicine for Adults: Orthopedics, Neurology. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
This course is designed for students who are interested in pursuing residency in Physical Medicine and Rehabilitation, Orthopedics, Neurology. Student-physicians will be responsible for inpatient work-ups and management as well as having the opportunity to participate in a variety of specialty clinics (EMG and Botox, traumatic brain injury, spinal cord injury, amputee, musculoskeletal pain, cardiac rehab) and inpatient consults.

PMED 7413. Rehabilitation Medicine for Adults - Virtual Offering. (; 4 cr. ; H-N only; Periodic Fall, Spring & Summer)
This Physical Medicine and Rehabilitation virtual clinical rotation was developed in response to the COVID-19 pandemic to ensure medical students an opportunity to learn about the field of Physical Medicine and Rehabilitation while unable to participate in hands-on clincial education. This innovative elective is centered on learner engagement, simulation of clinical experiences, and the importance of building relationships with faculty and residents. Medical students will participate in telehealth appointments with faculty and virtually follow standardized patients from consultation to discharge building their own plan of care and walking through that plan with senior residents that have a distinct set of learning objectives in place. Medical students will participate in interactive journal clubs, lectures, and didactic education with faculty and residents via Zoom on a daily basis. Virtual office hours with faculty and residents will provide students an opportunity to learn more about the field, the varied education and career paths taken, and to build meaningful relationships within the Department. To supplement the live education, an entire library of video presentations was built by Department faculty and affiliate faculty across the Twin Cities. This ensures students always have access to foundational material as well as the opportunity to delve deeper into their unique areas of interest. This virtual curriculum provides students a quality, robust, learning experience that serves as a great introduction to the field of Physical Medicine and Rehabilitation.

PMED 7415. Physical Medicine and Rehabilitation for the Generalist. (; 4-6 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Provide patient management in rehabilitation. Evaluate/plan management for disease processes. Plan for continuing care of chronically ill. Work on interdisciplinary team of health care professionals. Write Rx for PT/OT. Develop an accurate exam of joints/muscles. Concept of holistic medicine. Students evaluated by faculty based on participation, clinical skills, attitude. Case presentation, participation in weekly conferences.

PMED 7416. Pediatric Rehabilitation Medicine. (; 2 cr. ; H-N only; Every Fall, Spring & Summer)
Student works on inpatient service, outpatient clinics working with pediatric patients with traumatic brain injury, cerebral palsy, ventilatory dependent children, spinal cord injury, and developmental disabilities.

PMED 7417. Research in Physical Medicine and Rehabilitation. (; 6 cr. ; H-N or Audit; Every Fall)
This elective provides an opportunity for the interested student to pursue a clinical or laboratory problem related to physical medicine and rehabilitation.

PMED 7418. Rehabilitation Medicine: Trauma Rehab, Med-Spine. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
Adult rehabilitation management emphasizing traumatic brain injury, major multiple trauma, acute and chronic burns, musculoskeletal ultrasound, stroke, ALS, and EMG.

PMED 7420. Rehabilitation Medicine Research. (2-8 cr. [max 16 cr.] ; H-N only; Every Fall, Spring & Summer)
PM&R is an underrepresented field in terms of academic contribution to clinical research.

PMED 7421. Acting Intern Rehabilitation Medicine. (2-4 cr. ; H-N only; Every Fall, Spring & Summer)
This course is designed for students who plan to pursue their residency training in physical medicine and rehabilitation that already have prior experience (clinical, shadowing, research) and would like to dive deeper into the field of PM&R to prepare themselves for residency. Student-physicians will be responsible for inpatient work-ups and management as well as having the opportunity to participate in a variety of specialty clinics (amputee, Botox, EMG, general rehab, musculoskeletal, pain, spinal cord injury, traumatic brain injury) and inpatient consults. As part of this advanced rotation, students will take an active role in designing a rotation to fit their individualized needs. They will also be expected to perform at the level of an intern in addition to preparing and giving a 20-minute mini-grand rounds presentation on a rehabilitation topic to the PM&R staff & residents at the end of the rotation. At the conclusion of the four weeks, students will be able to: take a PM&R oriented history; perform a physical examination with an emphasis on functional status and disability; formulate rehabilitation goals and treatment plan; more fully understand the full breadth of PM&R; effectively communicate with an interdisciplinary team; facilitate complex discharge plans; prepare and provide sign

out for on-call physicians; be prepared to take on leadership roles during their residency training and advocate for people with cognitive and/or physical impairments. prereq: Prior PMED rotation or special approval from course director

PMED 7910. Physical Medicine and Rehabilitation Medical Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Physical medicine and rehabilitation medical residency.

PMED 7930. Physical Medicine and Rehabilitation Medical Fellowship. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Physical medicine and rehabilitation medical fellowship.

PMED 8200. Physical Medicine and Rehabilitation Service. (; 1-15 cr. ; Student Option; Every Fall, Spring & Summer)
N/A prereq: enrolled in PMed residency training program

PMED 8207. Basic and Applied Psychiatry. (; 1 cr. ; Student Option; Every Fall, Spring & Summer)
N/A prereq: enrolled in PMed residency training program

PMED 8210. Research in Physical Medicine. (; 1-15 cr. ; Student Option; Every Fall & Spring)
N/A prereq: enrolled in PMed residency training program

PMED 8212. Electromyography. (; 1-15 cr. ; Student Option; Every Fall, Spring & Summer)
N/A prereq: enrolled in PMed residency training program

PMED 8214. Readings in Electromyography. (; 1-3 cr. ; Student Option; Every Fall, Spring & Summer)
N/A prereq: enrolled in PMed residency training program

PMED 8220. Seminar: Physical Medicine and Rehabilitation. (; 1-15 cr. ; Student Option; Every Fall, Spring & Summer)
TBD prereq: enrolled in PMed residency training program

Physical Therapy (PT)

PT 6002. Ethics in Health Care. (; 1 cr. [max 2 cr.] ; S-N or Audit; Every Fall)
Moral/ethical analysis. Issues in physical therapy research/practice. Ethical decisions in a practice and in professional training. WebCT lectures, in-class discussions/instruction, exams.

PT 6058. Anatomy for Physical Therapy. (; 6 cr. ; A-F only; Every Summer)
Study of gross human anatomy, and surface anatomy, for practice of physical therapy. Cadaver dissection of extremities, head, neck, back, abdomen, thoracic, and pelvic regions. Correlation to clinical conditions. Lecture, laboratory.

PT 6212. Becoming a Physical Therapist. (1 cr. ; S-N only; Every Summer)
This course is designed to orient Doctor of Physical Therapy (DPT) students to the culture and operations of the institution, the Program, and the Physical Therapy profession. Learners engage with their peers, faculty, and staff to explore: 1) the breadth of resources available at the University of Minnesota, 2) the DPT curriculum and inclusive Program culture, 3) student engagement and leadership opportunities for early professional development, 4) strategies for a successful transition to graduate professional education, and 5) the foundations of healthcare and the Physical Therapy profession.

PT 6213. Developing the Physical Therapist I. (1 cr. ; A-F only; Every Fall)
Practical aspects of clinical education and professional behavior. Psychological, sociological, and cultural needs of diverse patient populations. Students complete a three hrs/week clinical affiliation at University Good Samaritan Center. Patient/therapist observations, concurrent didactic coursework. Facilitation of group exercise, restorative ambulation, range of motion programs, and resident assessment instrument. prereq: Registered PT student

PT 6214. Clerkship II. (2 cr. ; A-F or Audit; Every Spring)
Documentation of physical therapy exams, progress, discharge services. Regulatory agencies responsible for outcomes/ accreditation, third party reimbursement, coding, peer review. Complete three hrs/ wk clinical affiliation at Good Samaritan Center under supervision of clinical faculty. Observations/documentation, group exercise, restorative ambulation, range of motion programs, resident assessment instrument. prereq: Registered first year PT student

PT 6215. Clerkship III: The Physical Therapist in Today's Society. (1 cr. [max 2 cr.] ; A-F only; Every Fall)
Roles of physical therapist, in orthopedic outpatient setting, as educator and promoter of health/wellness. Students are assigned to a community outpatient orthopedic clinic. Patient evaluations/treatment. Instructing patients, therapists, student physical therapists, and community members to promote physical therapy, health, and wellness. Students assess, prepare, and provide educational experiences. prereq: Registered PT student

PT 6216. Clerkship IV: Advocacy and Adjustment to Disability. (1 cr. ; S-N only; Periodic Spring)
Role of physical therapist, in acute care or rehabilitation setting, as clinical educator of physical therapy students. Students are assigned to a local hospital or rehabilitation facility. Patient evaluations, treatment, discharge planning. Students prepare for full time clinical experiences and for their role as potential clinical instructors. prereq: Registered PT student

PT 6217. Integrated Clinical Education I. (; 0-1 cr. ; S-N only; Every Fall, Spring & Summer)
This course is designed to promote hands-on engagement in the clinical learning environment throughout Year 1 of the Doctor of Physical Therapy curriculum. Experiential learning opportunities allow students to apply and integrate previous and concurrent course content to develop professional, patient management, and practice management skills. Learning is enhanced through self-assessment, external feedback, and clinically oriented assignments linked to didactic courses. Experiences are structured in consultation with community partner organizations and are conducted under the direct supervision of licensed faculty.

PT 6220. Clinic Volunteer. (; 1 cr. [max 6 cr.] ; S-N only; Every Fall, Spring & Summer)
Functioning evening clinics supervised by licensed physical therapists. Students perform physical therapy exams, provide treatment various conditions, under supervision of a licensed physical therapy clinical instructor.

PT 6221. Therapeutic Procedures. (; 4 cr. ; A-F or Audit; Every Spring & Summer)
Theory/application of physical agents and therapeutic techniques. Therapeutic massage, ultraviolet radiation, thermotherapy, hydrotherapy, positive pressure devices, transcutaneous electrical nerve stimulation, neuromuscular electrical stimulation, biofeedback, iontophores, high volt pulsed current. prereq: Registered PT student

PT 6231. Clinical Biomechanics. (; 5 cr. ; A-F or Audit; Every Fall)
Principles of biomechanics. Forces/structures internal/external to body responsible for normal human movement. Muscle, joint, and tissue mechanics. Joint-specific normal function, whole body posture, gait mechanics. Focuses on normal mechanics as foundation for abnormal mechanics and pathology. Lecture, laboratory. prereq: Intro calculus, physics, registered PT student

PT 6241. Movement and Pathokinesiology. (3 cr. ; A-F only; Every Summer)
Provides an experiential bridge between foundational clinical courses and applied content area courses to aid in the development of comprehensive movement system examination and evaluation skills. Learners will solidify didactic integrative knowledge of the human movement system and its component elements through applied, real-world activities and clinical simulations. Growth in holistic clinical reasoning is fostered through exploratory practice and identification of the connections between 1) qualitative and quantitative movement examination, 2) analysis and diagnosis of movement system dysfunction, and 3) basic hypothesis generation of multi-system physical impairments/pathology and abnormal movement patterns/postures as contributing factors to movement system dysfunction. Oral and written communication of movement system examination and evaluation findings will enhance learner development of education and documentation skills. prereq: Registered PT student

PT 6250. Acute Care in Physical Therapy. (; 2 cr. ; A-F only; Every Summer)

General care of acute and critically ill patient. Disease/disorders common to acute care environment. Integration of evaluation, treatment, and client management skills. prereq: Registered physical therapy student

PT 6251. Integument. (; 2 cr. ; A-F or Audit; Every Summer)
Response of integument to injury, disease, and aging. Emphasizes wound management, burn care, amputee care, and rehabilitation of persons with acute/chronic integument disorders. Integrating elements of physiology, pathophysiology, and therapeutic procedures to evaluate, treat, and manage clients. prereq: Registered PT student

PT 6252. Pathophysiology. (; 3 cr. ; A-F only; Every Summer)
General and organ system pathology. Complicating patholodical factors that affect patients. Implications of pathology on patient? s clinical presentation. prereq: Enrolled PT student

PT 6280. Clinical Assessment. (; 4 cr. ; A-F or Audit; Every Fall)
Clinical assessment techniques of goniometry, manual muscle testing, range of motion, gait analysis, physical/sensory examination, and antropometrics. Basic intervention approaches, including stretching techniques and resistive exercise. Weekly integration assignments with first clinical clerkship. Lecture, discussion, lab. prereq: Registered PT student

PT 6281. Physiology for Physical Rehabilitation. (; 4 cr. ; A-F or Audit; Every Fall)
An in-depth presentation of fundamental concepts in tissue and organ system physiology as it relate to general health, aging, and physical exercise. Emphasis is on the following systems: muscle, bone & connective tissue, endocrine, immune, renal, GI, and hematology. Influence of aging on these systems will be addressed as well. prereq: Registered PT student

PT 6282. Cardiopulmonary Physiology and Rehabilitation. (; 4 cr. [max 45 cr.] ; A-F or Audit; Every Spring)
Conveys foundational information regarding human basic physiology cardiovascular and pulmonary physiology. In addition, fundamental principles of cardiac and pulmonary systems as it relates to physical therapy and will be known in the clinic to the physical therapist as Cardiac and Pulmonary Rehabilitation will be addressed. A focus of this course is on normal and abnormal responses to exercise and the pathophysiology, assessment, evaluation and rehabilitation of patients with cardiopulmonary disorders. prereq: Registered PT student

PT 6283. Musculoskeletal Rehabilitation 1. (; 6 cr. [max 7 cr.] ; A-F only; Every Fall)
First of a two part series on musculoskeletal rehabilitation. Evaluation concepts are introduced and methods practiced. Techniques for the treatment of lower extremity, lumbar and thoracic spine conditions will be covered, including exercise, mobilization/manipulation, traction and orthotics. Surgical interventions, medical imaging and pathology background related to these regions will be provided. Instructional methods include lecture, demonstration, lab practice, readings, problem solving, student presentation, research, and written assignments. Clerkship (PT 6215) clinic experience complements the coursework. prereq: enrolled PT student

PT 6284. Musculoskeletal Rehabilitation II. (; 5 cr. ; A-F only; Every Spring)
Second of a two part series on musculoskeletal rehabilitation. Techniques for the evaluation and treatment of cervical, shoulder, elbow, wrist, hand and temporomandibular joint conditions will be covered, including exercise, mobilization, orthotics and neurodynamics. Surgical interventions, radiology and pathology background related to these regions will be provided. Screening for non-mechanical pain conditions will be discussed. The rehabilitation needs of specific populations, such as athletes, women, industrial workers, and musicians will be investigated. Joint and disease specific content from fall semester will be used in the patient management sections of the course. Instructional methods include lecture, demonstration, lab practice, readings, problem solving, student research. prereq: Registered PT student

PT 6286. Neurorehabilitation I. (3 cr. ; A-F only; Every Fall)
An in depth exploration of fundamental principles of neural plasticity, neurophysiology, motor control, and motor learning as a basis for understanding scientific advancements in pathophysiology and therapeutic intervention in motor dysfunction. Prereq: registered PT student

PT 6287. Neurorehabilitation II. (; 8 cr. ; A-F only; Every Spring)
Second portion of a year-long course sequence. Assessment/rehabilitation of patients with neurological conditions (e.g., cerebral vascular disease traumatic brain injury, multiple sclerosis, Parkinson's disease, amyotrophic lateral sclerosis). Using treatment procedures, orthotics, and equipment to improve function and prevent, stabilize, or decrease impairments. prereq: Registered PT student

PT 6288. Pediatric Rehabilitation. (; 3 cr. ; A-F only; Every Summer)
Provides a study of the etiology, theoretical framework, and techniques used in the examination, evaluation, diagnosis, prognosis, intervention, and assessment of pediatric patients with neurological, orthopedic, cardiac, developmental, systemic, and behavioral conditions. Students will also gain exposure to treatment techniques and equipment used in comprehensive pediatric settings, with additional emphasis on developing plans of care that focus on optimizing functional outcomes for pediatric patients. Discussion, integration of written/video case studies, review of evidence-based practice, practice of psychomotor skills, assessment of children with and without disability, and practice establishing goals and plan of care will be used to facilitate learning. prereq: Registered PT student

PT 6290. Contemporary Physical Therapist Practice. (; 4 cr. ; A-F only; Every Summer)
This course will include learning experiences and project assignments related to contemporary physical therapy practice. Topics included are legal and regulatory aspects of practice management, the contemporary practice environment, professional development, and the integration of professional practice in the various practice settings. prereq: Registered PT student

PT 6293. Essentials of Rehabilitation Research. (; 3 cr. [max 4 cr.] ; A-F only; Every Fall)
Develop abilities to obtain, critically evaluate, synthesize and integrate the peer-reviewed literature. It will also enable students to identify and compute appropriate statistical procedures and interpret the meaning of statistical analyses. Finally, it will give students an opportunity to present the aims, methods, intended analyses, and preliminary results of their own research. prereq: Registered PT student

PT 6294. Clinical Integration. (3 cr. ; A-F only; Every Summer)
Integrates content from the entire physical therapy program to address physical therapy assessment and management of complex patient cases. Focus is on real-world examples of clinical practice, combining psychomotor skills with clinical reasoning, effective communication, professionalism, and affective competence. Students will deepen critical thinking skills and the ability to facilitate competent, evidence-based, patient-centered physical therapy care for patients with complex presentations. prereq: Registered PT student

PT 6295. Clinical Internship I. (9 cr. [max 27 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Communication skills, team participation, and evaluation/treatment. Predicting outcomes. Managing patient diagnoses/problems. Selected specialty area of physical therapy practice. Prereq Registered 3rd yr PT student.

PT 6296. Clinical Internship II. (; 9 cr. [max 10 cr.] ; S-N only; Every Fall, Spring & Summer)
Second of four courses. Students must demonstrate proficiency in communication, team participation, evaluation and treatment, predicting outcomes, and managing patient diagnoses and problems. Selected specialty area of physical therapy practice.

PT 6297. Clinical Internship III. (; 10 cr. ; S-N only; Every Fall, Spring & Summer)
Third of four courses. Students must demonstrate proficiency in communication, team participation, evaluation and treatment, predicting outcomes, and managing patient diagnoses and problems. Selected specialty area of physical therapy practice. prereq: Registered PT student

PT 6298. Clinical Internship IV. (; 10 cr. ; S-N only; Every Fall, Spring & Summer)
Fourth of four courses. Students must demonstrate proficiency in communication, team participation, evaluation and treatment,

predicting outcomes, and managing patient diagnoses and problems. Selected specialty area of physical therapy practice.

PT 6310. Physiology for Physical Rehabilitation. (5 cr. [max 10 cr.] ; A-F only; Every Spring)
This course is designed to convey foundational information regarding human basic physiology and more advanced integrative physiology to provide the physical therapist a broad range of knowledge on how the human body works at rest, exercise, and as we age.

PT 6340. Human Growth and Development. (; 3 cr. ; A-F or Audit; Every Fall)
Developmental process throughout life span. Physical, motor, social, and personality development. Theories of development. Factors that influence a child.s development. prereq: Registered PT student

PT 6400. Health Activism. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
Joint Medical School-School of Public Health course. Series of skill-building workshops. Hands-on community project completed by small group of public health and medical students in cooperation with a community organization and a faculty mentor. Projects focus on issues of health disparities, environmental justice, and access to care. prereq: Enrolled DPT student

PT 6401. Pediatric Rehabilitation Elective. (3 cr. ; A-F or Audit; Every Summer)
This course will expand upon the study of pediatric rehabilitation introduced in PT6288 to a greater variety of pediatric diagnoses and treatment settings. Pediatric evaluations will be administered in accordance with the Guide to Physical Therapy Practice 3.0 and the International Classification of Functioning, Disability, and Health (ICF) Model. Pediatric screenings will be practiced in the community. Students will gain exposure to health and wellness activities for children/adolescents with developmental disabilities to improve community participation and gross motor outcomes. Selection of adaptive equipment for children with physical and developmental disabilities will be explored, along with communication with a multidisciplinary assistive technology team and medical justification documentation. Evidence-based child and family-appropriate treatment techniques will be expanded from PT6288. prereq: Registered PT student

PT 6402. The Shoulder in Sports. (; 3 cr. ; A-F or Audit; Every Spring & Summer)
A three-credit online course for students who are interested in investigating the biomechanical and epidemiological aspects of the shoulder in athletics. The course will explore the unique demands placed on the shoulder in sports that involve throwing, swimming, swinging, and bodily impacts. The course begins with an investigation into sport-specific biomechanics, pathomechanics, and epidemiology and progresses to applied problem solving for rehabilitation and research scenarios. Prerequisites: (1) an undergraduate or graduate human anatomy course and (2) an undergraduate or graduate biomechanics course. It is recommended, but not required, you have an anatomy course including a detailed shoulder anatomy section and a biomechanics course including a detailed shoulder biomechanics section. Consent from course instructor or Rehabilitation Science graduate program is required.

PT 6403. Topics in Aging. (3 cr. ; A-F or Audit; Every Summer)
An elective course covering a variety of topics related to aging. It is intended to enhance the basic aging content students have already acquired. The course will be taught in a seminar format, requiring active engagement and discussion from all students. prereq: Registered PT student

PT 6404. Interprofessional Education Independent Study. (; 1 cr. [max 6 cr.] ; S-N only; Every Fall & Spring)
This course is designed to provide guidance and oversight to students engaged in structured interprofessional education experiences offered external to the core Doctor of Physical Therapy curriculum. Experiences vary by term depending on availability. Each approved experience allows an opportunity to engage with learners from other professions and develop interprofessional competencies in the areas of communication, teamwork, values and ethics, and roles and responsibilities as health care team members.

PT 6813. Cardiopulmonary Physical Therapy. (; 3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Theory and techniques of cardiopulmonary evaluation and treatment. Principles of exercise response and adaptations to training. prereq: enrolled PT student

PT 7000. Neurological Theory and Neuroscience in Physical Therapy. (1-6 cr. ; A-F only; Fall Odd, Spring Even Year)
Recent/current updates in neurological theory/ intervention supported by neuroanatomical science. Students explore evidence supporting clinical decision making process. One-six selected weekends. Prereq Admitted to Transisitional Doctor of Physical Therapy Program.

PT 7001. Topics in Musculoskeletal PT. (1-6 cr. ; A-F only; Every Fall & Spring)
Evidence base for evaluation/treatment techniques. Manual/exercise treatment skills. Common radiologic assessments for musculoskeletal client. Special requirements of select client populations such as athletes, industrial workers, musicians/dancers. Topics in women's health. Pathologic processes in common musculoskeletal conditions. One-six weekends. Prereq Admitted in transitional doctor of physical therapy program.

PT 7002. Topics in Cardiopulmonary Physical Therapy. (2 cr. ; A-F only; Fall Even Year)
Principles of cardiac/pulmonary systems as applied to physical therapy. Principles of normal/abnormal responses to exercise, pathophysiology, and training. Theory/ techniques of cardiopulmonary assessment, evaluation, rehabilitation, and clinical decision making of patients with cardiopulmonary disorders. Two selected weekends. Prereq Admitted in transitional doctor of physical therapy program.

PT 7003. Topics in Integumentary Physical Therapy. (2 cr. ; A-F only; Spring Odd Year)
Response of integument to injury, disease, and aging. Advances in wound management, rehabilitation of persons with acute/ chronic integument disorders. Physiology, pathophysiology, and therapeutic procedures to evaluate, treat, and manage clients with disorders of integument. Two selected weekends. Prereq Admitted in transitional doctor of physical therapy program.

PT 7004. Topics in Biomechanics and Pathokinesiology in Physical Therapy. (3 cr. ; A-F only; Fall Odd Year)
Principles of human biomechanics applied to physical therapy. Biomechanics/ pathokinesiology of selected joint complexes. Three selected weekends. Prereq Admitted in transitional doctor of physical therapy program.

PT 7005. Topics in Pediatric Physical Therapy. (1 cr. ; A-F only; Spring Odd Year)
Common pediatric disease processes. Analysis, clinical decision making of pediatric treatment interventions. Lecture, discussion, literature review. One selected weekend. Prereq Admitted in transitional doctor of physical therapy program.

PT 7006. Anatomy for Physical Therapy. (2 cr. ; A-F only; Fall Odd Year)
Dissection of bones, muscles, nerves, vessels, connective tissue, and selected internal organs. Joint structures of limbs, spinal column, head, and pelvis. Histology, embryology. Correlation of content to clincal practice. Lecture, human cadever lab. Two selected weekends. Prereq Admitted in transitional doctor of physical therapy program.

PT 7007. Administration and Legal Issues. (2 cr. ; A-F only; Fall Even Year)
Ethical/legal analysis applied to clinical/ administrative decision making in contemporary practice environments. Theoretical frameworks, concepts, and case analysis to address challenges in practice. Two selected weekends. Prereq Admitted in transitional doctor of physical therapy program.

PT 7008. Scientific Basis of PT Practice. (2 cr. ; A-F only; Spring Even Year)
Role of science/research in physical therapy as it relates to critical thinking and decision making in practice. Statistical terminology, research design, hypothesis testing. Two selected weekends. Prereq Admitted in transitional doctor of physical therapy program.

PT 7009. Capstone Experience. (; 3 cr. ; A-F only; Every Summer)
How case studies are conducted/written. Importance of case studies to a profession. Basics of case report, literature review. Measurement theory, writing techniques. Student projects are evaluated by instructor or core or adjunct faculty. prereq: Must be a DPT student

PT 7010. Topics in Geriatric Rehabilitation I. (; 2 cr. ; S-N only; Every Fall)

Demographics of aging population, psychosocial issues with aging, clinical research in the area of geriatrics. How to write patient case report. Lecture, discussion, literature review. prereq: Licensed physical therapist enrolled in geriatric clinical residency

PT 7011. Topics in Geriatric Rehabilitation II. (; 2 cr. ; S-N only; Every Spring)
Providing physical therapy to geriatric clients. Pphysiology, pathophysiology, and therapeutic procedures to evaluate, treat, and manage clients. How clinical issues vary in geriatric population vs. younger patients. Lecture, discussion, literature review. prereq: Licensed physical therapist enrolled in geriatric clinical residency

PT 7012. Topics in Geriatric Rehabilitation III. (; 2 cr. ; S-N only; Every Summer)
Management/reimbursement issues in geriatric health care system. Body systems/ pathological processes common in geriatric client. How physical therapy is reimbursed through Medicare system. Lecture, discussion, literature review. prereq: Licensed physical therapist enrolled in geriatric clinical residency

PT 8131. Research Problems Elective. (; 1-3 cr. [max 6 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Research elective guided by the research advisor. prereq: Grad PT major

PT 8132. Research Seminar. (; 1 cr. ; S-N only; Every Spring)
This initial course for the research series provides a foundation for future guided projects on components of the research cycle. Students explore why research is important and how it can be translated to improvements in clinical care. Basic research designs and reporting venues, literature search strategies and tools, critical review of literature, responsible conduct of research, and reference management are discussed. Pre-req: Grad PT major

PT 8193. Research Problems. (; 1-6 cr. ; Student Option; Every Fall, Spring & Summer)
Process of developing/completing a scholarly research project or literature review related to rehabilitation science/Physical Therapy education and practice. Students work directly with faculty participating in research in guided small group experience. Type of research experience is determined by adviser. prereq: Grad PT major

PT 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

PT 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

Physics (PHYS)

PHYS 5001. Quantum Mechanics I. (; 4 cr. ; Student Option; Every Fall)
Schrodinger equation: bound state and scattering problems in one dimension. Spherically symmetric problems in three dimensions, angular momentum, and the hydrogen atom. Approximation methods for stationary states. Time-dependent perturbation theory. Operators and state vectors: general formalism of quantum theory. prereq: 4101 or equiv or instr consent

PHYS 5002. Quantum Mechanics II. (; 4 cr. ; Student Option; Every Spring)
Symmetry in quantum mechanics, space-time symmetries and the rotation group, Clebsch-Gordan coefficients and the Wigner-Eckart theorem. Scattering theory. Method of second quantization with elementary applications. Relativistic wave equations including Dirac equation. prereq: 5001 or equiv

PHYS 5011. Classical Physics I. (; 4 cr. ; Student Option; Every Fall)
Classical mechanics: Lagrangian/Hamiltonian mechanics, orbital dynamics, rigid body motion, special relativity. prereq: 4001, 4002 or instr consent

PHYS 5012. Classical Physics II. (; 4 cr. ; Student Option; Every Spring)
Classical electromagnetism: electrostatics, magnetostatics, Maxwell's equations, electromagnetic waves, radiation, interaction of charged particles with matter. prereq: 5011 or instr consent

PHYS 5022. Relativity, Cosmology, and the Universe. (; 4 cr. ; Student Option; Periodic Fall)
Large-scale structure and history of universe. Introduction to Newtonian and relativistic world models. Physics of early universe. Cosmological tests. Formation of galaxies. prereq: 2601 or instr consent

PHYS 5041. Mathematical Methods for Physics. (; 4 cr. ; Student Option; Every Spring)
Survey of mathematical techniques needed in analysis of physical problems. Emphasizes analytical methods. prereq: 2601 or grad student

PHYS 5072. Best Practices in College Physics Teaching. (; 1-3 cr. [max 5 cr.] ; Student Option; Every Fall & Spring)
Pedagogies for introductory physics classes. Topics from educational research/practice as applied to classroom.

PHYS 5081. Introduction to Biopolymer Physics. (; 3 cr. ; Student Option; Every Spring)
Introduction to biological and soft condensed matter physics. Emphasizes physical ideas necessary to understand behavior of macromolecules and other biological materials. prereq: PHYS 2201 or equivalent

PHYS 5201. Thermal and Statistical Physics. (; 3 cr. ; A-F or Audit; Every Fall)
Equilibrium Statistical Mechanics. General Principles of Statistical Mechanics: Ensembles. Derivation of Thermodynamics from statistical principles. Classical Systems. Quantum Statistical Mechanics: Fundamentals. Photons. Ideal Fermi & Bose Gases. Non-ideal gases. Introduction to Phase Transitions. prereq: [[4101, 4201] or equiv] previous exposure to thermodynamics, introductory statistical physics

PHYS 5621. Introduction to Plasma Physics. (; 3 cr. ; Student Option; Periodic Fall)
Basic properties of collisionless, magnetized plasmas, single particle motion, plasmas as fluids, magnetohydrodynamics, waves in plasmas, equilibrium, instabilities, kinetic theory/shocks. prereq: CSE grad student, working knowledge of waves/electromagnetism

PHYS 5701. Solid-State Physics for Engineers and Scientists. (; 4 cr. ; Student Option; Periodic Fall & Spring)
Crystal structure and binding; diffraction; phonons; thermal and dielectric properties of insulators; free electron model; band structure; semiconductors. prereq: Grad or advanced undergrad in physics or engineering or the sciences

PHYS 5750. Advanced Topics in Quantum Mechanics and Quantum Information. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Topics may include quantum circuits and algorithms, hardware considerations for quantum computing, quantum information theory, and open quantum systems.

PHYS 5950. Colloquium Seminar. (; 1 cr. ; S-N or Audit; Every Fall & Spring)
Colloquium of School of Physics and Astronomy. prereq: [Grad student or advanced undergrad in physics], dept consent

PHYS 5970. Physics Journal Club. (; 1-3 cr. ; S-N only; Every Fall & Spring)
Weekly student-led presentation, discussion, and critical analysis of important papers. prereq: 2601, 2605 or equiv; intended for 2nd-yr grad students in physics

PHYS 5980. Introduction to Research Seminar. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Fall & Spring)
Introduction to the research activities of the School of Physics and Astronomy. prereq: Grad or upper div phys major

PHYS 5993. Directed Studies. (; 1-5 cr. [max 15 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent, directed study in physics in areas arranged by the student and a faculty member. prereq: instr consent, dept consent

PHYS 5994. Directed Research. (; 1-5 cr. [max 15 cr.] ; Student Option; Every Fall, Spring & Summer)
Problems, experimental or theoretical, of special interest to students. Written reports. prereq: Jr, dept consent

PHYS 8001. Advanced Quantum Mechanics. (; 3 cr. ; Student Option; Every Fall)
Topics in non-relativistic quantum mechanics; second quantization. Introduction to Diagrammatic and Green's function techniques and to relativistic wave equations. Application of relativistic perturbation theory to particle interactions with electromagnetic field. Invariant interactions of elementary particles. prereq: 5002 or instr consent

PHYS 8011. Quantum Field Theory I. (; 3 cr. ; Student Option; Every Spring)

Second quantization of relativistic wave equations: canonical quantization of the free scalar and Dirac fields. Fields in interaction: interaction picture. Quantum electrodynamics: quantization of the electromagnetic field, propagators and Feynman rules, tree-level processes. Higher-order processes and renormalization. prereq: 8001 or instr consent

PHYS 8012. Quantum Field Theory II. (; 3 cr. ; Student Option; Every Fall)
Aspects of general theory of quantized fields, including space-time and discrete transformation properties, the CPT theorem, and the spin-statistics connection. Introduction to functional and path-integral methods. Renormalization group and asymptotic freedom. Semi-classical methods and instantons in gauge theories. prereq: 8011 or instr consent

PHYS 8013. Special Topics in Quantum Field Theory. (; 3 cr. ; Student Option; Spring Even Year)
Includes non-perturbative methods in quantum field theory, supersymmetry, two-dimensional quantum field theories and their applications, lattice simulations of quantum fields, topological quantum field theories, quantum field theory methods applied to condensed matter physics, and string theory. prereq: 8012 or instr consent

PHYS 8014. Quantum many Body Systems. (3 cr. ; A-F only; Every Spring)
Applications of quantum field theory to systems at finite density and temperature. Perturbative field theory of the interacting electron gas and its response functions. Instabilities of interacting fermions at finite density using renormalization group and diagrammatic methods.

PHYS 8100. Seminar: Problems of Physics Teaching and Higher Education. (; 1 cr. [max 3 cr.] ; Student Option; Every Spring)
Lectures and informal discussions of courses and curricula, techniques, and materials important in undergraduate physics instruction; relation to general problems of higher education.

PHYS 8161. Atomic and Molecular Structure. (; 3 cr. ; A-F only; Fall Odd Year)
Emphasizes interpretation of quantum numbers and selection rules in terms of symmetry. Experimental data summarized and compared with theoretical predictions. prereq: Level of mathematics associated with BS in physical sciences

PHYS 8200. Seminar: Cosmology and High Energy Astrophysics. (; 1 cr. [max 6 cr.] ; S-N or Audit; Every Fall & Spring)
Current topics in cosmology and high energy astrophysics. prereq: instr consent

PHYS 8300. Seminar: Biological and Medical Physics.. (; 1 cr. [max 6 cr.] ; S-N or Audit; Every Fall & Spring)
Current research in biological and medical physics prereq: instr consent

PHYS 8301. Symmetry and Its Application to Physical Problems. (; 3 cr. ; Student Option; Periodic Fall)
Fundamental invariance principles obeyed by laws of physics. Group theory as tool for using symmetry and invariance to help understand behavior of physical systems. Applications made to atomic, molecular, nuclear, condensed-matter, and elementary particle physics. prereq: 5002 or instr consent

PHYS 8311. Biological Physics of Single Molecules. (; 3 cr. ; Student Option; Spring Odd Year)
Biological molecules, based on statistical mechanics, kinetics, optics, and other physics ideas. Physics of DNA/proteins, their interactions. Force spectroscopy (optical tweezers, atomic force microscopy). Concepts of optical spectroscopy. Single molecule fluorescence/imaging. prereq: [[5201 or Chen 4707], 5011] or instr consent

PHYS 8312. Biological Physics of Macroscopic Systems. (; 3 cr. ; Student Option; Spring Even Year)
Macroscopic systems, based on physics such as fluid dynamics, statistical mechanics, non-linear dynamics, and chaos theory. Super-molecular aggregates. Biological physics of the cell. Biological physics of populations/evolution. prereq: [[5201 or CHEN 4707], 5011] or instr consent

PHYS 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

PHYS 8444. FTE: Doctoral. (; 1 cr. [max 20 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

PHYS 8500. Plan B Project. (; 4 cr. ; Student Option; Every Fall, Spring & Summer)
Project topic arranged between student and instructor. Written report required. prereq: instr consent; may be taken once to satisfy Plan B master's project requirement; no cr toward PhD

PHYS 8501. General Relativity and Cosmology I. (3 cr. ; Student Option; Periodic Fall & Spring)
Tensor analysis and differential geometry. Special relativity leading to formulation of principles of general relativity and Einstein's equations. Tests of general relativity and thorough discussion of various black hole solutions, including Schwarzschild, Reissner-Nordstom, and Kerr solutions. prereq: 5012 or instr consent

PHYS 8502. General Relativity and Cosmology II. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Gravitational radiation. Applications of general relativity to stellar structure of white dwarfs and neutron stars, action principle, and symmetric spaces. Big-bang cosmology, strongly emphasizing particle physics. prereq: 8501 or instr consent

PHYS 8581. Big Data in Astrophysics. (4 cr. ; A-F only; Every Spring)
This course will introduce key concepts and techniques used to work with large datasets, in the context of the field of astrophysics. Prerequisites: MATH 2263 and MATH 2243, or equivalent; or instructor consent. Suggested: familiarity with astrophysics topics such as star formation and evolution, galaxies and clusters, composition and expansion of the universe, gravitational wave sources and waveforms, and high-energy astrophysics.

PHYS 8600. Seminar: Space Physics. (; 1 cr. [max 6 cr.] ; S-N or Audit; Every Fall & Spring)
Current topics in space physics and plasma physics.

PHYS 8601. Plasma Physics I. (; 3 cr. ; Student Option; Periodic Fall)
Theory of plasma waves and instabilities in plasmas, magnetohydrodynamics, nonlinear waves in plasmas, wave propagation in inhomogeneous plasmas. prereq: 4621, 5012 or instr consent

PHYS 8602. Plasma Physics II. (; 3 cr. ; Student Option; Periodic Fall)
Theory of plasma waves and instabilities, collisions, radiation, transport, nonlinear wave-particle and wave-wave interactions, instabilities in inhomogeneous plasmas. prereq: 8601 or instr consent

PHYS 8611. Cosmic Rays and Plasma Astrophysics. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Properties of energetic particles in heliosphere and in astrophysical environments; solar physics, including radiation and magnetic effects; solar wind and magnetospheric physics; physics of radiation belts. prereq: 5012 or instr consent

PHYS 8650. Advanced Topics in Space and Plasma Physics. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall)
Topics in plasma waves and instabilities, solar physics, cosmic ray physics, atmospheric physics or planetary physics. prereq: 8602 or 8611 or instr consent

PHYS 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

PHYS 8700. Seminar: Condensed Matter Physics. (; 1 cr. [max 6 cr.] ; S-N or Audit; Every Fall & Spring)
Current research. prereq: instr consent

PHYS 8702. Statistical Mechanics and Transport Theory. (; 3 cr. ; Student Option; Every Spring)
Equilibrium properties of macroscopic classical and quantum systems. Phase transitions and Renormalization Group. Transport theory. Applications to soft condensed matter systems. prereq: 5201 or instr consent

PHYS 8711. Solid-State Physics I. (; 3 cr. ; Student Option; Every Fall)
Fundamental properties of solids. Electronic structure and transport in metals and

semiconductors. Properties of disordered materials. prereq: 4211, 5002 or instr consent

PHYS 8712. Solid-State Physics II. (; 3 cr. ; Student Option; Every Spring)
Fundamental properties of solids. Electronic structure and transport in metals and semiconductors. Properties of disordered materials. prereq: 8711 or instr consent

PHYS 8750. Advanced Topics in Condensed Matter Physics. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Sample research topics: magnetism, superconductivity, low temperature physics, superfluid helium. prereq: 8712 or instr consent

PHYS 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

PHYS 8800. Seminar: Nuclear Physics. (; 1 cr. [max 6 cr.] ; S-N or Audit; Every Fall & Spring)
Current research topics.

PHYS 8801. Nuclear Physics I. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Nuclear/neutrino astrophysics. Thermonuclear reactions. Processes of nucleosynthesis. Origin of the elements. Stellar evolution. Theory of supernovae. Exotic stars. Chemical evolution of galaxies. prereq: 5001, 5002, 5011, 5012, 5201; AST 4001 recommended

PHYS 8802. Nuclear Physics II. (; 3 cr. ; Student Option; Periodic Fall)
Properties of nuclei based on hadronic and quark-gluon degrees of freedom. Relativistic field theory at finite temperatures and density applied to many-body problems, especially nuclear matter and quark-gluon plasma. Applications to lepton and hadron scattering, nucleus-nucleus collisions, astrophysics and cosmology. prereq: 8801 or instr consent

PHYS 8850. Advanced Topics in Nuclear Physics. (; 3 cr. [max 9 cr.] ; Student Option; Fall Odd Year)
Research topics. prereq: 8802 or instr consent

PHYS 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

PHYS 8900. Seminar: Elementary Particle Physics. (; 1 cr. [max 6 cr.] ; S-N or Audit; Every Fall & Spring)
Elementary particle physics, high energy physics, particle astrophysics and cosmology.

PHYS 8901. Elementary Particle Physics I. (; 3 cr. ; Student Option; Every Fall)
Types of fundamental interactions. Exact and approximate symmetries and conservation laws. Gauge quanta: gluons, photons, W and Z bosons, gravitons. Fundamental fermions: leptons and quarks. Isotopic and flavor SU(3) symmetries of strong interaction. Heavy hadrons. Amplitudes and probabilities. Quantum chromodynamics. prereq: 8001 or instr consent

PHYS 8902. Elementary Particle Physics II. (; 3 cr. ; Student Option; Every Spring)
Deep inelastic scattering. Weak interactions of leptons. Semileptonic and nonleptonic weak processes with hadons. Oscillations of neutral Kaons. Violation of CP symmetry in Kaons. Neutrino masses and oscillations. Standard model of the electroweak interaction. Grand unification. Unitarity of the S matrix. Properties of soft pions. prereq: 8901 or instr consent

PHYS 8911. Introduction to Supersymmetry. (; 3 cr. ; A-F only; Spring Even Year)
Motivation. Coleman-Mandula theorem. Supersymmetric Quantum Mechanics. 4D supersymmetry algebra and representations. Extended supersymmetry. N=1 superspace and superfields. Supersymmetric guage theories. Chiral/vector multiplets. Non-renormalization theorems. Supersymmetry breaking. Supersymmetric Standard Model. Phenomenology. Nonperturbative supersymmetry. Supergravity. prereq: 8011 or instr consent

PHYS 8994. Research in Physics. (; 1-12 cr. [max 24 cr.] ; Student Option; Every Fall, Spring & Summer)
Research under faculty direction. prereq: instr consent

Physiology (PHSL)

PHSL 5061. Principles of Physiology for Biomedical Engineering. (; 4 cr. ; Student Option; Every Fall)
Human physiology with emphasis on quantitative aspects. Organ systems (circulation, respiration, renal, gastrointestinal, endocrine, muscle, central and peripheral nervous systems), cellular transport processes, and scaling in biology. prereq: Biomedical engineering grad, one yr college chem and physics and math through integral calculus

PHSL 5094. Research in Physiology. (; 1-5 cr. [max 20 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent lab research project in physiology, supervised by physiology faculty. prereq: instr consent

PHSL 5095. Problems in Physiology. (; 1-5 cr. [max 20 cr.] ; Student Option; Every Fall, Spring & Summer)
Individualized study in physiology. Students address selected problem through library or lab research, supervised by physiology faculty. prereq: instr consent

PHSL 5096. Integrative Biology and Physiology Research Advances. (; 1 cr. [max 4 cr.] ; A-F only; Every Fall & Spring)
Attend/participate in IBP Fall/Spring seminar series. Seminars given by faculty, invited speakers, students. Exposure to key topics. How to present seminars. prereq: instr consent

PHSL 5101. Human Physiology. (; 5 cr. ; Student Option; Every Spring)
Survey of human physiology: Cardiovascular, muscle, respiratory, gastrointestinal, nutrition, renal physiology. Integrative, systems approach. Emphasizes normal function. prereq: Grad student

PHSL 5115. Clinical Physiology I. (; 3 cr. ; A-F or Audit; Every Fall)
Cellular mechanisms, disease states and clinical applications of excitable tissues: cellular transport, neurophysiology, skeletal muscle physiology, cardiovascular physiology. prereq: instr consent

PHSL 5116. Clinical Physiology II. (; 3 cr. ; A-F or Audit; Every Spring)
Cellular mechanisms, disease states and clinical applications of metabolic systems: respiratory physiology, renal physiology, acid base physiology, metabolism, gastrointestinal physiology, endocrine physiology, physiology of pregnancy and labor. prereq: instr consent

PHSL 5197. Stress Physiology. (; 1-3 cr. ; A-F only; Every Spring)
Journal club format. Meets weekly to examine foundations of stress, historical progress, development of stress, modern stress physiology. Focus on stress-induced pathology with attention to cardiovascular, metabolic, neuroendocrine disorders. Students participating in the weekly discussion are assessed on discussion participation, completion of weekly writing assignments and quality of the presentation in the class, are eligible for 1 credit. Students completing a midterm (test) and a final project (specific aims page of an NIH RO1 grant) in addition to the criteria described above are eligible for 3 credits. Prerequisite: instructor consent is required. Graduate student standing, master students, and post-doctoral fellows (if they are eligible for credits). Undergraduate students must have taken PHSL 3061 or equivalent, and have previous laboratory research experience.

PHSL 5201. Computational Neuroscience I: Membranes and Channels. (; 3 cr. ; Student Option; Every Fall)
Neural excitation (ion channels, excitation models, effects of neural morphology) using UNIX workstations to simulate empirical results. Includes the Hodgkin-Huxley model, nonlinear dynamic systems analysis, voltage and ligand gated ion channels, ion transport theories, and impulse initiation and propagation. prereq: calculus through differential equations

PHSL 5211. Physiology of Inflammation in Disease. (3 cr. ; A-F only; Every Spring)
In this course, we will explore the latest developments in the field of inflammation-mediated chronic diseases. The students will learn basic concepts of immunity and inflammation and the mechanisms by which non-infectious inflammatory processes mediate chronic disease. Instructor consent is required. Courses in physiology, such as PHSL3051, 3061, and Microbiology and Immunology, such as MICB 4131, are recommended but not required.

PHSL 5221. Systems and Computational Physiology. (3 cr. ; A-F only; Every Spring)
Physiological processes can involve a complex level of interactions that can be challenging to understand based on intuition alone. Quantitative and computational approaches can be used to help us better understand

the mechanisms regulating such complex processes, both in healthy and pathological conditions. In this course, students will be introduced to current methods from systems biology, computational biology, and artificial intelligence to better understand human physiology. We will discuss mathematical approaches to model biological interactions that describe fundamental physiological concepts such as feedback and homeostasis that operate across biological scales, from intracellular enzymes to organ regulation. We will apply these approaches to understand a range of physiological systems, including hormone secretion, circadian rhythms, and inflammation. We will also introduce students to machine learning and deep learning methods, and discuss how these computational approaches are being applied in the areas of clinical physiology and biomedical imaging.

PHSL 5444. Muscle. (; 3 cr. ; Student Option; Every Spring)
Muscle membranes: structures, mechanisms, and physiological roles of channels/pumps. Muscle contraction: force generation by actin/myosin. prereq: 3061 or 3071 or 5061 or BioC 3021 or BioC 4331 or instr consent

PHSL 5510. Advanced Cardiac Physiology and Anatomy. (; 2-3 cr. ; Student Option; Every Spring)
Fundamental concepts, advanced topics related to clinical/biomedical cardiac physiology. Lectures, laboratories, workshops, anatomical dissections. Intense, one week course. prereq: instr consent

PHSL 5525. Anatomy and Physiology of the Pelvis and Urinary System. (; 1-2 cr. ; A-F only; Every Spring)
Two-day intensive course. Pelvis, perineum, and urinary system with cadaveric dissection. Structure/function of pelvic and urinary organs, including common dysfunction and pathophysiology. Laboratory dissections, including kidneys, ureters, urinary bladder, pelvic viscera and perineum (male or female), pelvic floor, vascular and nervous structures. Grand rounds section. prereq: One undergrad anatomy course, one undergrad physiology course, instr consent

PHSL 5540. Advanced Exercise Medicine: Physiology and Bioenergetics. (; 1-2 cr. ; Student Option; Periodic Fall)
Three-day intensive course. Physiology, bioenergetics, nutrition, and sports medicine. Focuses on application of principles to treatment of diseases and functional deficits. Lectures, demonstrations, hands-on experiences in an exercise medicine facility. prereq: [Grad student or practicing health professional], instr consent

PHSL 5701. Physiology Laboratory. (; 1-2 cr. ; A-F or Audit; Every Fall & Spring)
Experiments in physiology. Emphasizes quantitative aspects, including analysis of organ systems. prereq: instr consent

PHSL 5702. Cell Physiology. (; 4 cr. ; A-F only; Every Fall)
Control mechanisms in maintaining homeostasis with respect to critical cell functions. Regulation of pH, volume, nutrient transport, intracellular electrolyte composition, membrane potential. Aspects of intercellular communication. prereq: [Two semesters of physics/chemistry, calculus, one semester of systems-level physiology] or instr consent

PHSL 6051. Systems Physiology. (; 4 cr. ; A-F or Audit; Every Spring & Summer)
General physiology, endocrine, circulatory, respiratory, digestive, energy metabolism, and renal physiology examined at molecular, cellular, and organ level. Emphasizes homeostasis and basic regulatory aspects of physiological processes of organ systems. prereq: [Prev or current] neuroscience course; [biochemistry, human anatomy] recommended

PHSL 8216. Selected Topics in Autonomic and Neuroendocrine Regulation. (; 1 cr. ; S-N or Audit;)
Advanced seminar.

PHSL 8222. Central Regulation of Autonomic Function. (; 3 cr. ; A-F or Audit; Periodic Fall)
Neural/hormonal sensory pathways affecting central autonomic nuclei involved in maintenance of homeostasis. Current research on physiological control systems at cellular, organ, and integrative levels. Offered fall of odd-numbered years. prereq: NSC 5561 or instr consent

PHSL 8232. Critical Reading of Journal Articles in Physiology. (; 2 cr. [max 4 cr.] ; A-F only; Every Spring)
Integrative physiology, critical reading of current scientific literature related to lecture topics in the Human Physiology course. prereq: concurrent registration is required (or allowed) in PHSL 5101, instr consent

PHSL 8242. Professional Skills Development For Biomedical Scientists. (; 2 cr. ; A-F only; Periodic Fall, Spring & Summer)
Professional skills development, including critical evaluation of the scientific literature, short oral presentations, development of research project specific aims and grant writing. Students will become familiar with strategies/mechanics of writing a grant proposal, NIH study section grant reviews, scientific presentations, dissecting scientific literature, and PubMed/NIHreporter tools. prereq: instr consent

PHSL 8252. Obesity prevention, from the molecule to the bedside. (; 2 cr. ; A-F only; Every Fall)
This course will cover research topics in obesity prevention at a graduate level. Starting with the second week, a professor will review a topic area, and a student will present one assigned refereed research paper in the area, to be discussed by the class. All students will submit a weekly written critique of the manuscript, prior to the discussion. This 8000 level course is intended for graduate students pursuing graduate work in a health science-related program. Undergraduate degrees can include, but are not limited to, a bachelor of science in nutrition, physiology, integrative biology, or other related degree. The instructor will consider other majors on an individual basis and permission. Prereq: Must be in a graduate program. Must have taken PHSL 5101, if not, instructor consent.

PHSL 8294. Research in Physiology. (; 1-18 cr. ; S-N only; Every Fall, Spring & Summer)
Directed laboratory research. prereq: Grad cellular and integrative Phsl major, instr consent

PHSL 8310. Advanced Topics in Cellular Physiology. (; 1 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
Discussion of primary research publications. Topics vary by semester. prereq: instr consent

PHSL 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

PHSL 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

PHSL 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

PHSL 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

PHSL 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Plant Pathology (PLPA)

PLPA 5003. Diseases of Forest and Shade Trees. (; 3 cr. ; Student Option; Every Spring)
This course provides an overview of tree diseases in urban and forested areas. It covers diseases that have had a significant impact on society such as Dutch Elm disease; oak wilt, chestnut blight, white pine blister rust, sudden oak death and many others. It also provides an overview of important cankers, leaf diseases, wilts, rusts, root rots and other tree problems. Laboratory sessions enable students to get hands-on experience identifying disease agents, examining symptoms and learning appropriate control procedures. Emphasis will also be placed on ecological processes, biological and cultural control, and host-parasite interactions. This course should be of value to anyone interested in biological sciences, natural resources or ecology. It is a must or individuals that will have a career in natural resources but should also be useful to those interested in maintaining healthy trees

at home, in urban areas or woodlands. Alumni of the University working with trees or woody ornamentals indicate this is one of the most important courses you can take as a student.

PLPA 5100. Topics in Plant Pathology. (; 1-4 cr. ; A-F or Audit; Every Fall & Spring)
Topics in Plant Pathology

PLPA 5103. Plant-Microbe Interactions. (3 cr. ; Student Option; Every Spring)
Genetics, physiology, molecular biology of plant-microbe interactions. Communication between plant/microbes, signal transduction, control of gene expression, symbiosis/parasitism, plant host response mechanisms, plant disease physiology. prereq: Intro course in plant pathology or molecular biology or equiv

PLPA 5202. Field Plant Pathology. (; 2 cr. ; S-N only; Every Fall)
Characteristics of a variety of plant diseases. Field trips to observe symptoms and effects of diseases, and to learn about prevention and control of diseases in field, forest, golf course, greenhouse, nursery, orchard, and urban environments.

PLPA 5203. Introduction to Fungal Biology. (; 3 cr. ; Student Option; Spring Odd Year)
Fungi are a critical component of the diversity and function of terrestrial ecosystems, affecting decomposition, plant nutrient uptake, and agricultural practices. Key components of fungal biology, including ecology, genetics, life cycles and diversity. Labs provide hands on experience with a diverse range of organisms. prereq: BIOL 1009 or equiv

PLPA 5300. Current Topics in Molecular Plant Pathology. (; 1 cr. [max 2 cr.] ; S-N only; Every Spring)
Current Topics in Molecular Plant Pathology is a highly interactive class in which students read, discuss, and critique pivotal publications in the field of molecular plant pathology. Specific topics will change from year to year, but will generally include subjects such as plant-microbe communication, diversity and evolution of plant-microbe associations, genomic analysis of pathogens (symbionts) and plant host responses, and mechanisms of pathogenicity. prereq: Introductory courses in plant pathology or microbiology; genetics; molecular biology or genomics; or consent of instructor

PLPA 5301. Large Scale Omic Data in Plant Biology. (; 3 cr. ; Student Option; Every Fall)
Introduction to large scale data in plant biology. Emphasizes model plants and important agricultural crops focusing on new approaches and technologies in the field. Fundamentals, acquisition, and analysis of high-throughput DNA and RNA sequencing, high-throughput plant phenotyping, functional and comparative genomics, epigenomics, proteomics, metabolomics, and microbiomics. prereq: Intro course in genetics or instr consent

PLPA 5303. Data Visualization in Plant and Microbial Biology. (3 cr. [max 31 cr.] ; Student Option; Every Fall)
Data Visualization in Plant and Microbial Biology is a course for graduate and advanced undergraduate students interested in developing skills to visualize common datasets in plant and microbial research. Students will learn fundamentals of data visualization and reproducibility that are common approaches to present plant and microbial biological data. The topics to be covered in the course are not limited to but can include fundamentals of proper data visualization techniques, principles of manuscript figure design, differences between manuscript, poster, presentation, and communication data visualizations, and how to ensure that analysis and visualizations are reproducible. The class will consist of lectures, discussions, group activities, and lots of hands-on learning and analysis. prereq: Limited experience with R software is recommended, but not required.

PLPA 5444. Ecology, Epidemiology, and Evolutionary Biology of Plant-Microbe Interactions. (; 3 cr. ; A-F or Audit; Every Fall)
Concepts and recent research in the ecology, epidemiology, and evolutionary/coevolutionary biology of plant-microbe interactions spanning the range from parasitic to mutualistic in agricultural and natural habitats. prereq: Intro plant pathology or advanced biology coursework recommended

PLPA 5480. Principles of Plant Pathology. (; 3 cr. ; Student Option; Every Fall)
This course is intended for graduate students and undergraduate students in their third or fourth year that are interested in learning about principles of plant pathology, diseases that affect plants, microbiology and microbial and plant interactions. In this course students will learn principles of plant pathology through lectures and demonstrations and exercises in laboratory. Students will gain knowledge of mycology and select diseases caused by fungi within Ascomycota, Basidiomycota and the fungal-like Oomycota. Diseases caused by bacteria, nematodes, viruses, parasitic plants and abiotic damage are also examined. Lectures will include information concerning the history and importance of plant pathology, mycology, bacteriology, nematology, virology, infection process, genetics of host and microorganism interactions, epidemiology of diseases and disease control strategies. In the hands-on laboratory period the student will learn laboratory skills, gain experience using the microscope, work with microorganisms, learn diagnostic skills, and be able to recognize 30 plant diseases. prereq: BIOL 1009 or equiv

PLPA 5660. Plant Disease Resistance and Applications. (; 3 cr. ; A-F or Audit; Every Spring)
Fundamentals of disease resistance in plants and the genetics of host-parasite interactions as they relate to the sustainable control of plant diseases. Examples explored at the Mendelian, populational, and molecular level of organization. prereq: 2001, BIOL 4003

PLPA 5999. Special Topics in Plant Pathology. (; 1 cr. ; Student Option; Every Fall, Spring & Summer)
Workshops on topics in plant pathology. See Class Schedule or department for current offerings.

PLPA 8005. Supervised Classroom or Extension Teaching Experience. (; 1-2 cr. ; S-N only; Every Fall & Spring)
Teaching experience in Plant Pathology. Discussions about effective teaching to strengthen skills and develop a personal teaching philosophy. prereq: instr consent

PLPA 8090. Research and Internship. (; 1-8 cr. ; Student Option; Every Fall & Spring)
Special assignment in lab or field problems in pathological research. Opportunities to provide students with unique exposure to research in other environments, including private industries, federal agencies, other countries, or other universities. Because of their value to the graduate student experience, the Department of Plant Pathology will offer credit for internships of 3-12 weeks duration.

PLPA 8103. Plant-Microbe Interactions. (3 cr. ; Student Option; Every Spring)
Genetics, physiology, and molecular biology of plant-microbe interactions. Communication between plants/microbes. Signal transduction, control of gene expression, symbiosis/parasitism, plant host response mechanisms, plant disease physiology. prereq: Intro course in plant pathology or molecular biology or equiv

PLPA 8104. Plant Virology. (; 2 cr. ; A-F only; Every Spring)
Characteristics, biology, epidemiology, and control of plant diseases caused by viruses. prereq: 5480

PLPA 8105. Plant Bacteriology. (; 3 cr. ; Student Option; Every Spring)
Bacteria interact with plants in various ways depending upon environmental conditions, nutrient status, and host plant genotypes. The outcome of these interactions can result in the plant associated bacteria being pathogens, or mutualists. In the Plant Bacteriology course, we will examine several bacterial diseases in-depth to understand the disease cycles, epidemiology, mechanisms of pathogenesis, beneficial microbes, and means of disease control. The laboratory section will focus on techniques used to identify bacteria, for inoculating plants, isolating bacteria from plant material, and methods to understand the plant-bacterial interactions. The first hour of most class sessions will consist primarily of lectures by the instructor followed by group discussion of assigned readings. Laboratory sessions will occur for 90 minutes and are designed to illustrate concepts presented during the lecture/discussion sessions. prereq: 5480

PLPA 8123. Research Ethics in Plant and Environmental Sciences. (; 0.5 cr. ; S-N or Audit; Every Spring)
History/values relating to research/scholarship. Social responsibility, reporting misconduct. Authorship. Plagiarism. Peer review. Copyright, intellectual property. Conflicts of interest. Research data management. Fiscal responsibility/management. Environmental health/safety. Research involving humans/animals. Mentorship. Presentations by faculty, invited speakers. Meets during first seven weeks of spring semester. prereq: Enrolled in a plant/environmental grad research program

PLPA 8200. Plant Pathology Seminar. (; 1 cr. ; A-F only; Every Fall & Spring)
Students enrolled in PlPa 8200 will gain experience and expertise in the area of oral scientific communication. Through participation in a regular departmental seminar series, students will be exposed to a variety of seminar preparation and presentation techniques. Working one-on-one with a Seminar Advisor and the course Instructor, students will select and appropriately define a seminar topic, identify pertinent literature, prepare an effective abstract, and prepare and present a public seminar on the selected topic. Students will further interact with classmates and other participants in the departmental seminar series through public question and answer periods and by moderating individual seminar sessions. PlPA 8200 will be conducted in hybrid format, providing opportunities for in person and online (Zoom) participation in a synchronous manner.

PLPA 8300. Plant Pathology Project. (1-6 cr. [max 24 cr.] ; Student Option; Every Fall & Spring)
Laboratory or library projects for Plan B master's students in plant pathology.

PLPA 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

PLPA 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

PLPA 8500. Perspectives in Plant Pathology. (; 2 cr. [max 4 cr.] ; S-N or Audit; Every Fall)
Integrative overview of the field. For Ph.D. students nearing end of formal classroom experience.

PLPA 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

PLPA 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

PLPA 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Plant and Microbial Biology (PMB)

PMB 5111. Microbial Physiology and Diversity. (3 cr. ; Student Option; Every Fall)
Structural/functional organization of bacteria/archaea. Energy metabolism utilizing light, inorganic/organic chemicals. Cell morphologies, roles/assembly of surface structures. Growth/survival mechanisms in various extreme environments. Adaptation to changing conditions by development of specialized cells/structures, altering metabolic patterns.

PMB 5131. Prokaryotic Genetics. (3 cr. ; Student Option; Every Spring)
Genetics is the application of abstractions to understand biological function. Much of our understanding at the molecular level of the natural world is derived from genetic work in model microbial systems like Escherichia coli, Salmonella, and Saccharomyces. Prokaryotic Genetics will focus on a molecular understanding of bacteria, with a smattering of archaea and phage genetics, covering both classic (transposons, mutant/suppressors) and modern (sequencing, metagenomics, synthetic biology) genetic approaches. prereq.: Introductory microbiology course.

PMB 5212. Fungi - A Kingdom of Their Own. (3 cr. ; Student Option No Audit; Every Spring)
No matter how you classify life on Earth, the fungi are in a Kingdom of their own. Latest estimates of the number of fungal species on our planet are between 2.2 and 3.8 million species. The diversity of single-celled and multi-cellular fungi is staggering, the result of divergence within a group of aquatic eukaryotes one billion years ago (? 500 million years). That divergence ultimately gave rise to animals and fungi, but the diversification within the fungal lineages is unrivaled. They can be found in aerobic and anaerobic environments. They are found on every Continent, recycling and reallocating vast amounts of nutrients in every Biome. They cause problems in crops but are also used to make food, with ancient processes such as fermentation and mushroom cultivation. For these reasons, mycology (study of fungi) is increasingly popular among students with interests as diverse as their fungal subjects. With the advent of high-throughput DNA sequencing to sample entire communities, we are seeing fungi in all of these places where they were previously invisible. The fungal role in Earth's most critical processes is, right now, coming into light. It is an exciting time to study Kingdom Fungi. This course uses a format of lecture, discussion, and field trips to provide undergraduate and graduate students with a solid foundation in the fungi, primarily through an environmental lens. Undergraduate and graduate students will learn the basics of fungi in three core sections: 1) Phylogeny, taxonomy, and diagnostics (Who are the fungi?); 2) Morphology and physiology (How do fungi work?); 3) Ecology and Biotechnology (What are fungal implications and applications?). Within each core section, there will be one class period devoted to a discussion of the environment, the role of fungi, and the human dimensions of conservation and management. This discussion will be used by the class to vote for an environmental theme used to frame writing assignments, one per unit. Using this theme, all students will create a Fungus in Focus one-page brief focused on this environmental issue. This is a creative way to connect dots for students linking microbial processes to the environment, in our case harnessing connections to fungi that often have visible characters (e.g. mushrooms) that make those connections easier for students. We will also go on two field trips, one to a mushroom cultivation facility, and one into the field in April, all depending on class size and weather.

PMB 5412. Plant Physiology and Development. (3 cr. ; Student Option; Every Fall)
Plant physiology and development is the study of how plant cells, tissues and whole organisms grow and function in response to internal and external cues. PMB 4412/5412 covers the classic plant physiology and development processes including plant water relations, mineral nutrition, membrane transport, photosynthesis, respiration, vascular function, metabolism, growth and development, and hormone responses. The physics underlying our understanding of these physiological systems will also be addressed. Other areas of plant science such as plant genetics and biochemistry are covered in other courses and will not be emphasized this course. There are no enforced prerequisites for this course. The following preparation is recommended: PMB 2022 General Botany or PMB 3007W Plant Algal and Fungal Diversity; General Chemistry and Introductory Physics.

PMB 5601. Topics in Plant Biochemistry. (; 3 cr. ; Student Option; Every Spring)
Biochemical analysis of processes unique to photosynthetic organisms. Photosynthesis and carbon dioxide fixation. Synthesis of carbohydrates, lipids, and derivatives. Aromatic compounds such as lignin, other natural products. Functions of natural products. prereq: [BIOL 1002 or BIOL 1009 or BIOL 2003], CHEM 2301

PMB 5802. Field Microbiology at Itasca Biological Research Station. (3 cr. ; A-F only; Every Summer)
The microbial world is incredibly diverse: there are estimated to be more microbial cells on Earth than stars in the entire universe. Much of our understanding in microbiology derives from studies of pure cultures; organisms that can easily be grown in the lab. However, it is now clear that the vast majority of microorganisms in nearly every environment are not readily grown under laboratory conditions. We must, therefore, go to them. Field Microbiology will be a three-week intensive course where students will be taught methods of environmental microbiology in both lecture and laboratory format. The goal is to not only quantify who is in a given sample but also to understand something about the conditions they live in (temperature, nutrient availability, etc.). Ecological data and microbial community structure will be generated using Oxford Nanopore sequencing technology - a cutting edge method to generate large sequencing datasets in real-time. Analyses will be integrated with an in situ set of field instrumentation that includes an eddy covariance system for quantifying fluxes of methane and carbon dioxide from Lake Itasca

and Elk Lake, as well as in-lake measurements of solar radiation, dissolved organic matter, pH, conductivity, temperature, dissolved oxygen and chlorophyll. A series of field trips will be scheduled to locations in and around Itasca State Park including Elk Lake, Arco Lake, Iron Springs Bog and Lake Alice Spring. Students will also develop an independent research project that will apply methods learned during the first 1.5 weeks of the course.

PMB 5812. Field Mycology. (3 cr. ; A-F only; Every Spring & Summer)
This class focuses on learning about how to study fungi. Students will gain experience identifying mushrooms and other samples collected during course field trips using macromorphological, microscopic, and molecular techniques. In addition, students will isolate fungi from environmental samples and maintain cultures as well as assess fungal community abundance and composition using both traditional (e.g., root tip colonization) and DNA-based methods (e.g., next-generation sequencing, bioinformatics, and ecological statistics). Course lectures highlight different aspects of fungal diversity (taxonomic, physiological, and ecological) and lab exercises provide hands-on practice. Course writing assignments and presentations emphasize exploring the natural history of fungi as well as critically assessing primary research literature. Permission is required for undergraduates to enroll in the graduate-level of this course (PMB 5812); inquire with the instructor.

PMB 8081. Succeeding in Graduate School: Skills, Ethics, and Beyond. (; 3 cr. ; A-F only; Every Fall)
What to expect and developing skills for succeeding in graduate school. Research ethics training. Reading/evaluating primary literature. Oral presentations. Exploring career options. prereq: Plant and Microbial Biology grad student or instr consent

PMB 8123. Research Ethics in the Plant and Environmental Sciences. (; 0.5 cr. ; S-N or Audit; Every Spring)
History/values relating to research/scholarship. Social responsibility/reporting misconduct. Authorship plagiarism. Peer review. Copyright/ intellectual property. Conflicts of interest. Research data management. Fiscal responsibility/management. Environmental health/safety. Research involving humans/ animals. Mentorship presentations by faculty and invited speakers. Meets first seven weeks of spring semester. prereq: Grad student in [applied plant sciences or plant pathology or plant biological sciences or soil science]

PMB 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
FTE: Master's prereq: Master's student, adviser and DGS consent

PMB 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

PMB 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Doctoral Pre-Thesis Credits prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

PMB 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall & Spring)
Thesis Credits: Master's prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

PMB 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Thesis credit: Doctoral. prereq: Max 18 cr per semester or summer; 24 cr required

PMB 8900. Seminar. (; 1 cr. [max 4 cr.] ; S-N only; Every Fall & Spring)
Current scientific research.

PMB 8901. Preparation of Research Proposals. (; 2 cr. ; S-N only; Every Fall)
Grant writing process. Strategies and ethical standards for research proposal preparation/ review. Students prepare an original proposal and critique work of others. prereq: Plant biological sciences PhD student

PMB 8910. Journal Club. (; 1 cr. [max 4 cr.] ; S-N or Audit; Periodic Fall, Spring & Summer)
Critical evaluation of selected current literature.

PMB 8993. Directed Studies. (; 1-5 cr. [max 15 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed Studies prereq: PBio grad student, instr consent

PMB 8994. Research. (; 1-5 cr. [max 10 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent research determined by student's interests, in consultation with faculty mentor. prereq: PBio grad student, instr consent

Political Science (POL)

POL 5315. State Governments: Laboratories of Democracy. (3 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
State governments are rarely at the forefront of the minds of the American public, but in recent years they have made critical decisions about issues like education, health care, climate change, and same-sex marriage. State governments perform a host of vital services, and they regulate and tax a wide array of business activities. Moreover, the states have adopted a very wide range of approaches in addressing these and other policy issues. This course examines the institutional and political changes that sparked the recent ? resurgence of the states,? and it investigates why state policies differ so dramatically from one another. In addition to playing a central and increasingly important role in the U.S. political system, the American states provide an unusually advantageous venue in which to conduct research about political behavior and policymaking. They are broadly similar in many ways, but they also offer significant variation across a range of social, political, economic, and institutional characteristics that are central to theories about politics. As a result, it becomes possible for scholars to evaluate hypotheses about cause-and-effect relationships in a valid way. This course pursues two related objectives. Its first goal is to give students a better understanding of American state governments? substantive significance. Its second goal is to use the states as an analytical venue in which students can hone their research and writing skills. Students will design and complete an original research paper on an aspect of state politics of their choosing. They will develop a research question, gather and critically evaluate appropriate and relevant evidence, and discuss the implications of their research. prereq: grad student or instr consent

POL 5403. Constitutions, Democracy, and Rights: Comparative Perspectives. (; 3 cr. ; Student Option; Fall Even, Spring Odd Year)
Around the world, fundamental political questions are often debated and decided in constitutional terms, and in the United States, the constitution is invoked at almost every turn to endorse or condemn different policies. Is adhering to constitutional terms the best way to safeguard rights and to achieve a successful democracy? When and how do constitutions matter to political outcomes? This course centers on these questions as it moves from debates over how constitutional drafting processes should be structured and how detailed constitutions should be, to the risks and benefits of different institutional structures (federal v. unitary, and the distribution of powers between the executive, legislature, and judiciary), to which rights (if any) should be constitutionalized and when and why different rights are protected, closing with a discussion of what rules should guide constitutional amendment and rewrite. For each topic, we compare how these issues have been resolved in the U.S. with alternative approaches in a wide variety of other countries around the globe. The goal is not only to expose students to the variety of ways, successful or unsuccessful, that other political communities have addressed these issues, but also to gain a more contextualized and clearer understanding of the pros and cons of the U.S. model, its relevance for other democratic or democratizing countries, whether and how it might be reformed, and, generally speaking, when/how constitutions matter for democratic quality and stability.

POL 5465. Democracy and Dictatorship in Southeast Asia. (GP; 3 cr. ; Student Option; Fall Even Year)
A fundamental question of politics is why some regimes endure for many years while others do not. This course examines the "menu of manipulation" through which dictators and democrats claim and retain power, and the conditions under which average citizens mobilize to challenge their governments, despite the risks and in the face of what may seem to be insurmountable odds. We will explore these political dynamics in Southeast Asia, one of the most culturally and politically diverse regions of the globe. Composed of

eleven countries, Southeast Asia covers a wide geographical region stretching from India to China. With a rich endowment of natural resources, a dynamic manufacturing base, and a strategic location on China's southern flank, the region has come to play an increasingly important role in the political and economic affairs of the globe. Culturally and ethnically diverse, hundreds of languages are spoken, and the religions practiced include Buddhism, Catholicism, Hinduism, and Islam. The region is similarly diverse in its political systems, which range from democratic to semi-democratic to fully authoritarian.

POL 5492. Law and (In)Justice in Latin America. (3 cr. ; Student Option; Every Spring)
This course examines, from various angles, how law and justice function in contemporary Latin America, highlighting similarities and differences within and between countries and issue areas. Students reflect on and debate the causes behind the varied outcomes, as well as the effectiveness, actual and potential, of the different institutional and social change efforts that have been underway in the region since the 1980s. Specific topics addressed include accountability for past and present mass violence; origins of and responses to crime, from "mano dura" policies to criminal justice reform and anti-corruption initiatives; and advances and limitations in equal rights protection. Special attention is paid across the course to issues of indigeneity, race, class, gender, and sexuality. Throughout, students compare situations within Latin America, which is by no means a monolith, as well as consider parallels between Latin America and the United States, where, despite great differences in wealth, history and culture, similar problems of law and justice can be found. The course aims thus not only to teach students about Latin America but also to get students to think about what we might learn from Latin America.

POL 5970. Individual Reading and Research. (1-4 cr. [max 8 cr.] ; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. Prereq instr consent, dept consent, college consent.

POL 8060. Research Proseminar in Political Science. (; 2 cr. [max 8 cr.] ; Student Option; Every Fall & Spring)
Readings, discussion, guest speakers. Topics vary by semester.

POL 8070. Advanced Research and Writing in Political Science. (; 2 cr. [max 4 cr.] ; Student Option; Every Fall & Spring)
Commentary/guidance at all stages of dissertation research process, from conceptualization of topic/project to editing of nearly final drafts.

POL 8101. Introduction to Political Science. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
History, scope, and methods of political science as a discipline; current subfields; major research programs (including statism, pluralism, institutionalism, realism, behavioralism, rational choice, and critical theory); problems of theory, interpretation, concept-formation, comparison, measurement and experimentation; designs for research. prereq: Grad pol sci major or instr consent

POL 8104. Professional Development I. (2 cr. [max 4 cr.] ; S-N only; Every Spring)
The objectives of this course are as follows: (1) to provide students with professional advice that will help them move with dispatch through the graduate program; (2) to learn the formal and informal norms of the discipline; and (3) to help them prepare to do independent research and dissertation research. prereq: 1st year Pol graduate student

POL 8105. Professional Development II. (; 1 cr. [max 2 cr.] ; S-N or Audit; Every Fall)
Research ethics. Skills for teaching undergraduate courses in political science. Completion of dissertation prospecti or early chapters. prereq: Pol sci student, ABD, dept consent

POL 8106. Quantitative Political Science I. (3 cr. ; Student Option; Every Fall)
This course provides a thorough grounding in the quantitative analysis of political science data. The emphasis is on how to analyze such data, interpret statistical results, and summarize and report the findings. By the end of the term you will (1) know how to describe variables; (2) test hypotheses; (3) use measures of association to quantify the relationship between two variables while holding a third variable constant; (4) understand bivariate regression and the basics of multiple regression; (5) understand reliability and validity and how to assess these properties empirically; and (6) know how to use the STATA statistical software program. prereq: political science grad major or instr consent

POL 8107. Quantitative Political Science II. (; 3 cr. ; A-F only; Every Spring)
Multiple linear regression model applied to political science data. How to use regression techniques to analyze data, interpret statistical results, and summarize/report the findings. Estimation of model. Underlying assumptions. Inference. Model diagnostics. Extensions of model. prereq: Political science grad major or instr consent

POL 8108. Maximum Likelihood Estimation. (3 cr. ; Student Option; Every Fall)
This course presents an overview of the likelihood theory of statistical inference, and its wide range of uses in applied quantitative political science. When dependent variables take the form of ordered or unordered categories, event counts, or otherwise violate the traditional assumptions of the linear regression model, models estimated by maximum likelihood provide an essential alternative. Topics covered include binary, multinomial, and ordered logit/probit, Poisson regression, and multilevel models. We will rely heavily on computational methods of analysis using the R statistical computing environment, and instruction on how to use R for applied research will be provided throughout the length of the course.

POL 8120. Core Course in Political Methodology: Modeling Political Processes. (; 3 cr. ; Student Option; Fall Odd, Spring Even Year)
Methods used and potential for creating models of political processes. Designing political institutions, discerning/forecasting election outcomes, producing early warnings of international conflicts, increasing turnout in elections. Using mathematics to study political strategy and collective decision making in committees/legislatures. Using statistics to measure political variables, design experiments with human subjects, and test micro/macro political theories. prereq: Pol sci grad major or instr consent

POL 8122. Positive Theory. (; 3 cr. ; Student Option; Every Fall)
Survey of positive political theory and rational-choice models. Information and transaction costs; institutions; models of elections, voting, coalitions. prereq: Grad pol sci major or instr consent

POL 8124. Game Theory. (; 3 cr. ; Student Option; Every Spring)
Application of noncooperative game theory in political science. Equilibrium concepts, bargaining, repeated games, games of incomplete information, signaling games, reputation, learning in games. prereq: [8122, grad pol sci major] or instr consent

POL 8125. Dynamic Analysis. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Time series method, its application in political science. prereq: Pol sci grad student or instr consent

POL 8126. Qualitative Methods. (; 3 cr. ; Student Option; Fall Even, Spring Odd Year)
Qualitative methods in social science. Hands-on training through fieldwork projects. Interviewing, participant observation, narrative interpretation, ethical problems. Issues of gender/race in fieldwork. prereq: Grad student

POL 8127. Survey Research Methods: Measuring Public Opinion. (; 3 cr. ; Student Option; Fall Even, Spring Odd Year)
Theoretical/empirical issues in survey research methodology aimed at assessing political attitudes/behavior (including questionnaire design, scientific sampling). Skill areas necessary to analyze, design, or conduct surveys to examine political phenomena. prereq: Pol sci grad major

POL 8131. Advanced Methods and Models. (; 3 cr. ; Student Option; Every Fall)
Intersection of statistical methodology and deductive modeling; issues in merging inductive and deductive research. Sample topics: parties and elections, probabilistic voting, strategic modeling of international relations. prereq: Grad pol sci major, 6 cr 81xx seminars or instr consent

POL 8160. Topics in Models and Methods. (; 3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Seminars on selected topics, as specified in Class Schedule.

POL 8201. Understanding Political Theory. (3 cr. ; Student Option; Every Fall & Spring)

Key concepts/major approaches. prereq: Grad student or instr consent

POL 8215. Philosophy of Political Inquiry. (; 3 cr. ; Student Option; Every Fall)
Major schools in philosophy of science as applied to political inquiry: pragmatism, positivism, hermeneutics, critical rationalism, critical theory, realism. Themes of political inquiry: explanation, interpretation, theory, criticism. Political issues raised by philosophy of science: liberalism, democracy, control, multiculturalism. prereq: Grad pol sci major or instr consent

POL 8225. American Political Thought. (; 3 cr. ; Student Option; Every Fall)
Colonial era to present: Puritans, American Revolution, Constitution, rise of individualism, pro- and anti-slavery arguments, civil war and reconstruction, industrialism, westward expansion, Native Americans, immigration, populism, socialism, social Darwinism, growth of corporations and unions; Great Depression; growth of American power at home and abroad. prereq: Grad pol sci major or instr consent

POL 8235. Democratic Theory. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Competing models of democracy: classical, republican, liberal, radical, Marxist, neo-Marxist, pragmatist, populist, pluralist, postmodern, participatory. Domestic and international struggles over meaning of "democracy"; social science models of and findings on democracy. prereq: Grad pol sci major or instr consent

POL 8251. Ancient and Medieval Political Thought. (; 3 cr. ; Student Option; Every Fall)
Politics and ethics in Greece, Rome, Christendom: Thucydides, Socrates, Plato, Aristotle, Cicero, Augustine, Aquinas, Marsilius. prereq: Grad pol sci major or instr consent

POL 8252. Early Modern Political Thought. (; 3 cr. ; Student Option; Every Fall)
Theorists and texts from Renaissance to French Revolution. Selectively includes Machiavelli, More, Calvin, Luther, Grotius, Bodin, Hobbes, Winstanley, Harrington, Locke, Montesquieu, Rousseau, Hume, Smith, Burke, and Wollstonecraft; key debates over liberty, law, power, and knowledge. prereq: Grad pol sci major or instr consent

POL 8253. Late Modern Political Thought. (; 3 cr. ; Student Option; Every Fall & Spring)
Theoretical responses to and rival interpretations of Western economy, society, politics, and democratic culture in the modern age; theories of history; class struggle; the end of metaphysics and the death of God; technology and bureaucracy; psychology of culture, in Hegel, Marx, Tocqueville, Mill, Nietzsche, Weber, Freud. prereq: Grad pol sci major or instr consent

POL 8260. Topics in Political Theory. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Readings and research in special topics or problems.

POL 8275. Contemporary Political Thought. (; 3 cr. ; Student Option; Every Fall)
From approximately World War II to the present. Survey of range of texts or intensive focus on such authors as Adorno, Arendt, Derrida, Foucault, Habermas, Horkheimer, Rawls, Said. Sample topics: feminism, postmodernism, communitarianism, Frankfurt School, postcolonialism. prereq: Grad pol sci major or instr consent

POL 8301. American Politics. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Seminar on main themes of theory and research in American politics, institutions, law, and policy. Major works on individual, mass, elite, and institutional behavior and their relationship to each other. Foundation for advanced seminars in American politics. prereq: Grad pol sci major or instr consent

POL 8302. Public Opinion and Political Behavior. (3 cr. ; Student Option; Every Fall)
Major theoretical perspectives/research on political participation, voting behavior, public opinion. Voter turnout, importance of party identification, effects of campaigns, long-term change in public opinion, designing/conducting research. prereq: Grad pol sci major or instr consent

POL 8303. Political Parties. (; 3 cr. ; Student Option; Every Fall)
Party systems and subsystems; party organizational characteristics, goals, and incentives; distribution of power and authority within the party; chief party functions; party as an organizer of governmental power; determinants of party structure and role. prereq: Grad pol sci major or instr consent

POL 8305. Interest Groups and Social Movements. (; 3 cr. ; Student Option; Every Fall & Spring)
Theoretical/empirical work on role of interest groups and social/political movements in American politics and policy-making processes. Theories of interest group and social/political movement formation, maintenance, and decline. How interest groups and social/political movements attempt to influence public policy. Impact/effectiveness groups/movements as agents of democratic representation, particularly for marginalized groups. prereq: Grad pol sci major or instr consent

POL 8307. Proseminar in Political Psychology I. (; 2 cr. ; S-N or Audit; Every Fall)
Readings, discussion, and guest speakers. Topics vary by semester. prereq: Grad pol sci major or pol psych minor or instr consent

POL 8308. Proseminar in Political Psychology II. (; 2 cr. ; Student Option; Every Spring)
Readings, discussion, and guest speakers. Topics vary by semester.

POL 8311. Political Psychology and Socialization. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Introduction to political psychology. Personality and politics; political cognition, emotion, and political behavior; political expertise; media and politics; aggression, authoritarianism, and political behavior; altruism and politics. prereq: Grad pol sci major or pol psych minor or instr consent

POL 8312. Legislative Process. (; 3 cr. ; Student Option; Every Fall & Spring)
Introduction to study of legislative politics; theories of legislative institutions and individual behavior; congressional elections; congressional committees, parties, and leaders. prereq: Grad pol sci major or instr consent

POL 8313. Executive Process. (; 3 cr. ; Student Option; Every Fall)
Tension between leadership and democracy in context of American presidency in terms of President's relationship with federal bureaucracy, Congress, and making of diplomatic and military policy. prereq: Grad pol sci major or instr consent

POL 8314. Judicial Process. (; 3 cr. ; Student Option; Every Fall)
Judicial systems and roles; selection of judges; organizing and supporting litigation; influences on judicial decisions; impact and enforcement of judicial decisions; courts and other institutions of government. prereq: Grad pol sci major or instr consent

POL 8320. Social Psychology of Prejudice and Intergroup Relations. (; 3 cr. ; A-F or Audit; Every Fall)
Approaches, findings, and controversies in research on social psychology of prejudice, racial attitudes, and intergroup relations. Focuses on approaches based in social psychology and on related work from political science and sociology.

POL 8321. Urban Politics. (; 3 cr. ; A-F or Audit; Every Fall)
Selection of local leadership; relationship of political system to governmental forms and social institutions; role and impact of political institutions; policymaking at local level; studies in policy problems; the emerging metropolis. prereq: Grad pol sci major or instr consent

POL 8325. State Politics and Intergovernmental Relations. (; 3 cr. ; Student Option; Every Fall)
Theoretical approaches to comparative study of state politics; study of political culture and behavior, governmental institutions, and public policy at state level; federalism. prereq: Grad pol sci major or instr consent

POL 8331. Constitutional Law. (; 3 cr. ; Student Option; Every Fall)
Overview of substantive and theoretical debates in American constitutional law; role of law and constitutional interpretation in shaping American political institutions and American politics. prereq: Grad pol sci major or instr consent

POL 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

POL 8335. Public Policy. (; 3 cr. ; Student Option; Every Fall)
Theoretical approaches: incrementalism, innovation and policy learning, comparative

policy outputs, policy process models, interest groups, and selected areas of public policy. prereq: Grad pol sci major or instr consent

POL 8337. Welfare State Theories and American Social Policy. (; 3 cr. ; Student Option; Every Fall)
Rival theoretical explanations for cause and nature of welfare state development in context of four American social policies: social security, welfare, education, and healthcare. prereq: Grad pol sci major or instr consent

POL 8360. Topics in American Politics. (; 3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Readings and research in special topics or problems. prereq: instr consent

POL 8401. International Relations. (; 3 cr. ; Student Option; Every Fall & Spring)
Basic theories/approaches to study of international politics. Surveys representative work/central issues of scholarship. prereq: Grad pol sci major or dept consent

POL 8402. International Security. (; 3 cr. ; Student Option; Spring Odd Year)
Introduction to contending theories of international conflict/security. prereq: Grad pol sci major or instr consent

POL 8403. International Norms and Institutions. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Origins, roles, and effectiveness of international norms and institutions; theoretical explanations and debates. Institution of sovereignty; rational choice versus constructivist perspectives; role of international law, international organizations, and non-governmental organizations; and international society and transnational cultural norms. prereq: Grad pol sci major or instr consent

POL 8404. International Hierarchy. (; 3 cr. ; Student Option; Periodic Fall)
Asymmetric structures and processes of international relations; systemic conditions and implications of informal empire and structures of hegemony; cultural productions of difference and inequality. prereq: Grad pol sci major or instr consent

POL 8405. International Political Economy. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Theoretical and policy issues in international economic relations. Different approaches for understanding outcomes in international economy. Trade, finance, labor markets, creation and maintenance of international regimes, and "globalization" of economic liberalism. prereq: Grad pol sci major or instr consent

POL 8406. Politics of International Finance. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Relationship between workings of the international political system and that of international markets for currency and capital. prereq: Grad pol sci major or instr consent

POL 8407. Morality in World Politics. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Approaches to normative theorizing and empirical research on moral norms in world politics. Theoretical topics: realism, communitarianism, consequentialism, constructivism, postmodernism, cultural relativism. Substantive issue areas: famine and foreign aid, just war theory, nuclear weapons, moral implications of technology, case study on war (Gulf War). prereq: Grad pol sci major or instr consent

POL 8408. International Relations of the Environment. (; 3 cr. ; Student Option; Periodic Fall)
Theory and practice of international environmental politics. Emergence of environment as major issue of international relations. Diversities of agendas and politics. Imperatives, templates, resistance in global efforts to forge an applied politics of environmental sustainability. Selected cases. prereq: Grad pol sci major or instr consent

POL 8409. International Law and Regulation. (3 cr. ; Student Option; Periodic Fall & Spring)
This is a graduate seminar that examines seminal interdisciplinary research on the role of international laws, institutions, and regulations in world politics. Its objective is to enhance your understanding of the ways in which international rules shape international and domestic politics, practices, values, and relations. To what extent does international law help resolve conflicts between countries? What is its relationship with governments? foreign policies? To what extent has international law helped governments achieve common goals or express important values? How does international law interact with domestic politics, legal systems, or cultures? Throughout the course, we emphasize the relationship between law and politics and seek to understand the nature of international law and transnational regulatory standards. The course is divided into three main parts. First, we will explore a variety of approaches to conceptualizing and analyzing international rules and institutions. This part will consider different reasons for legalizing cooperation, the role of domestic politics in the turn to international law and regulation, institutional design considerations, and the process and politics of delegating authority to a supranational legal body. The second part of the course examines tools and approaches scholars use to evaluate the effectiveness or effects of these efforts. We assess whether and how legal or regulatory institutions engender compliance with rules; explore different ways in which they can have an effect on the behavior, beliefs, and identities of a range of actors; and interrogate the intended and unintended consequences of legal regulation in global politics. Finally, after workshopping our own research, we consider broader implications of the turn to international law in terms of complexity, fragmentation, backlash, and pressing problems for the current political moment.

POL 8411. Political Psychology and Foreign Policy. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Foreign policy theories about decision makers and audiences. Impact of human nature, formal institutions, cultural and cross-cultural settings, and kinds of issues on foreign policy choice, control, and justification. prereq: Grad pol sci major or instr consent

POL 8412. American Foreign Policy. (; 3 cr. ; Student Option; Periodic Fall & Spring)
U.S. policy toward foreign states and peoples: heritage, motivations, policy processes, what the public generally knows and wants, specific policies. Rise of intermestic issues and decline of enemy-focused internationalism; implications for process and content of U.S. foreign policy. prereq: 8410 or instr consent

POL 8444. FTE: Doctoral. (; 1 cr. [max 10 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and director of graduate studies consent

POL 8460. Topics in International Relations. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Readings and research in advanced topics or problems. Recent topics: global environmental issues, morality in world politics, and norms and institutions in world politics.

POL 8601. Introduction to Comparative Politics. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Main theoretical approaches and issues: comparative method, the state and class; political culture; development, democratization, rational choice, social movements. prereq: Grad pol sci major

POL 8602. Families, Children, and the State. (; 3 cr. ; A-F or Audit; Periodic Fall)
Politics of family, sex, and children. Comparative perspective. Family autonomy vs. state authority. Political struggles over the definition of family, sex, and marriage. Crisis in fatherhood. Children.s rights. Globalization of Western ideology of childhood. Political realities of third-world childhood. Theories of political efficacy in family/child advocacy.

POL 8603. European Government and Politics. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Main theories and approaches used to interpret European politics. Many of these theories have broad relevance for comparative politics, for example, theories about the state, cleavages and coalitional bases, parties and social movements, and constitutional structures and institutions have broad relevance for the field of comparative politics. prereq: Grad pol sci major or instr consent

POL 8605. Government and Politics in Africa. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Theoretical and methodological approaches to study of African politics, focusing on pre-colonial and colonial legacies for post-colonial reality. Local politics, social construction of identities, political economy of peasantry and working class, political development and decay, social movements, and prospects for democracy. prereq: Grad pol sci major or instr consent

POL 8608. Government and Politics of Russia and the Commonwealth of Independent States. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Framework for understanding politics of change underway in the former Soviet Union. Roots of current transformation, including causes and legacy of the Russian revolution and creation of the Soviet Union. Issues in current transformation, including nationalism, economic reform, and democratization. Prior knowledge of basic Soviet politics is assumed. prereq: Grad pol sci major or instr consent

POL 8611. Chinese Politics. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Major issues since 1949: democratization, dissent, violence, gender, capitalist and socialist development strategies, inequality, effect of culture on politics, status of Taiwan. Current scholarly debates on Chinese politics. Professional methods for research on contemporary China. prereq: Grad pol sci major or instr consent

POL 8615. The Political Economy of Contemporary Japan. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Major political and economic issues confronting the Japanese system; situation of Japanese case within comparative politics literature concerning role of the state in formulating economic and social policy making. Review of literature. Deregulation in key industries, welfare reform, tax reforms. prereq: Grad pol sci major or instr consent

POL 8619. Latin American Politics. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Major bodies of theory on development, democracy and redemocratization, social movements, civil society, the state, and transnational linkages. prereq: Grad pol sci major or instr consent

POL 8621. Comparative and Case Study Methods. (2 cr. [max 4 cr.] ; Student Option No Audit; Every Fall & Spring)
This course will provide students with a basic introduction to methodological debates surrounding comparative and case study methods in political science. Although the course is designed primarily with an eye to the needs of students in comparative politics, this course will also be useful to students in other subfields who wish to learn more about comparative and/or case study methods. This course is primarily for students in their 2nd year and beyond in the Political Science PhD program.

POL 8633. Comparative Sociopolitical Change. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Critical evaluation of literature and theoretical perspectives; comparative examination of social and political change and interrelationship between both processes; structure/agency nexus. prereq: Grad pol sci major or instr consent

POL 8637. Comparative Political Economy. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Connections between democracy and markets, emphasizing experiences of countries in North America and Europe. prereq: Grad pol sci major or instr consent

POL 8641. Comparative Mass Political Behavior. (; 3 cr. ; A-F or Audit; Fall Even, Spring Odd Year)
Examined from a cross-national perspective. Development of political participation, mobilization and its effects, development of political cleavages and political parties as vehicles of conflict, modes of political behavior under varied systems of representation and varied party systems. prereq: Grad pol sci major or instr consent

POL 8643. Comparative Political Institutions. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Structure/operation of various political institutions in different settings. Theoretical approaches, comparative frameworks. Introduction to literature on political institutions. Preparation for comparative research on political institutions. prereq: Pol sci grad student or instr consent

POL 8660. Topics in Comparative Politics. (; 3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Readings in advanced topics or problems. Supervised research/training. Topics specified in Class Schedule.

POL 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral, up to 24 combined cr, permission number required for registration, doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

POL 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

POL 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

POL 8990. Directed Readings and Research in Political Science. (; 1-7 cr. ; Student Option; Every Fall, Spring & Summer)
TBD prereq: 16 cr 8xxx pol sci courses, instr consent, dept consent

Portuguese (PORT)

PORT 5910. Topics in Lusophone Cultures and Literatures. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Cultural manifestations in Portuguese-speaking world (Portugal, Brazil, Lusophone Africa). Literature, history, film, intellectual thought, critical theory, popular culture. Topics may include writers (e.g. Machado de Assis) groups of writers (e.g. Lusophone women writers), or problematics such as (post-)colonialism or Luso-Brazilian modernities. prereq: Grad student or instr consent

PORT 5993. Directed Studies. (1-4 cr. [max 9 cr.] ; Student Option; Every Fall, Spring & Summer)
Lusophone studies (Portuguese-speaking Africa, Brazil, Portugal). Areas not covered in other courses. Students submit reading plans for particular topics, figures, periods, or issues. Prereq MA or PhD candidate, instr consent. Students enrolling in this directed study/ research course will complete the University's common Directed Study/Research contract with the faculty mentor/evaluator. The Faculty member will ensure academic standards are upheld, including: - the work proposed is at the appropriate level for the course, academic in nature, and the student will be involved intellectually in the project. - the project scope is reasonable for one semester and the number of credits specified (42 hours of work per credit) - the faculty mentor is qualified to serve in this role - assessment of student learning and grading criteria are clear and appropriate - the student will be working in a respectful, inclusive environment

PORT 5994. Directed Research. (1-4 cr. [max 9 cr.] ; Student Option; Every Fall, Spring & Summer)
Graduate-level research in literatures and cultures of the Portuguese-speaking world. Topics vary. Prereq Grad student or instr consent. Students enrolling in this directed study/research course will complete the University's common Directed Study/Research contract with the faculty mentor/evaluator. The Faculty member will ensure academic standards are upheld, including: - the work proposed is at the appropriate level for the course, academic in nature, and the student will be involved intellectually in the project. - the project scope is reasonable for one semester and the number of credits specified (42 hours of work per credit) - the faculty mentor is qualified to serve in this role - assessment of student learning and grading criteria are clear and appropriate - the student will be working in a respectful, inclusive environment

PORT 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

PORT 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

PORT 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
prereq: Max 18 cr per semester or summer; 24 cr required

Poultry Health (POUL)

POUL 5001. Avian Anatomy and Physiology. (; 1 cr. ; A-F or Audit; Every Fall)

This course provides an abbreviated overview of avian anatomy and physiology at the gross and cellular levels. Basic avian anatomy and physiology will be presented in the context of the commercial broiler chicken and turkey.

POUL 5002. Poultry Nutrition. (; 1 cr. ; A-F only; Every Spring)
The purpose of this course is to provide the principles of poultry nutrient metabolism, feed composition, and chemistry as it applies to commercial broiler chickens and turkeys.

POUL 5003. Poultry Diseases. (; 1 cr. ; A-F only; Every Spring)
The purpose of this course is to provide introduction to common diseases of poultry, focusing on commercial broiler chicken and turkey production in the United States. We will start with an introduction to the principles of disease, and the role of the host in susceptibility to disease. Then, specific diseases will be covered, including viral, bacterial, fungal, and protozoal pathogens. Finally, non-infectious disease associated with nutrition, metabolism, and toxins will be covered. The student will gain understanding of the pathogen and host relative to each disease covered.

POUL 5013. Animal Welfare. (; 1 cr. ; A-F only; Every Spring)
This course will cover the basic principles, history, and application of animal welfare science for poultry. Students will learn to assess the welfare of poultry using science-based methods and reasoning. This course will provide background and application of animal welfare science.

POUL 5015. Broiler/Layer/Turkey Rotation. (1 cr. ; A-F only; Every Summer)
This course will serve as the capstone of the Applied/Production track of the Poultry Health Certificate. This one-week, in-person experience will be catered to the student?s interest in one of three areas: commercial broiler chicken, chicken layer, or turkey production. The student will choose one of these three experiences and will learn core competencies in that area over a 1-week intensive hands-on course.

POUL 5016. Capstone in Molecular Technologies. (1 cr. ; A-F or Audit; Every Summer)
This course will serve as the capstone of the Research/Diagnostics track of the Poultry Health Certificate. This one-week, in-person experience will take place at the MCROC laboratory in Willmar, Minnesota. The student will learn about core molecular techniques and gain hands-on experience with these techniques over a 1-week intensive hands-on course.

POUL 5101. Living in a microbial world and raising animals: the poultry perspective. (; 3 cr. ; A-F only; Every Fall)
It?s a microbial world. We are just living in it. This statement by Professor Mark Martin could not be more relevant than it is today. In every aspect of life, microbes play a role. This is particularly true in agricultural practices used to grow food for the human population. Good and bad, microbes are intricately linked to the practice of raising meat, fruits, and vegetables for human consumption. The purpose of this online course is to emphasize the holobiont, which is the host itself plus the assemblage of microbes living inside and outside of it. This is different than your typical microbiology course. Yes, we will cover the basics of microbiology, and the role of the microbiome in the maintenance of health and disease. But we will also put this information in the context of ecology. Using the poultry production environment as an example, you will learn about the basics of poultry production and how microbes contribute to every aspect of the production chain - including the bird itself, the barns that birds are grown in, the ecosystem surrounding these barns, the processing plants that produce our meat, and even ?us? as we interface with live production animals and consume their meat. In practical terms, this course will train you to appreciate and understand how normal ?commensal? microbes in the animal and its surrounding environment are important for everyday life, health, and success. This course is suitable for upper-level undergraduate students, graduate students, and non-traditional industry professionals.

POUL 5102. How safe is your chicken? Food safety from a poultry perspective. (; 3 cr. ; A-F only; Every Fall)
The purpose of this course is to provide introduction to food safety with emphasis on poultry production. An emphasis will be given to understanding the major pathogens transmitted through live poultry and products and how they can be controlled or mitigated in live production and processing steps. After completing this course, you will have understanding of the basic food safety principles, major foodborne pathogens in poultry, principles of hazard analysis and critical control points (HACCP)-approach of food safety, meat and egg safety, and major preharvest and post-harvest approaches to safety of poultry foods. This course is suitable for upper-level undergraduate students, graduate students, and non-traditional industry professionals.

POUL 5103. Poultry biosecurity: framework for healthy production. (; 3 cr. ; A-F only; Every Fall)
In 2015, an avian influenza virus was introduced to poultry production in the upper Midwestern United States. This outbreak resulted in the destruction of more than 43 million chickens and turkeys raised for meat and egg production, devastating these poultry industries. This changed our view of biosecurity forever as it related to protecting the poultry supply. While this virus has subsided, we do not know where or when the next threat will emerge, and as such we need to be prepared for the unknown. The purpose of this course is to provide the principles of biosecurity, with an emphasis on poultry production. This course will cover the basics of biosecurity, and the role of everyone in the maintenance of biosecurity in commercial broiler chickens, turkeys, and egg layers. You will learn about biosecurity and will learn how to develop an effective biosecurity plan while navigating regulations and other logistical challenges. This online course is suitable for upper-level undergraduate students, graduate students, and non-traditional industry professionals.

Power Systems, Pwr Electronics (PSE)

PSE 6011. Electric Machines and Drives. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Students learn various aspects of electric machines and drives under a steady state operation. Course provides overview of the components and control and a basic fundamental understanding for further learning. This course describes the principles behind how electric machines operate, in a way that they can be controlled in adjustable speed and position applications. In order to do so, power-electronics based converters are described in their functionality as well as the feedback control of speed and position in a system. prereq: Circuit analysis ??? dc and sinusoidal ac in steady state using phasors; basic idea of diode, transistor and thyristor operation; Fourier analysis; Laplace Transform: Bode Plots, gain and phase margin; Electromagnetic-field concepts, magnetic-circuit concepts

PSE 6021. Power Systems. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Students will learn various aspects of electric power systems and receive an overview of the various components and control and a basic fundamental understanding for further learning. Course begins with examining various means of generating electricity and then transmitting it over power lines and cables; calculating power flow in an interconnected grid; various components such as transformers, synchronous generators, etc. that make up power systems. The middle-part of the course describes the requirements for voltage stability and keeping the generators operating synchronously under transient fault conditions. The last part of the courses deals with the protection of power systems against transmission line faults using protective relaying, and under transient over-voltages by means of insulation coordination using surge arrestors. prereq: Circuit analysis ??? dc and sinusoidal ac in steady state using phasors; basic idea of diode, transistor and thyristor operation; Fourier analysis; Laplace Transform; Electromagnetic field concepts, magnetic-circuit concepts

PSE 6031. Power Electronics. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Course on power electronics, an enabling technology, with a focus on its various applications, basic converter structures and how these converters are used and controlled in these applications. By exploiting the commonality of various converters, students get a much deeper and broader understanding. The concentration of this course will be on switch-mode power electronics where the transistors such as MOSFETs and IGBTs are used as semiconductor switches - either

ON or OFF. The terminal characteristics of these devices will be discussed for designing converters in which they are used in order to calculate conduction and switching losses for thermal management and design trade-offs; however, in analyzing the voltage transfer ratios in various converter topologies and in their feedback control, these semiconductor devices and the associated passive components will be considered ideal. The last part of the course will discuss thyristor-based converters used at very high power levels in electric-utility applications. prereq: Circuit analysis ??? dc and sinusoidal ac in steady state using phasors; basic idea of diode, transistor and thyristor operation; Fourier analysis; Laplace Transform: Bode Plots, gain and phase margin; Electromagnetic field concepts, magnetic-circuit concepts

PSE 6041. Power Generation Operation and Control. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Power system operations and economics is a topic important to understanding how decisions are made in hour by hour control of a power system and in planning of new power system facilities. The cost of power starts with acquiring fuel and in buying and selling power with neighboring electric companies and in markets. The course builds on the characteristics of large generating facilities to include how they are operated to minimize cost while meeting the requirement to supply load and keep equipment operating within safe margins. This necessarily brings into focus the transmission system which connects generators to loads and several sections of the course are devoted to transmission system operation and analysis. Students will be introduced to new optimization methods and new analysis methods used in the power industry. prereq: Advanced calculus, linear albegra, Laplace transforms, circuit analysis - dc and sinusoidal ac in steady state using phasors; basic power systems analysis including three phase per unit systems, real and reactive power calculations, power flow calculations, basic probability and statistics, basic time series analysis of signals.

Preventive Science Minor (PREV)

PREV 8001. Prevention Science: Principles and Practices. (; 3 cr. ; Student Option No Audit; Every Spring)
Theoretical, empirical, and practical foundations for strategic interventions to prevent behavioral problems and promote healthy development. Multidisciplinary roots of prevention science. Trends/directions. best practices.

PREV 8002. Prevention Science Research Methodology. (3 cr. ; A-F or Audit; Every Fall)
This course is intended to provide students with broad exposure to topics in research methodology within the field of prevention science. Prevention science as a discipline focuses on the etiology and prevention of social, physical and mental health problems and the translation of that information to promote health and well-being. This course will emphasize research methodology as it pertains to preventive interventions in youth and family contexts. The course is intended to serve as a survey of a wide range of topics within these areas, with research design, measurement issues, and analytic methods representing the major foci. Topics will be covered with attention to the community contexts within which prevention research often occurs as well as the ethical and human subjects issues that may arise. Students who successfully complete the course are expected to be able to interpret and critically evaluate prevention research methodology as well as identify appropriate methodical strategies to address research questions within prevention science

PREV 8003. New Topics in Prevention: Implementation and Dissemination. (3 cr. ; A-F or Audit; Every Spring)
This is an interdisciplinary course focused on the new science of implementation and dissemination of evidence-based/empirically-supported family-focused psychosocial prevention programs. Course content will include an overview of conceptual and theoretical foundations of implementation research, key research questions, methods for evaluating implementation and dissemination efforts, and case examples from the empirical literature. The course will take an ecological perspective to the implementation of family-based prevention programs, addressing questions such as how widespread efforts to install programs in communities can ensure that programs create change in children and families

PREV 8005. Prevention Science Capstone Course. (; 1 cr. ; Student Option No Audit; Periodic Fall)
Topics for preservation research project. Students discuss possible projects with faculty/peers. Students present final proposal for research project.

Product Design (PDES)

PDES 5193. Directed Study in Product Design. (; 1-4 cr. [max 8 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Independent study in product design under tutorial guidance. prereq: Grad, instr consent

PDES 5701. User-Centered Design Studio. (4 cr. ; A-F only; Every Spring)
This class provides a studio-based overview of user-centered product design and development processes. Students will practice both user and market research, creativity and idea generation tools, concept evaluation/selection techniques, prototyping methods for concept development and communication, and user testing. This class will also cover fundamentals of intellectual property and manufacturing.
In this studio, students will apply these skills towards the development of a product concept.

PDES 5702. Visual Communication. (3 cr. ; A-F only; Every Fall)
This class provides an overview of sketching, manual rendering and Adobe Photoshop, Illustrator, and InDesign for communication of conceptual product design. Topics covered will include free-hand perspective drawing of simple/complex geometries, line weight/quality, shading/shadow, design details and annotations, as well as image editing, vector graphics, and multi-page layout design. There will be weekly drawing assignments and critique of work.

PDES 5703. Prototyping Methods. (4 cr. ; A-F only; Every Fall)
This class is a hands-on introduction to traditional and digitally interactive prototyping tools and techniques. Through a series of projects students will gain experience with building product models using different materials and tools related to foam core, foam, wood, Arduino, and digital fabrication. In the process, the course covers design topics related to form and function, ergonomics, visual aesthetics, and design critique.

PDES 5704. Computer-Aided Design Methods. (3 cr. ; A-F only; Every Fall)
This class provides an overview of how to make high-quality digital computer-based models of existing and conceptual products and interactions. Students will learn Adobe Photoshop, Adobe Illustrator, and Axure for two-dimensional design and digital prototyping. Students will also learn SolidWorks and KeyShot for three-dimensional solid modeling and rendering. prereq: Senior or grad student

PDES 5705. History and Future of Product Design. (3 cr. ; A-F only; Every Spring)
This class covers critical milestones in the history, evolution, and trajectory of modern product design as well as the human relationships to consumer goods, including production and consumption. In some assignments, students have the opportunity to apply the topics discussed towards imagining the future of the product design industry.

PDES 5706. Designing for Manufacture. (4 cr. ; A-F only; Every Fall)
Hands-on exposure to a number of common manufacturing methods and the considerations in product design. Students will be able to apply the theory of design for manufacturing (DFM) and design for assembly (DFA) to other methods that may not be taught in this course.

PDES 5711. Product Innovation Lab. (; 4 cr. ; A-F only; Every Spring)
A hands-on experience in integrated product design and development processes. Elements of industrial design, engineering, business, and humanities are applied to a semester-long product design project. Cross-functional teams of students in different majors work together to design and develop new consumer product concepts with guidance from a community of industry mentors

PDES 8192. Readings in Product Design. (; 1-3 cr. [max 6 cr.] ; A-F or Audit; Every Fall & Spring)
Independent study; review of books and periodicals under tutorial guidance. prereq: Grad, instr consent

PDES 8193. Directed Study in Product Design. (; 1-4 cr. [max 8 cr.] ; A-F or Audit; Every Fall, Spring & Summer)

Independent study in product design under tutorial guidance. prereq: Grad, instr consent

PDES 8721. New Product Design and Business Development I. (4 cr. ; A-F or Audit; Every Fall)
This is a 2-semester course. PDES 8722 must be taken in sequence in the Spring of the same year. Students and faculty work with company representatives to develop a product concept, a working physical prototype, and an extensive business plan. Concept design, detail design, manufacturing, marketing, introduction strategy, and profit forecasting. Sponsoring company intends to bring product to market. Engineering and design students must enroll for both semesters. Business students may enroll for one, the other or both semesters.

PDES 8722. New Product Design and Business Development II. (4 cr. ; A-F or Audit; Every Spring)
This is a 2-semester course sequence. PDES 8721 must be taken prior to this class in the Fall of the same year. Students and faculty work with company representatives to develop a product concept, a working physical prototype, and an extensive business plan. Concept design, detail design, manufacturing, marketing, introduction strategy, and profit forecasting. Sponsoring company intends to bring product to market. Engineering and design students must enroll for both semesters. Business students may enroll for one, the other or both semesters.

Prosthodontics (PROS)

PROS 7110. Classic Prosthodontic Literature Review. (; 2 cr. ; A-F only; Every Fall & Spring)
Selected historical literature. Current research, its implications for present-day restorative dental therapy. prereq: instr consent

PROS 7120. Current Literature Review. (; 1 cr. [max 6 cr.] ; A-F or Audit;)
Historical development of maxillofacial prosthetics, interdisciplinary relationships in treatment of maxillofacial patient.

PROS 7161. Applied Biomaterials. (; 2 cr. ; A-F or Audit; Every Summer)
Principles governing manipulation of materials used in restorative dental practice. The physical and mechanical properties and the biocompatibility of dental materials to oral tissues. prereq: instr consent

PROS 7171. Principles of Maxillofacial Care. (; 2 cr. ; A-F only; Every Fall & Summer)
Treatment, biomechanics, and technical procedures associated with fabrication, fitting, and servicing of various types of oral and facial prostheses.

PROS 7200. Advanced Clinical Prosthodontics I. (; 5 cr. ; A-F only; Every Fall, Spring & Summer)
Practical clinical experience in examination, diagnosis, treatment planning, and various phases of treatment of patients with complex restorative dental problems. New and unfamiliar concepts and techniques. prereq: instr consent

PROS 7210. Advanced Technical Restorative Dentistry. (; 2 cr. ; A-F or Audit; Every Summer)
Residents are exposed to technical aspects of complete denture, removable partial denture, fixed partial denture construction, associated use of implants, considerations related to temporomandibular dysfunction (TMD). prereq: instr consent; offered concurrently with course on dental materials, head/neck anatomy

Psychology (PSY)

PSY 5014. Psychology of Human Learning and Memory. (; 3 cr. ; A-F only; Spring Odd Year)
Human memory encoding/retrieval. How we adaptively use memory. Brain systems that support memory. Episodic/semantic memory. Working/short-term memory. Procedural memory. Repetition priming. Prospective remembering. Autobiographical memory. prereq: 3011 or 3051 or honors or grad student

PSY 5015. Cognition, Computation, and Brain. (; 3 cr. ; Student Option; Spring Even Year)
Human cognitive abilities (perception, memory, attention) from different perspectives (e.g., cognitive psychological approach, cognitive neuroscience approach). prereq: [Honors or grad] or [[jr or sr], [3011 or 3031 or 3051 or 3061]] or instr consent

PSY 5018H. Mathematical Models of Human Behavior. (; 3 cr. ; A-F only; Periodic Fall)
Mathematical models of complex human behavior, including individual/group decision making, information processing, learning, perception, and overt action. Specific computational techniques drawn from decision theory, information theory, probability theory, machine learning, and elements of data analysis. prereq: Math 1271 or instr consent

PSY 5031W. Perception. (WI; 3 cr. ; Student Option; Fall Odd Year)
Cognitive, computational, and neuroscience perspectives on visual perception. Topics include color vision, pattern vision, image formation in the eye, object recognition, reading, and impaired vision. prereq: 3031 or 3051 or instr consent

PSY 5036W. Computational Vision. (WI; 3 cr. ; Student Option; Fall Even Year)
Applications of psychology, neuroscience, computer science to design principles underlying visual perception, visual cognition, action. Compares biological/physical processing of images with respect to image formation, perceptual organization, object perception, recognition, navigation, motor control. prereq: [[3031 or 3051], [Math 1272 or equiv]] or instr consent

PSY 5037. Psychology of Hearing. (; 3 cr. ; Student Option; Periodic Fall)
Biological and physical aspects of hearing, auditory psychophysics, theories and models of hearing, perception of complex sounds including music and speech. Clinical/other applications. Prereq: Instructor permission

PSY 5038W. Introduction to Neural Networks. (WI; 3 cr. ; Student Option; Fall Odd Year)
Parallel distributed processing models in neural/cognitive science. Linear models, Hebbian rules, self-organization, non-linear networks, optimization, representation of information. Applications to sensory processing, perception, learning, memory. prereq: [[3061 or NSC 3102], [MATH 1282 or 2243]] or instr consent

PSY 5052. Psychology of Attention. (3 cr. ; A-F only; Fall Odd Year)
Is attention needed for perception? Are we more likely to attend to locations associated with reward? Does brain training work? Are attention deficits at the root of autism spectrum disorders? This course will introduce students to advanced topics in the psychology of attention. It will combine didactic lecturing, instructor-led discussions, and student-led discussions on core topics of attention and its neural substrates. Students will acquire familiarity with theories, phenomena, and experimental paradigms of attention. prereq: Psy 3051 or equivalent

PSY 5054. Psychology of Language. (; 3 cr. ; Student Option; Every Fall)
Theories/experimental evidence in past/present conceptions of psychology of language. prereq: Grad or [[jr or sr], [3011 or 3031 or 3051 or 3061]] or instr consent

PSY 5062. Cognitive Neuropsychology. (; 3 cr. ; Student Option; Every Fall)
Consequences of different types of brain damage on human perception/cognition. Neural mechanisms of normal perceptual/cognitive functions. Vision/attention disorders, split brain, language deficits, memory disorders, central planning deficits. Emphasizes function/phenomenology. Minimal amount of brain anatomy. prereq: Grad or [[jr or sr], [3011 or 3031 or 3051 or 3061]] or instr consent

PSY 5063. Introduction to Functional MRI. (; 3 cr. ; A-F only; Every Fall)
How to understand and perform a brain imaging experiment. Theory and practice of functional MRI experimental design, execution, and data analysis. Students develop experimental materials/acquire and analyze their own functional MRI data. Lectures/lab exercises. prereq: Jr or sr or grad or instr consent

PSY 5064. Brain and Emotion. (; 3 cr. ; A-F or Audit; Spring Odd Year)
Introduction to affective neuroscience. How brain promotes emotional/motivated behavior in animals/humans. Biological theories of emotion in historical/current theoretical contexts. Fundamental brain motivational systems, including fear, pleasure, attachment, stress, and regulation of motivated behavior. Implications for emotional development, vulnerability to psychiatric disorders. prereq: 3061 or 5061 or instr consent

PSY 5065. Functional Imaging: Hands-on Training. (; 3 cr. ; Student Option; Every Spring)

Basic neuroimaging techniques/functional magnetic resonance imaging (fMRI). First half of semester covers basic physical principles. Second half students design/execute fMRI experiment on Siemens 3 Tesla scanner. prereq: [3801 or equiv], [3061 or NSCI 3101], instr consent

PSY 5066. Neuroscience, Philosophy and Ethics. (3 cr. ; Student Option; Every Spring)
Neuroscience increasingly allows us to explain the human experience in terms of mechanistic, electrochemical processes. The current course explores philosophical issues sparked by these developments in two modules. The first module examines the ways in which human neuroscience may shed new light on age-long philosophical quagmires such as mind-body dualism, free-will, and consciousness. For example, will neuroscience solve the mind-body problem by providing a wholly physical account of human nature? Is the neural view of decision making as a logical consequence of brain states incompatible with free-will? Can all of conscious experience (qualia) be reduced to neurobiology? The second module turns to neuro-ethical questions regarding the potential benefits and harms neuroscience might bring to the moral fabric of society.

PSY 5101H. Honors: Personality: Current Theory and Research. (; 3 cr. ; A-F only; Spring Odd Year)
Current theory and research on personality functioning and personality structure. Descriptive, biological, evolutionary, cognitive, developmental, cultural, and narrative perspectives on personality. prereq: Honors Psychology major OR Psychology PhD student

PSY 5135. Psychology of Individual Differences. (; 3 cr. ; Student Option; Periodic Spring)
Differential methods in study of human behavior. Psychological traits. Influence of age, sex, heredity, and environment in individual/group differences in ability, personality, interests, and social attitudes. prereq: [3001W or equiv] or [5862 or equiv] or instr consent

PSY 5136. Human Abilities. (; 3 cr. ; Student Option; Every Spring)
Theory, methods, and applications of research in human abilities. Intelligence, aptitude, achievement, specific abilities, information processing/learning and intelligence, aptitude/treatment interactions, and quantitative measurement issues. prereq: [3001W or 3001V], [3135 or 5135], [5862 or equiv] or instr consent

PSY 5137. Introduction to Behavioral Genetics. (; 3 cr. ; Student Option; Every Fall)
Genetic methods for studying human/animal behavior. Emphasizes nature/origin of individual differences in behavior. Twin and adoption methods. Cytogenetics, molecular genetics, linkage/association studies. prereq: 3001W or equiv or instr consent

PSY 5202. Attitudes and Social Behavior. (; 3 cr. ; Student Option; Periodic Spring)
Theory/research on social psychology of beliefs/attitudes. Persuasion principles. prereq: 3201 or instr consent

PSY 5204. Psychology of Interpersonal Relationships. (; 3 cr. ; A-F only; Periodic Fall)
Introduction to interpersonal relationship theory/research findings. prereq: Honors or grad student or instr consent

PSY 5205. Applied Social Psychology. (; 3 cr. ; Student Option; Spring Odd Year)
Applications of social psychology research/theory to domains such as physical/mental health, education, the media, desegregation, the legal system, energy conservation, public policy. prereq: 3201 or grad student or instr consent

PSY 5206. Social Psychology and Health Behavior. (3 cr. ; A-F only; Spring Odd Year)
Survey of social psychological theory/research regarding the processes that shape people's beliefs about health and how these beliefs affect and are affected by their health behavior. Consideration of how theory and evidence regarding these processes informs the development and testing of intervention strategies to promote health behavior change. Prerequisite: Psy 3201

PSY 5207. Personality and Social Behavior. (; 3 cr. ; A-F or Audit; Every Fall)
Conceptual/methodological strategies for scientific study of individuals and their social worlds. Applications of theory/research to issues of self, identity, and social interaction. prereq: 3101 or 3201 or honors or grad student or instr consent

PSY 5501. Self, Society and Health - What's Work Got To Do With It?. (; 3 cr. ; Student Option; Every Spring)
Survey of history, concepts, theories, methods, and findings of vocational/occupational health psychology. Burnout, personality, violence, stressors/stress-relations, counter productive behaviors, coping in workplace. Vocational development/assessment, career decision-making/counseling, person-environment fit. prereq: 3001W or equiv or instr consent

PSY 5701. Employee Selection and Staffing. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Application of psychological research/theory to issues in personnel recruitment/selection and to measurement of job performance. Applying principles of individual differences, psychological measurement to decision making in organizations (recruitment, selection, performance appraisal). Prerequisite: Psy 3001W, Psy 3711 or Instructor Permission

PSY 5703. Psychology of Organizational Training and Development. (; 3 cr. ; Student Option; Every Fall)
Theories, methods, research, and practice of improving performance of individuals at work through adult learning and instruction, including needs analysis, learning philosophy, models of program and instructional design, theory of knowledge and training transfer, learning analytics, and training evaluation. Prerequisites: PSY 3801 or equivalent

PSY 5708. Organizational Psychology. (; 3 cr. ; Student Option; Every Spring)
Psychological causes of behavior in work organizations. Consequences for individual fulfillment and organizational effectiveness. Individual differences, social perception, motivation, stress, job design, leadership, job satisfaction, teamwork, organizational culture. Prereq: Psy 3001W or 3001V and 3711 OR Psy grad

PSY 5862. Psychological Measurement: Theory and Methods. (; 3 cr. ; Student Option; Every Fall)
Types of measurements (tests, scales, inventories) and their construction. Theory/measurement of reliability/validity. prereq: 3801H or MATH 1271 or grad student

PSY 5865. Advanced Measurement: Theory and Application. (; 3 cr. ; Student Option; Spring Odd Year)
Topics in test theory. Classical reliability/validity theory/methods, generalizability theory. Linking, scaling, equating. Item response theory, methods for dichotomous/polytomous responses. Comparisons between classical, item response theory methods in instrument construction. prereq: 5862 or instr consent

PSY 5960. Topics in Psychology. (; 1-4 cr. [max 8 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Special course or seminar. Topics listed in Class Schedule. prereq: PSY 1001, [jr or sr or grad student]

PSY 5993. Research Laboratory in Psychology. (; 3 cr. [max 18 cr.] ; Student Option; Every Fall & Spring)
Laboratory instruction and seminars in faculty research areas. prereq: instr consent, dept consent

PSY 8004. Philosophical Psychology. (; 3 cr. ; S-N or Audit; Periodic Spring)
Selected philosophical/methodological problems. prereq: Grad student or instr consent

PSY 8010. Advanced Topics in Learning. (; 3 cr. [max 12 cr.] ; S-N or Audit; Periodic Spring)
Contemporary topics in learning and behavior theory. prereq: 5012 or instr consent

PSY 8026. Neuro-Immune Interactions. (; 3 cr. ; Student Option; Periodic Fall)
Regulatory systems (neuroendocrine, cytokine, and autonomic nervous systems) linking brain and immune systems in brain-immune axis. Functional effects of bidirectional brain-immune regulation. prereq: MicB 4131 or equiv, NSc 5111 or equiv

PSY 8031. Seminar: Visual Perception. (; 2 cr. [max 3 cr.] ; Student Option; Every Fall & Spring)
Cognitive, psychological, neurophysiological determinants of visual perception. Current research. prereq: 5031 or instr consent

PSY 8036. Topics in Computational Vision. (; 3 cr. [max 12 cr.] ; Student Option; Every Spring)
Recent research in visual psychophysics, visual neuroscience, and computer vision. prereq: 5031 or 5036 or equiv or instr consent

PSY 8037. Psychophysics and Audition. (; 3 cr. ; Student Option; Periodic Spring)

Modern/classical psychophysics. Psychophysical/physiological correlates of audition. Theories of hearing. prereq: instr consent

PSY 8041. Proseminar in Perception. (; 3 cr. ; A-F or Audit; Fall Odd Year)
Seminar. Advanced topics in auditory and visual perception. Lecture, discussion, and student-led presentations of research papers on core topics of the peripheral visual and auditory systems, cortical representations, behavioral and brain-imaging methods, and computational approaches to understanding/ simulating perception. prereq: Psy grad student or instr consent

PSY 8042. Proseminar in Cognition, Brain, and Behavior. (; 3 cr. ; A-F or Audit; Fall Even Year)
Advanced topics in cognition, brain, and behavior. Lecture, discussion, and student-led presentations of research papers on core topics of attention, memory, emotion, categorization, thinking, and language, and intersections between these areas. prereq: Psy grad student or instr consent

PSY 8055. Seminar: Cognitive Neuroscience. (; 3 cr. ; Student Option; Spring Odd Year)
Recent advances in analysis of neural bases of cognitive functions. prereq: 5015 or instr consent

PSY 8056. Seminar: Psychology of Language. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Selected topics in psycholinguistics. prereq: Grad psych major or instr consent

PSY 8061. Neuropsychopharmacology. (; 3 cr. ; A-F or Audit; Fall Even Year)
Relationships between biochemical, neurophysiological, psychological, and behavioral effects of drugs. Research in neuropharmacology, behavioral pharmacology, and pharmacology of addiction. prereq: 5xxx coursework in biological psych or neuroscience or pharmacology or instr consent

PSY 8070. Seminar: Psychopharmacology. (; 1-3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Basic issues, contemporary research. Lectures, student presentations. prereq: instr consent

PSY 8101. NSF Graduate Fellowship Proposal Writing Seminar. (1 cr. ; S-N only; Every Fall)
The primary purpose of this course is to prepare students to submit a competitive NSF Graduate Research Fellowship proposal. Students submitting to other organizations are welcome to join the course, but all of the assignments and focus will be on increasing NSF and predoctoral fellowship competitiveness. This course is intended primarily for doctoral students in their first or second year of study.

PSY 8201. Social Cognition. (; 3 cr. ; A-F or Audit; Periodic Fall)
Social psychological theory/research on social inference and reasoning processes. Psychology of prejudice/stereotyping. prereq: Psych PhD candidate

PSY 8202. Close Relationships. (; 3 cr. ; Student Option; Periodic Spring)
Classic/contemporary theory/research on close relationships. Emphasizes romantic relationships. prereq: 5204 or instr consent

PSY 8203. Impression Management. (; 3 cr. ; Student Option; Periodic Fall)
Classic and contemporary theory and research concerning interpersonal strategies of impression management and interplay between private and public self. prereq: Grad psych major; 8208 recommended; instr consent

PSY 8204. Social Psychology of Prejudice and Intergroup Relations. (; 3 cr. ; A-F or Audit; Periodic Fall)
Approaches, findings, and controversies in research on social psychology of prejudice, racial attitudes, and intergroup relations. Focuses on approaches based in social psychology and on related work from political science and sociology.

PSY 8205. Principles of Social Psychology. (; 3 cr. [max 15 cr.] ; Student Option; Every Fall)
Contemporary theoretical positions and related research. prereq: Psy PhD student

PSY 8206. Proseminar in Social Psychology. (; 1 cr. [max 5 cr.] ; S-N only; Every Spring)
Current research topics in social psychology. prereq: [PSY 8205, Social Psych PhD student] or instr consent

PSY 8208. Social Psychology: The Self. (; 3 cr. ; A-F only; Every Spring)
Social psychological theory and research concerning the self and social behavior. prereq: Psych background especially in personality and soc psych

PSY 8209. Research Methods in Social Psychology. (; 3 cr. ; A-F only; Fall Odd Year)
Experimental/quasi-experimental methods for research in social psychology. Statistical, interpretive, operational, and ethical issues. prereq: Psych PhD student

PSY 8210. Law, Race, and Social Psychology. (; 3 cr. ; A-F only; Periodic Fall)
Interdisciplinary seminar. Scientific foundations for and legal implications of implicit (vs explicit) racial or gender bias in four socio-legal domains: criminal law, affirmative action, employment discrimination, and legislative redistricting. prereq: 2nd or 3rd yr law student or PhD student in social science doctoral program

PSY 8211. Proseminar in Political Psychology I. (; 2 cr. ; S-N or Audit; Periodic Fall & Spring)
Readings, discussion, and guest speakers. Topics vary each semester.

PSY 8212. Proseminar in Political Psychology II. (; 2 cr. ; S-N or Audit; Periodic Fall & Spring)
Readings, discussion, and guest speakers. Topics vary each semester.

PSY 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

PSY 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

PSY 8501. Counseling Psychology: History and Theories. (; 3 cr. ; Student Option; Every Fall)
Introduction to history of counseling psychology and to primary theoretical orientations used by counseling psychologists. For each theory: basic principles, application to counseling practice, and research support. prereq: Counseling psych grad student or instr consent

PSY 8502. Assessment in Counseling Psychology. (; 3 cr. ; Student Option; Periodic Fall)
Principles and practice. Emphasizes psychometric assessment. History, foundations in measurement, basic methods, survey of instruments, test interpretation evaluation, ethics. prereq: Counseling psych grad student or instr consent

PSY 8503. Interviewing and Intervention. (; 3 cr. ; Student Option; Every Fall)
Skills-based course: conceptualization of counseling process, stages of counseling, development of counseling skills, and strategies for behavior change. prereq: Counseling Psy grad student or instr consent

PSY 8510. Counseling Psychology Beginning Practicum: General. (; 1-6 cr. ; S-N only; Every Fall)
Beginning applied experiences in counseling psychology settings. prereq: Counseling Psy grad student

PSY 8511. Counseling Psychology Beginning Practicum: General. (; 1-6 cr. [max 18 cr.] ; S-N only; Every Spring)
Beginning applied experiences in counseling psychology settings. prereq: Counseling Psy grad student

PSY 8512. Counseling Psychology Beginning Practicum: General. (; 1-6 cr. [max 18 cr.] ; S-N only; Every Summer)
Beginning applied experiences in counseling psychology settings. prereq: Counseling Psy grad student

PSY 8514. University Counseling Practicum I. (; 4-6 cr. ; S-N only; Every Fall)
Integrates science with supervised practice in University Counseling and Consulting Services (UCCS) involving career, academic, and personal counseling clientele. prereq: Counseling Psy grad student, instr consent

PSY 8515. University Counseling Practicum II. (; 4-6 cr. ; S-N only; Every Spring)
Integrates science with supervised practice in University Counseling and Consulting Services (UCCS) involving career, academic, and personal counseling clientele. prereq: Counseling Psy grad student

PSY 8541. Multicultural Psychology. (; 3 cr. ; Student Option; Spring Odd Year)

Approaches, findings, and controversies in research on psychology of ethnic/racial minorities and other cultural populations. Emphasizes counseling/community applications of theory/research. Lecture, discussion, lab. prereq: instr consent

PSY 8544. Vocational and Occupational Health Psychology Research. (; 3 cr. ; Student Option; Spring Odd Year)
Research problems specific to special populations, vocational research, assessment/testing, findings in these areas useful to counseling psychology practice. prereq: [[8501, 8502, 8503] or equiv], counseling psych grad student, instr consent

PSY 8545. Counseling Psychology Process and Outcome Research. (; 3 cr. ; Student Option; Spring Even Year)
Research methods, empirically-supported interventions, assessing treatment outcomes in practice, research on the counseling process, applying counseling research in counseling practice and in non-counseling contexts in the "real world." Ethics and standards of research, history of counseling process and outcome research. prereq: [[8501, 8502, 8503] or equiv], counseling psy grad student, instr consent

PSY 8560. Counseling Psychology Advanced Practicum I: General. (1-3 cr. ; S-N only; Every Fall)
Applied practice experience in counseling psychology settings and seminars. May include guest speakers, readings, and student presentations. prereq: Counseling psy grad student, instr consent

PSY 8561. Counseling Psychology Advanced Practicum II: General. (1-3 cr. ; S-N only; Every Spring)
Applied practice experience in counseling psychology settings and seminar that may include guest speakers, readings, and student presentations on topics relevant to clients and settings of practice experiences. prereq: Counseling psy grad student, instr consent

PSY 8562. Counseling Psychology Advanced Practicum III: General. (1-3 cr. ; S-N only; Every Summer)
Applied practice experience in counseling psychology settings and seminar that may include guest speakers, readings, and students presentations on topics relevant to clients and settings of practice experiences. prereq: Counseling psy grad student, instr consent

PSY 8565. Counseling Psychology Advanced Practicum I: Career Counseling and Assessment Clinic. (; 1-6 cr. ; S-N only; Every Fall)
Applied practice experience in vocational assessment clinic of Department of Psychology. Career/vocational testing, assessment, decision making. prereq: Counseling psy grad student, instr consent

PSY 8566. Counseling Psychology Advanced Practicum II: Career Counseling and Assessment Clinic. (; 1-6 cr. ; S-N only; Every Spring)
Applied practice experience in Vocational Assessment Clinic of Department of Psychology. Career/vocational testing, assessment, decision making. prereq: Counseling psy grad student, instr consent

PSY 8567. Counseling Psychology Advanced Practicum III: Career Counseling and Assessment Clinic. (; 1-6 cr. ; S-N only; Every Summer)
Applied practice experience in Vocational Assessment Clinic of Department of Psychology. Career and vocational testing, assessment, and decision making. prereq: Counseling psy grad student, instr consent

PSY 8570. Counseling Psychology Internship I. (; 1-12 cr. [max 36 cr.] ; S-N only; Every Fall)
First part of counseling psychology internship. prereq: Counseling psy PhD candidate, instr consent

PSY 8571. Counseling Psychology Internship II. (; 1-12 cr. [max 36 cr.] ; S-N only; Every Spring)
Second part of counseling psychology internship. prereq: Counseling psy PhD candidate, instr consent

PSY 8572. Counseling Psychology Internship III. (; 1-12 cr. [max 36 cr.] ; S-N only; Every Summer)
Third part of counseling psychology internship. prereq: Counseling psy PhD candidate, instr consent

PSY 8601. Contemporary Directions in Clinical Psychology Research Seminar Series. (1 cr. ; Student Option; Every Fall)
The central goal of this series is to provide incoming clinical students broad exposure to clinical science methodologies used by CSPR faculty and affiliated scientists in the U of MN community. Each week, faculty will provide an hour long, formal presentation of their research program, emphasizing employed research design and methods. Students will be assigned 1-2 readings relevant to the presentation of the week. Students are encouraged to meet with faculty presenters further to follow-up on specific research methods of interest. This seminar lays the foundation for more in-depth methodological training, in lab-specific areas, to be completed during the Research Laboratories in Psychology course (Psy 5993). prereq: PhD student in Clinical Psychology

PSY 8602. Psychopathology & Personality. (3 cr. ; A-F or Audit; Every Fall)
Psychopathology and Personality. Theory/research. Evaluation of current experimentation in various behavior disorders. prereq: Clinical psych grad student, instr consent

PSY 8603. Clinical Seminar Series: Contemporary Directions In Clinical Psychology Research. (1 cr. ; A-F only; Every Fall)
The central goal of this series is to provide incoming clinical students broad exposure to clinical science methodologies used by CSPR faculty and affiliated scientists in the U of MN community. Each week, faculty will provide an hour long, formal presentation of their research program, emphasizing employed research design and methods. Students will be assigned 1-2 readings relevant to the presentation of the week. Students are encouraged to meet with faculty presenters further to follow-up on specific research methods of interest. This seminar lays the foundation for more in depth methodological training, in lab-specific areas, to be completed during the Research Laboratories in Psychology course (Psy 5993). Additional goals of the seminar include: (a) exposing students to the work of potential mentors, committee members, and/or consultants; (b) prompting students to think through the methodological aspects of their first year project; and (c) providing opportunities to hear from faculty on issues related to career development, work-life balance, and the importance of lifelong learning.

PSY 8614. Intellectual and Neuropsychological Assessment. (3 cr. ; A-F or Audit; Every Fall)
Fundamentals of intellectual and neuropsychological assessment including principles of measurement including reliability, validity, and sources of error in psychological assessment. prereq: Clinical psych grad student

PSY 8615. Professional Methods in Applied Assessment I: Intellectual & Neuropsychological Functioning. (3 cr. ; A-F or Audit; Every Fall)
Theory/practice in clinical application of assessment techniques/interviewing. Lab observations, administration, scoring, interpretation. prereq: Clinical psych grad student

PSY 8616. Applied Assessment II, Personality and Psychopathology. (3 cr. [max 5 cr.] ; A-F or Audit; Every Spring)
Theory/practice in clinical application of assessment techniques/interviewing. Lab observations, administration, scoring, interpretation. prereq: 8611/8615, clinical psych grad student

PSY 8617. Ethical and Equitable Decisions in Clinical Science and Counseling Psychology. (3 cr. ; A-F only; Every Fall)
Ethical principles/codes of conduct for psychologists. Ethical dilemmas faced by researchers, practitioners, teachers. prereq: Counseling or clinical psych grad student or instr consent

PSY 8618. Current Issues in Equity And Inclusion for Clinical Science and Counseling Psychology. (1 cr. [max 5 cr.] ; S-N only; Every Fall)
This elective discussion group meets with the Psy 8617 class biweekly to discuss the latest research and thought papers relevant to inclusion, diversity, equity and accessibility in clinical science and counseling psychology. The readings change every semester offered and so this course may be taken multiple times. The course will cover current scholarship on topics such as race, ethnicity and immigrant status, biological sex and gender identity, sexual orientation, socio-economic status & class, and belief and religion.

PSY 8619. Foundations in Therapeutic Intervention Applying Theory to Clinical Practice. (3 cr. ; A-F or Audit; Every Fall)

Professional methods in clinical psychology. Individual and group treatment techniques. Lectures and demonstrations of contemporary theories of methods of intervention with adults and or children. prereq: Clinical psych grad student

PSY 8620. Clinical Practicum: Consultation, Supervision, Professional Standards, and Lifelong Learning. (1-6 cr. [max 36 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Field experience in professional work in clinical settings. prereq: instr consent

PSY 8622. Theories and Methods of Effective Intervention. (3 cr. ; A-F or Audit; Spring Even Year)
Methodological issues in treatment research, theories of change/motivation. Empirically supported therapies for anxiety, mood, personality disorders, psychosis, addiction. Simulating therapeutic interactions to prepare students to provide therapy. prereq: 8111, CSPR grad student

PSY 8664. Personality Assessment. (; 3 cr. ; Student Option; Spring Even Year)
Concepts/issues concerning individual differences in personality and their assessment; content, reality, and significance of personality traits; classification of personality traits; major approaches to measurement of personality. prereq: Psy grad student or instr consent

PSY 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

PSY 8701. Seminar in Industrial and Organizational Psychology I. (; 3 cr. ; A-F or Audit; Periodic Fall)
Application of research and theory in psychological measurement and individual differences to problems in job analysis, personnel selection and classification, performance assessment, and individual training. prereq: instr consent

PSY 8702. Seminar in Industrial and Organizational Psychology II. (; 3 cr. ; A-F or Audit; Periodic Fall)
Determinants of behavior, performance, job satisfaction that can be influenced after an individual enters an organization. Application of research/theory in attitudes, motivation, leadership, group/team dynamics, and job design to enhancement of job performance/ satisfaction. prereq: instr consent

PSY 8703. Seminar in Industrial and Organizational Psychology III. (; 3 cr. ; A-F or Audit; Periodic Spring)
Developing issues/trends in current research, research methodological advances, and implementation practices. Recent important/ controversial developments. prereq: instr consent

PSY 8704. Research Methods in IO Psychology. (3 cr. ; Student Option; Periodic Fall & Spring)
Psy 8704 will introduce students to the best research practices in Industrial-Organizational Psychology. Prerequisite: Instructor Consent.

PSY 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

PSY 8814. Analysis of Psychological Data. (; 4 cr. ; Student Option; Every Fall)
Data-analytic procedures used in psychological research. Types of variables used in psychological research. Data collection designs, their limitations. Procedures for analyzing experimental/non-experimental data, both univariate and multivariate. Emphasizes selection of data-analytic procedures. Procedures and their assumptions. Computation using statistical software. Limitations, interpretation. Lecture, lab. prereq: Undergrad course in statistics, grad student in psychology, instr consent

PSY 8815. Analysis of Psychological Data. (; 4 cr. ; Student Option; Every Spring)
Data-analytic procedures used in psychological research. Types of variables used in psychological research. Data collection designs, their limitations. Procedures for analyzing experimental/non-experimental data, both univariate and multivariate. Emphasizes selection of data-analytic procedures. Procedures and their assumptions. Computation using statistical software. Limitations, interpretation. Lecture, lab. prereq: 8814, instr consent

PSY 8881. Seminar: Quantitative and Psychometric Methods. (; 3 cr. [max 15 cr.] ; Student Option; Every Fall)
Reviews individual research on current topics in psychological measurement.

PSY 8882. Seminar: Quantitative and Psychometric Methods. (3 cr. [max 15 cr.] ; Student Option; Every Spring)
Reviews, individual research on current topics in psychological measurement.

PSY 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

PSY 8901. Psychology Research and Professional Development Workshop. (1 cr. [max 6 cr.] ; S-N only; Periodic Fall & Spring)
The purpose of this workshop course is threefold: 1) to provide students an opportunity to present their work and receive feedback, 2) for students to learn how to provide constructive feedback; that is, to be both critical and supportive of their colleagues work, and 3) to discuss a variety of professional development issues that are relevant to students and their future careers. Prerequisite: Graduate Student in Psychology

PSY 8935. Readings in Behavioral Genetics and Individual Differences Psychology. (; 1 cr. [max 10 cr.] ; S-N or Audit; Every Fall & Spring)
Each week participants read and discuss one or two primary research articles. prereq: 5135, 5137 or instr consent

PSY 8937. Seminar in Human Behavioral Genetics. (; 3 cr. [max 9 cr.] ; Student Option; Every Spring)
Advanced topics vary with each offering. Sample topics: gene identification in complex human traits, behavioral genetics of alcoholism, twin-family methodology. prereq: 5137 or instr consent

PSY 8960. Graduate Seminar in Psychology. (; 1-4 cr. [max 36 cr.] ; Student Option; Every Fall & Spring)
Graduate seminar in subject of current interest in psychology. prereq: Psychology grad student or instr consent

PSY 8993. Directed Studies: Special Areas of Psychology and Related Sciences. (; 1-6 cr. [max 36 cr.] ; Student Option; Every Fall & Spring)
Special area of psychology or a related science. prereq: instr consent

Public Affairs (PA)

PA 5002. Introduction to Policy Analysis. (1.5 cr. ; A-F or Audit; Every Fall & Spring)
Process of public policy analysis from problem structuring to communication of findings. Commonly used analytical methods. Alternative models of analytical problem resolution.

PA 5003. Introduction to Financial Analysis and Management. (1.5 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Finance/accounting concepts/tools in public/ nonprofit organizations. Fund accounting. Balance sheet/income statement analysis. Cash flow analysis. Public/nonprofit sector budgeting processes. Lectures, discussions. Cases. prereq: Public policy major/minor or major in development practice, public affairs or liberal studies or grad nonprofit mgmt cert or instr consent

PA 5004. Introduction to Planning. (3 cr. ; A-F or Audit; Every Fall)
History/institutional development of urban planning as profession. Intellectual foundations, planning theory. Roles of urban planners in U.S./international settings. Scope, legitimacy, limitations of planning/planning process. Issues in planning ethics/settings of diverse populations/stakeholders. prereq: Major/minor in urban/regional planning or instr consent

PA 5011. Management of Organizations. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Challenges facing higher-level managers in public and nonprofit organizations in mixed economy and democratic republic. Distinctive features of public and nonprofit management, skills necessary for effective management, manager's role as creator of public value. Lectures, case discussions.

PA 5012. The Politics of Public Affairs. (; 3 cr. ; A-F or Audit; Every Fall & Spring)

Politics is how we make collective decisions about matters of shared consequence. This course examines politics and introduces students to key concepts and skills needed for effective political analysis. The central themes of the course focus on power; institutions and organizations; discourse; and citizenship.

PA 5013. Law and Urban Land Use. (1.5 cr. ; A-F or Audit; Every Fall)
Role of law in regulating/shaping urban development, land use, environmental quality, local/regional governmental services. Interface between public/private sector. prereq: Major or minor in urban/regional planning or instr consent

PA 5021. Microeconomics for Policy Analysis. (3 cr. ; A-F or Audit; Every Fall)
Introduction to tools useful for public policy. Intermediate microeconomics.

PA 5022. Applications of Economics for Policy Analysis. (; 1.5-3 cr. [max 9 cr.] ; A-F or Audit; Every Spring)
Application of economic reasoning to a wide range of contemporary public policy issues. The following topically-focused courses also fulfill the MPP economics requirement: PA 5431: Public Policies on Work and Pay, PA 5503: Economics of Development, PA 5521: Development Planning and Policy Analysis, PA 5722: Economics of Natural Resource and Environmental Policy, and PA 5805: Global Economics. prereq: 5021 or equiv

PA 5023. Stratification Economics and Public Policy. (2 cr. ; Student Option No Audit; Every Spring)
Stratification economics differs from conventional neoclassical economics and its related offspring of behavioral economics because it does not assume that the nature of inequality arises solely via rational choices made in competitive markets. Rather, it posits structural and historical processes that impede the ability of marginalized groups to gain access to markets. One of the key insights from stratification economics is that conventional policy mechanisms (e.g. deterrence policies in the criminal justice system) don?t work because they fail to take account of the legacy of inequality (e.g. convict lease systems and vagrancy laws). The arguments in favor of reparations, baby bonds, universal health care can be viewed and examined using the methods and techniques of stratification economics. This course introduces students to some new methodologies that complement their training in conventional economic analysis. Topics: ? A review of conventional microeconomic approaches to policy analysis, including the core assumptions and key conclusions ? Summary and critique of the conventional microeconomic approach ? The historical backdrop to the evolution of ?identity economics? and stratification economics for understanding racial disparities ? Core assumptions of stratification economics ? Applications: Housing markets and residential segregation; racial profiling; discrimination in labor markets. ? Policy proposals based on stratification economics ? reparations, baby bonds, universal income and health payments. Advanced undergraduate students may register with permission of the instructor.

PA 5031. Statistics for Public Affairs. (4 cr. ; A-F or Audit; Every Fall)
Basic statistical tools for empirical analysis of public policy alternatives. Frequency distributions, descriptive statistics, elementary probability/probability distributions, statistical inference. Estimation/hypothesis testing. Cross-tabulation/chi-square distribution. Analysis of variance, correlation. Simple/ multiple regression analysis.

PA 5032. Applied Regression. (2 cr. ; A-F or Audit; Every Spring)
Bivariate/multivariate models of regression analysis, assumptions behind them. Problems using these models when such assumptions are not met.

PA 5033. Multivariate Techniques. (2 cr. ; A-F or Audit; Every Spring)
Use of bivariate and multivariate statistical approaches for analyzing and evaluating public affairs issues and the assumptions behind the analytical approaches. Designed to help students read, understand, interpret, use, and evaluate empirical work used in social sciences by policy analysts and policy makers. prereq: Students who register for PA 5033 must take PA 5044 and PA 5033 in the same semester. The same grade will be issued for PA 5044 and PA 5033 after PA 5033 is completed.

PA 5035. Survey Research and Data Collection. (1.5 cr. ; A-F only; Every Spring)
Introduction to survey research methods. Emphasizes applications to policy/applied research. Research design choices (e.g., descriptive, experimental, case studies), sampling, variable specification, measurement. Conducting interviews, self-administered questionnaires. Qualitative techniques.

PA 5041. Qualitative Methods for Policy Analysts. (4 cr. ; A-F only; Every Fall)
Qualitative analysis techniques, examples of application. Meet with researcher. Hands-on experience in designing, gathering, analyzing data.

PA 5042. Urban and Regional Economics. (2 cr. ; A-F only; Every Spring)
Evaluation of city existence/growth using economics. Economic forces in development of cities. Economic analysis of urban areas/ land market. Economic analysis of planning issues in land use, transportation, housing, environment. prereq: [Major or minor in urban and regional planning, microeconomics course] or instr consent

PA 5043. Economic and Demographic Data Analysis. (2 cr. ; A-F only; Every Spring)
Economic/demographic data analysis techniques for planning. Exposure to most important data sources. Conceptual understanding of range of methods/hands-on experience in applying these methods. prereq: Major or minor in urban/regional planning or instr consent

PA 5044. Applied Regression, Accelerated. (2 cr. ; A-F only; Every Spring)
Bivariate/multivariate models used in regression analysis, including assumptions behind them/problems that arise when assumptions are not met. Course covers similar topics as PA 5032 but delves deeper into theory/application of methods. prereq: Students who register for PA 5044 must take PA 5044 and PA 5033 in the same semester. The same grade will be issued for PA 5044 and PA 5033 after PA 5033 is completed.

PA 5045. Statistics for Public Affairs, Accelerated. (4 cr. ; A-F or Audit; Every Fall)
Introduces a range of quantitative tools that are commonly used to inform issues in public affairs. The course provides an introduction to descriptive statistics, probability, and statistical inference, with an emphasis on the ways in which quantitative tools are applied to a diverse range of practical policy questions. PA 5045 is an accelerated treatment of applied statistics for public affairs and serves as a more mathematically and conceptually rigorous alternative to PA 5031.

PA 5051. Leadership Foundations. (; 2 cr. ; A-F only; Every Fall)
Leadership concepts, tools, and strategies in a personal, community, and organizational context for mid-career students. prereq: Major in public affairs (cohort) or public affairs certificate (cohort); 5051-5052 must be taken in same academic yr

PA 5052. Public Affairs Leadership. (; 2 cr. ; A-F only; Every Spring)
Continues 5051. Leadership concepts, tools, and strategies in diverse settings for mid-career students. prereq: Major in public affairs (cohort) or public affairs certificate (cohort); 5051-5052 must be taken in same academic yr

PA 5053. Policy Analysis in Public Affairs. (; 2 cr. ; A-F only; Every Fall)
Process of public policy and program analysis, including problem formulation, program design and implementation. Opportunity to draw upon published research and conduct field-based research to understand implementation conditions. Professional communications, including writing of memos, requests for proposals, and implementation briefs, are stressed. prereq: Major in public affairs (cohort) or public affairs certificate (cohort); 5053-5054 must be taken in same academic yr

PA 5054. Program Design and Implementation Analysis. (; 2 cr. ; A-F only; Every Spring)
Continues 5053. Process of public policy and program analysis, including problem formulation, program design and implementation. Opportunity to draw upon published research and conduct field-based research to understand implementation conditions. Professional communications, including writing of memos, requests for proposals, and implementation briefs, are stressed. prereq: Major in public affairs (cohort) or public affairs certificate (cohort); 5053-5054 must be taken in same academic yr

PA 5055. Qualitative Research Methods and Analysis. (2 cr. ; A-F only; Every Fall)

Problem-based learning of analytical reasoning through social science research methods. Systematic review and literature review. Qualitative research including interviews, focus groups, and analysis. Research proposal. prereq: Major in public affairs or public affairs certificate, [5055-5056 must be taken in same academic yr]

PA 5056. Quantitative Research Methods and Analysis. (2 cr. ; A-F only; Every Spring)
Problem-based learning to analytical reasoning through social science research methods. Frequency distributions, descriptive statistics, elementary probability, statistical inference. Hypothesis testing. Cross-tabulation, analysis of variance, correlation. Simple regression analysis. prereq: Major in public affairs or public affairs certificate, [5055-5056 must be taken in same academic yr]

PA 5080. Capstone Preparation Workshop. (; 1 cr. ; S-N only; Every Fall, Spring & Summer)
Project management, qualitative research, and critical framework to complete Capstone course. Students write draft of client project group norms and client contract.

PA 5081. Understanding Power and Teamwork in Public Affairs Education. (0.5 cr. ; S-N only; Every Fall)
Power and teamwork in public affairs education.

PA 5101. Management and Governance of Nonprofit Organizations. (; 3 cr. ; Student Option; Every Fall)
Theories, concepts, and real world examples of managerial challenges. Governance systems, strategic management practices, effect of funding environments, management of multiple constituencies. Types of nonprofits using economic/behavioral approaches. prereq: Grad student or instr consent

PA 5103. Leadership and Change. (; 1.5-3 cr. ; Student Option; Periodic Spring)
Models of change/leadership. How leaders can promote personal, organizational, and societal change. Case studies, action research. Framework for leadership and change.

PA 5104. Strategic Human Resource Management. (; 3 cr. ; A-F or Audit; Every Fall)
Theory/practice of developing, utilizing, and aligning human resources to improve culture/ outcomes of nonprofit/public organizations. HR strategy, individual diversity, leadership, selection, training, compensation, classification, performance appraisal, future HR practices. prereq: Grad student or instr consent

PA 5105. Integrative Leadership: Leading Across Sectors to Address Grand Challenges. (; 3 cr. ; Student Option No Audit; Every Fall)
Are you interested in working across government, business, and the non-profit sector for public good? Are you wondering how you can create sustainable shared leadership on challenges that can best be addressed together? This course explores multi-sector leadership and related governance and management challenges from a variety of perspectives and provides an opportunity for students to work together to apply what they are learning individually and in teams through in-class exercises and a final team project. The course is taught by a team of interdisciplinary faculty and considers different contexts, forms, and specific examples of multisector leadership that can enable transformative action to tackle a significant societal issue and achieve lasting change. Credit will be not be granted if credit has been received for GCC 5023, OLPD 6402, PUBH 6702, MGMT 6402, PA 5130, LAW 6623.

PA 5108. Board leadership development. (; 1 cr. ; S-N only; Every Fall & Spring)
Nonprofit board governance. Governance models, roles/responsibilities, ethics/dynamics. Current research/concepts along with students' current board experiences to illuminate challenges/explore solutions that build board leadership competencies. prereq: Grad student or instr consent

PA 5113. State and Local Public Finance. (; 3 cr. ; Student Option; Every Spring)
Theory/practice of financing. Providing public services at state/local level of government. Emphasizes integrating theory/practice, applying materials to specific policy areas, and documenting wide range of institutional arrangements across/within the 50 states. prereq: Grad or instr consent

PA 5114. Budget Analysis in Public and Nonprofit Orgs. (1.5 cr. [max 3 cr.] ; Student Option; Every Spring)
Techniques, terminology, concepts and skills for developing and analyzing operating and capital budgets in public and nonprofit organizations. Budget analysis using case studies, problem sets, and spreadsheets. Time value of money, cost-benefit analysis, break-even analysis, sensitivity analysis, and fiscal analysis. prereq: PA 5003

PA 5116. Financing Public and Nonprofit Organizations. (1.5 cr. ; Student Option; Every Spring)
Financial resource management for public and nonprofit organizations. Short-term and long-term debt management, retirement financing, and endowment investing. Conceptual frameworks and analytical techniques applied to real-world problems. Financial management in context of national and regional economies. prereq: PA 5003; credit will not be granted if credit already received for: PA 5111

PA 5122. Law and Public Affairs. (; 3 cr. ; Student Option; Every Spring)
Overview of evolution of American legal system. Role of courts, legislatures, and political actors in changing law. How law is used to change public policy. prereq: Grad or instr consent

PA 5123. Philanthropy in America: History, Practice, and Trends. (; 1.5-3 cr. ; Student Option; Every Spring)
Theory/practice of philanthropy. Foundation/ corporate/ individual giving. History/economic structure/dynamics. Models of philanthropy, components of grant making/seeking. Current debates, career options.

PA 5135. Managing Conflict: Negotiation. (; 3 cr. ; A-F only; Every Fall)
This course teaches the theory and the practice of negotiation strategies with an emphasis on applied, personal skill building constructed on a foundation of research and practice in the field. Students will apply their negotiation skills across interpersonal, public dispute, government, and private sector settings. The course focuses on developing students? personal theory of practice for decision-making, effective communication and impactful leadership through practice of distributive bargaining, value creation, consensus building, facilitation, and mediation exercises and discussions.

PA 5136. Group Process Facilitation for Organizational and Public/Community Engagement. (1 cr. ; Student Option No Audit; Every Summer)
Group process facilitation components, theories, tools, techniques. Facilitator?s role in group goals and processes. Facilitation in public policy. Cross-cultural challenges. Topics may include meeting management, group decision-making, conflict, participatory leadership, and other tools.

PA 5137. Project Management in the Public Arena. (1.5 cr. [max 3 cr.] ; Student Option No Audit; Every Spring)
Project management and leadership strategies for implementing public policy, including new or revised government programs, public works, and regulations. Use of project management concepts, principles, and tools, including project definition, scoping, planning, scheduling (using the critical path method), budgeting, monitoring, staffing, and managing project teams. Application of "agile" and "extreme" project management in situations of complexity and uncertainty, including those due to the scrutiny and expectations of elected officials, the media, citizens, and other stakeholders.

PA 5144. Social Entrepreneurship. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Introduction to field of social entrepreneurship. Prepares current/future managers/leaders to create, develop, lead socially entrepreneurial organizations/initiatives. prereq: Grad student or instr consent

PA 5145. Civic Participation in Public Affairs. (; 3 cr. ; A-F only; Every Spring)
Critique/learn various approaches to civic participation in defining/addressing public issues. Readings, cases, classroom discussion, facilitating/experiencing engagement techniques. Examine work of practitioner, design engagement process.

PA 5151. Organizational Perspectives on Global Development & Humanitarian Assistance. (3 cr. ; A-F only; Every Fall)
Organizational analysis of international development and humanitarian assistance, including perspectives from sociology, political science, psychology, public administration, and management. Examines efforts of multiple

organizational players, including NGOs, governments, bi-lateral and multi-lateral organizations, corporations, foundations, and international organizations. Critical analysis of aid organizations, especially regarding ways in which they reflect and create power and privilege, the manner in which individuals? needs and desires interact with, support, or challenge the needs of the organization, and how all of this is influenced by forces outside the boundary of the organization. Students practice developing actionable recommendations to improve the effectiveness of international aid organizations in the context of multiple (and often contested) understandings of global development needs and conflicting stakeholder demands. Readings, class discussions, mini-lectures, simulations, case analyses, group projects, oral presentations, memo writing, opinion writing.

PA 5161. Redesigning Human Services. (; 3 cr. ; A-F or Audit; Every Fall)
This course provides an in-depth examination of the history and institutions delivering human services in the United States, with an emphasis on how human-centered design can help improve service provision and outcomes. It explores how public, nonprofit, and philanthropic structures create unique operational realities and cultures that must be navigated to lead change across institutional boundaries. It also systematically investigates contributors to disparities in the human services system, particularly race. The use of frameworks such as human-centered design, human services value curve, and an equity lens will help us on this exploration. Course learning materials take students through a design process to highlight strategies for systems change and improvement grounded in outcomes. Design processes are iterative and involve understanding and engaging the people and context in problem solving. Through project-based learning approach, students will understand the various constraints that need to be navigated in design: feasibility, viability, and desirability. Students gain experience using design to help appreciate these constraints and develop strategies for overcoming them.

PA 5162. Public Service Redesign Workshop. (; 3 cr. ; A-F only; Every Spring)
Public service delivery innovation and redesign in health and human services fields to improve outcomes. Study and application of theories of organizational development, leadership, and system change. Social system dynamics analysis. Engaging diverse stakeholders. Effects and influence of implicit bias on current and redesigned efforts. Models and tools for public service redesign.

PA 5190. Topics in Public and Nonprofit Leadership and Management. (; 1-3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Selected topics.

PA 5205. Statistics for Planning. (4 cr. ; A-F only; Every Fall)
Basic statistical tools for empirical analysis in urban and regional planning, including descriptive statistics, frequency distributions, elementary probability theory, research design and sampling, statistical inference, hypothesis testing, cross-tabulation/chi-square distribution, correlation, and simple/multiple regression analysis.

PA 5206. The City of White Supremacy. (3 cr. ; Student Option; Every Fall)
The title of this course is meant to signal the objective of scrutinizing how systems of white supremacy have shaped the American city and how the American city functions in ways that reproduce and reinforce white supremacy. The colonization of the Americas coincided with the fabrication of racial identities that set the terms for membership in what became a white supremacist/racial state wherein all things, including spatial thinking and design, conformed to a racial calculus. As Lipsitz (2007: 12) tells us, ?The lived experience of race has a spatial dimension, and the lived experience of space has a racial dimension.? The core of this class will, however, focus on later developments characteristic of the period of rapid urbanization from the Jim Crow era through the New Deal and Civil Rights periods to today. The first section of the course will focus on frameworks for understanding white supremacy generally, and as it relates to urban development specifically. The second section considers specific domains of urban policy and planning using white supremacy as the analytic framework. In these weeks we examine how white supremacy has been expressed across a range of urban development issue areas, including housing, transportation, the urban environment, education, criminal justice, and urban design, and how policies and planning practice have maintained or disrupted systems of white supremacy.

PA 5209. Urban Planning and Health Equity. (; 3 cr. ; Student Option; Every Spring)
This interdisciplinary course examines the causes and consequences of place-based health disparities in cities, explores how health disparities can be mitigated and exacerbated by urban planning decisions, and introduces best practices in urban planning for achieving community health equity. The course will involve extensive readings, guest lectures, field-based assignments, data-collection activities, and local community involvement. Twin Cities has one of the largest disparities in health outcomes in the nation and local practitioners are pioneering new urban planning solutions to reduce place-based health disparities. The course will utilize this location advantage and use the region as an immersive learning environment. Students are expected to apply knowledge and skills learned in the class locally in the Twin Cities region. At the end of the course, students will be able to: Understand the historical foundations, current trends and challenges, and international perspectives in connecting urban planning to health equity issues; investigate how various planning sectors and urban environment dimensions, including land use, transportation, open space, housing, food systems, and community social capital, interact to affect health disparities in cities; critically evaluate how existing planning processes and decisions respond to the needs of vulnerable populations and contribute to health equity; and develop skills to engage communities and identifying community-sensitive solutions for reducing place-based health disparities. Fulfills a requirement for graduate Health Equity Minor (http://www.sph.umn.edu/academics/minor/health-equity/).

PA 5211. Land Use Planning. (3 cr. [max 6 cr.] ; A-F only; Every Fall)
Physical/spatial basis for land use planning at community/regional level. Role of public sector in guiding private development. Land use regulations, comprehensive planning, growth management, innovative land use planning/policies. prereq: Major or minor in urban/regional planning or instr consent

PA 5212. Managing Urban Growth and Change. (; 3 cr. ; Student Option; Fall Even Year)
Theory/practice of planning, promoting, and controlling economic growth/change in urban areas. Economic development tools available to state/local policymakers, historic context of their use in the United States. legal, social, and economic implementation constraints. Interactions among economic, social, and demographic trends. prereq: Grad student or instr consent

PA 5213. Introduction to Site Planning. (; 3 cr. ; Student Option; Every Spring)
Analyzing/preparing graphic plans for development or redevelopment of property. Site planning issues, process, opportunities, details, and techniques. Hands-on preparation of a site plan. Site visits, lectures, research, presentations, exam, in-class exercises. prereq: Grad student or instr consent

PA 5214. Planning & Design for the Urban Public Realm. (1.5 cr. ; A-F only; Every Fall)
The Great Inversion, or what former Minneapolis Mayor RT Rybak called ?the flight to the city,? has been ongoing for two decades, and to preserve and enhance the quality of life in our cities, we must continue to invest in our urban public realm. Cities must maintain and improve older parks, plazas and streets, but they must also provide new public spaces in developing areas that never had them before - waterfronts, industrial sites, rail yards, and acres of surface parking. Perhaps most important yet easily overlooked is the re-envisioning of the public right-of-way ? the street ? as a place that accommodates not just cars but multiple transportation modes including buses, rail, bicycles, and scooters and other forms of personal transport, all integrated into an accessible, pedestrian-friendly, safe, and green environment. The greening of city streets is critical for the creation of lush and livable places while also producing social, economic, and environmental benefits. Since the start of the Covid 19 pandemic in March 2020, our collective experience of the urban public realm and its meaning and value to us have changed dramatically. Our use of public places has increased as parkways once dominated by cars were closed off and filled with pedestrians, cyclists, skateboarders, roller skaters, roller skiers, and people on all other sorts of wheeled

conveyances. Park spaces that were once often largely empty filled with people getting exercise, enjoying nature, visiting playgrounds, meeting friends, social-distance dating, taking walking happy hours, having picnics, playing spike ball, hula-hooping, and in the case of the homeless, camping out to avoid the dangers of shelters, to socially distance themselves, and in some cases, both. Following the May 2020 death of George Floyd in police custody, our experience of the public realm changed again to include protests, marches, riots, property damage, the creation of new public art, the erection of new monuments, and the removal of old ones. Since March 2020, we have been learning to use our public places many new ways, some traditional, some adaptive, and some temporary. And the economic effects of the Coronavirus ? the recession, job losses, reduced spending, and a decline in business ? mean that cities and other governments will likely have less tax revenue and therefore less money to invest in the public realm in the coming years. This will mean not only fewer projects for new or revitalized public places, but also less money for maintenance, operations, and programming of existing places. It is possible that our public realm will become a little worn in the coming years. Now more than ever, the work of improving our public realm requires a commitment to multi-disciplinary collaboration and broad and genuine stakeholder engagement processes at an entirely new level. Complicated public realm projects require a form of project team leadership that looks more like representative democracy than the imposition of a wonderfully pure vision by a single brilliant designer. Facilitating this process successfully requires uniquely skilled and open-minded planners and designers who can help us all envision a better way to live together in our cities. Last but not least, 2020 has shown us that social investment and planning for equity and justice in the public realm is as important, if not more important, than capital investment in the actual physical infrastructure. The purpose of this course is to help planners, designers, and other city builders come to understand the opportunities and challenges of project implementation through the lens of a specific project type: The Urban Public Realm Project. The course integrates theory and practice into a framework for understanding the experience of public places and the role of planning and design in the implementation of urban public realm projects ? from inception through construction, start-up, and ongoing operations.

PA 5221. Private Sector Development. (; 3 cr. ; Student Option No Audit; Every Spring)
Roles of various participants in land development. Investment objectives, effects of regulation. Overview of development process from private/public perspective.

PA 5231. Transit Planning and Management. (; 3 cr. ; Student Option; Every Fall)
Principles/techniques related to implementing transit systems. Historical perspective, characteristics of travel demand, demand management. Evaluating/benchmarking system performance. Transit-oriented development. Analyzing alternative transit modes. System design/finance. Case studies, field projects. prereq: Grad student or instr consent

PA 5232. Transportation Policy, Planning, and Deployment. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Development of transportation policy, making of transportation plans, deployment of transportation technologies. Lectures, interactive case studies, role playing.

PA 5233. Sustainable Transportation. (3 cr. ; A-F or Audit; Spring Odd Year)
This course emphasizes the theories and practices associated with a sustainable transportation system, especially pedestrian and bicycle transportation. It covers key concepts of sustainable transportation, climate mitigation and adaptation, and planning for pedestrian and bicycle transportation. The specific topics regarding pedestrian and bicycle transportation include benefits and advocacy, data collection and performance measures, demand forecasting, behavior and its connection with neighborhood design and zoning, safety, planning, design principles of facilities, equity, and innovations.

PA 5234. Urban Transportation Planning and Policy. (3 cr. ; A-F or Audit; Every Spring)
This course will integrate key theories and practices, traditional and emerging policy instruments, and techniques for urban and transportation planning. The goal is to introduce students to essential concepts, influential thinkers, and important debates associated with the land use-transportation connection as a foundation for both professional and academic work. By the end of the course, students will be able to comprehend urban transportation planning process and demand forecasting; the theories and empirical evidence on land use and transportation interactions; land use and transportation policy instruments and their effectiveness; and land use and transportation planning in developing countries.

PA 5242. Environmental Planning, Policy, and Decision Making. (; 3 cr. ; Student Option; Periodic Spring)
Theory and practice. Ethical, legal, and institutional frameworks relative to a range of environmental issues. Innovative environmental decision making informed by collaboration, conflict resolution, adaptive management, and resilience thinking. prereq: Grad or instr consent

PA 5243. Environmental Justice in Urban Planning & Public Policy. (3 cr. ; A-F or Audit; Every Spring)
Environmental racism can be defined as policies and practices that result in communities of Black, Indigenous and other people of color (BIPoC communities) being overexposed to environmental harms and being denied access to environmental goods. The environmental justice (EJ) movement in the United States was birthed in the 1980s with the aim of ending environmental racism. Early EJ activism was led by Black rural communities protesting the disproportionate presence of toxic waste facilities in their neighborhoods and Latinx migrant farmworkers who were overexposed to harmful pesticides. Central to the course is the understanding that structural racism, in the form of social, political, and economic forces, has denied BIPoC individuals and communities their rights to live in clean environments and access natural resources that allow communities to build and maintain their physical, mental, emotion, and fiscal health. Although the course focuses on race and racism, it takes as axiomatic that racism is intertwined with other systems of oppression including, but not limited to, sexism, classism, ableism, homophobia, and transphobia. The course begins by tracing the history of the EJ movement and unpacking the terms ?racism? and ?justice.? The main body of the course will focus on a series of issues that EJ scholars and activists address including pollution, greening, transportation, disasters, and climate change. The course ends with discussions and reflections on our roles, responsibilities and possibilities as public policy and planning scholars, researchers and practitioners to work towards ending environmental racism and achieving EJ for all. The required ?readings? for the course will include academic journal articles, news stories, governmental policies, podcasts, videos, poetry, and short stories. This will allow us to understand the theoretical and methodological approaches to EJ activism and research and explore popular and creative forms of knowledge about EJ which will add depth to our understanding and analysis of relevant plans and policies. Our time together in the classroom will primarily be a mix of lectures, group discussions, in-class exercises, and occasionally guest speakers. While we will reflect on some international issues and materials, we will largely focus on EJ in the United States.

PA 5251. Strategic Planning and Management. (; 3 cr. ; Student Option No Audit; Periodic Spring)
Theory and practice of strategic planning and management for public and nonprofit organizations and networks. Strategic planning process, management systems; stakeholder analyses. Tools and techniques such as purpose expansions, SWOT analyses, oval mapping, portfolio analyses, and logic models.

PA 5261. Housing Policy. (; 3 cr. ; A-F or Audit; Every Spring)
Institutional/environmental setting for housing policy in the United States. Competing views of solving housing problems through public intervention in the market. Federal/local public sector responses to housing problems. prereq: Grad or instr consent

PA 5262. Neighborhood Revitalization Theories and Strategies. (3 cr. ; Student Option No Audit; Every Fall)
Policymaking/politics of planning in housing, community development, social policy. Connecting policy to local/regional politics. Role of institutional decision-making structures on policy outcomes. Importance of citizens, social movements, interest groups in policymaking process.

PA 5263. Financing Affordable Multi-Family Rental Hsg in US. (3 cr. ; Student Option No Audit; Every Spring)
Financing affordable multifamily housing in the United States is a complicated endeavor that requires more than just a command of financial principles and analysis but also an appreciation for the nuances and fluidity of policy, public-private-partnership, and public discourse. This course will demystify the financial drivers and consequences in our affordable housing delivery system. It will simultaneously build participants? confidence in basic financial modeling of affordable housing using the most common capital structures, while also exploring the relationship of finance with policy and regulation, real estate and urban planning objectives, design, and program limitations. Participants in this course will emerge with:
- An understanding of the roles, risk sharing and influence of public and private actors in the financing and provision of affordable housing.
- A practical familiarity with the major financing programs and policies that drive investment in this sector. - Experience in financial modeling specific to multifamily affordable housing which will prepare them for work in the industry, regardless of role.

PA 5271. Geographic Information Systems: Applications in Planning and Policy Analysis. (; 3 cr. ; Student Option; Every Fall)
Introduction to GIS. Applications in public planning and policy analysis. Operational skills in GIS software. Mapping analysis of U.S. Census material. Local/state government management/planning. Spatial statistical analysis for policy/planning. prereq: Major in urban/regional planning or instr consent

PA 5281. Immigrants, Urban Planning and Policymaking in the U.S.. (3 cr. ; A-F or Audit; Every Fall)
Social, political, economic experiences of contemporary U.S. immigrants. Draws from sociology, economics, demography, political science, public affairs. Local government policies/plans. Cities/suburbs as contexts for immigrants. Interactions between immigrant communities/urban planners/policymakers. prereq: Grad student or instr consent

PA 5290. Topics in Planning. (; 0.5-4 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Selected topics.

PA 5301. Population Methods & Issues for the United States & Global South. (3 cr. ; Student Option; Every Fall)
Basic demographic measures/methodology. Demographic transition, mortality, fertility. Perspectives on nonmarital fertility, marriage, divorce, cohabitation. Cultural differences in family structure, aging, migration, refugee movements, population policies. Discussion of readings. prereq: Grad student or instr consent

PA 5311. Program Evaluation. (; 3 cr. ; A-F only; Periodic Fall & Spring)
This course covers the core principals, methods, and implementation of evaluation research. Students will learn through an applied partnership with a nonprofit or state/local government clients. The course is designed for both students interested in a potential career in evaluation and those that want to be better consumers of research. Past programmatic/policy areas included health and human services, education, environment science, economic development, transportation, and evidence-based policymaking.

PA 5312. Cost-Benefit Analysis for Program Evaluation. (2 cr. ; Student Option No Audit; Every Fall & Spring)
This class introduces students to cost-benefit analysis, the leading evidenced-based method for determining whether a government program or policy improves the well-being of society. Starting with the foundations of welfare economics, students learn how to monetize important benefits and costs associated with government activities. Topics include discounting future benefits and costs, the roles of standing and risk, ways of valuing human lives and other benefits that may be hard to value in dollar terms. Students will acquire skills needed to perform relevant calculations needed for the economic assessment of benefits relative to costs and the ability to critique the use of these methods regarding how they may advantage or disadvantage some members of society or particular types of policies. Policy areas include preventive interventions in social, health and education as well as applications in transportation and environmental policy. Prerequisite: PA 5021 or other prior course in microeconomics.

PA 5390. Topics in Advanced Policy Analysis Methods. (; 1-4 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Topics in advanced policy analysis methods.

PA 5401. Poverty, Inequality, and Public Policy. (; 3 cr. ; Student Option; Every Fall)
Nature/extent of poverty/inequality in the United States, causes/consequences, impact of government programs/policies. Extent/causes of poverty/inequality in other developed/ developing countries. prereq: Grad or instr consent

PA 5405. Public Policy Implementation. (; 3 cr. ; A-F or Audit; Every Fall)
Theory, tools, and practice of the implementation of public policy, particularly in areas involving public, private, and nonprofit organizations. Analytical approach focuses on multiple levels in policy fields to pinpoint and assess implementation challenges and levers for improvement.

PA 5413. Early Childhood and Public Policy. (; 1.5-3 cr. ; Student Option; Every Fall)
State/federal/int'l policies/legislation touching first 5 years of child's life. Family, community, institutional roles in promoting children's social/cognitive/emotional development. Health, mental health, poverty, special needs, economic/social justice. Part of Early Childhood Pol cert. prereq: Grad or instr consent

PA 5415. Effective Policies for Children in the First Decade. (1.5-3 cr. [max 6 cr.] ; Student Option No Audit; Periodic Spring)
Policies to improve the wellbeing of children through the first decade of life are examined using examples from economics and other disciplines. The course focuses on the role of government in helping to promote early childhood development. Readings and projects focus on policies or programs that affect child outcomes from the prenatal period to third grade. Students will become familiar with the importance of rigorous impact evaluations and the use of cost-effectiveness and cost-benefit analysis as a tool for efficient resource allocation. Some familiarity with regression analysis would be helpful.

PA 5416. Economics of U.S. Social Insurance Programs. (3 cr. ; A-F only; Every Spring)
This class will introduce you to the Economics of Social Insurance Programs. It begins by introducing a framework to evaluate the efficiency and equity of social insurance programs, drawing on theory from the economics of insurance programs and behavioral economics. It then applies this framework to social insurance programs such as workers? compensation, unemployment insurance, health insurance, social security, TANF and Supplemental Nutritional Assistance, and the Earned Income Tax Credit. Prerequisite: PA 5021 or other prior course in microeconomics.

PA 5421. Racial Inequality and Public Policy. (; 3 cr. ; Student Option No Audit; Periodic Fall & Spring)
Historical roots of racial inequality in American society. Contemporary economic consequences. Public policy responses to racial inequality. Emphasizes thinking/analysis that is critical of strategies offered for reducing racism and racial economic inequality. prereq: Grad or instr consent

PA 5422. Diversity and Public Policy. (; 3 cr. ; A-F only; Periodic Fall)
What is diversity? What role does it play in public policy? What role should it play? Whom does diversity include or exclude? In this highly participatory class, we will apply a policy analysis lens to explore how diversity interacts with, contributes to, and is impacted by policy. The interdisciplinary course readings draw from topics such as gender identity, intersectionality, socio-economic class, race and ethnicity, indigenous ways of knowing, sexual orientation, and disability. Students examine the evolution of difference and diversity, explore various domains of diversity (gender, race, ethnicity, sexuality, disability, class), and synthesize and apply this knowledge to the development of a policy brief that focuses on a particular policy or organizational problem.

PA 5426. Community-Engaged Research and Policy with Marginalized Groups. (; 3 cr. ; Student Option; Every Spring)
Marginalized populations tend to be viewed as objects of social policy, passive victims, or a cause of social problems. Processes of marginalization we will explore in this class include: structural racism, colonization, economic exclusion and exploitation, gender bias, and more. Policy and research are typically driven by mainstream/dominant society members with little direct knowledge

about the real lives of people on the margins. This can lead to misguided actions, misunderstandings, paternalism, unintended negative consequences, and further marginalization and/or stigmatization. In this course, we will learn about community-engaged research methodologies such as participatory action research (PAR) and community-based participatory research (CPBR). We will use case studies to explore the challenges, rewards, and ethical implications of these community-engaged approaches to research and policy-making. Possible topics include, but are not limited to, sex trafficking, housing, and youth work. Instructors and students in the course will work together on a real-world research and policy challenge so that students contribute to ongoing work in the field in real-time.

PA 5431. Public Policies on Work and Pay. (; 3 cr. ; Student Option; Every Fall)
Public policies affecting employment, hours of work, and institutions in labor markets. Public programs impacting wages, unemployment, training, collective bargaining, job security, and workplace governance. Policy implications of the changing nature of work. prereq: [[PA 5031 or equiv], grad student] or instr consent

PA 5442. Education Law and Policy. (3 cr. ; Student Option No Audit; Periodic Fall)
Education law and policy with focus on elementary/secondary. Topics include governance; interplay of federal, state and local law and policy; education redesign; intersection with workforce development; reform efforts; desegregation; achievement gap; role of teacher unions; and finance. Early childhood education discussed in connection with K-12 issues. Case studies include recently enacted legislation in multiple states.

PA 5480. Topics in Race, Ethnicity, and Public Policy. (; 1-3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Link between race/ethnicity and public policy. How to identify/measure racial/ethnic disparities and their historical/cultural origins and policy impacts and to craft politically feasible remedies. Topics may include criminal justice, housing, child welfare, and education. prereq: Jr or sr or grad student or instr consent

PA 5490. Topics in Social Policy. (; 1-4 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Selected topics.

PA 5501. Theories and Policies of Development. (; 3 cr. ; Student Option; Every Fall)
What makes some countries wealthier than others, one group of people healthier and more educated than another? How does the behavior of rich nations affect poor nations? Origins of development thought, contemporary frameworks and policy debates. Economic, human, and sustainable development. prereq: Grad student or instr consent

PA 5503. Economics of Development. (; 3 cr. ; A-F or Audit; Every Fall)
Economic growth, inequality, poverty, rural/urban labor markets, risk/insurance. Investments in human capital, credit markets, gender/household economics, governance/institutional issues. Microfinance, conditional cash transfers, labor/education policies. prereq: PA 5501 or concurrent registration is required (or allowed) in PA 5501

PA 5504. Transforming Development. (3 cr. ; Student Option; Every Spring)
Emerging infectious diseases such as COVID-19, antimicrobial resistance, climate change, loss of species, and habitats are driven by our dominant definition of development and pose existential challenges to humankind. COVID-19 has laid bare the ethnic, racial, class, and gender inequalities in the ways societies across the globe lead material life (economy). Current social and environmental challenges are global and local in scale and challenge us to consider poverty alleviation not as an international issue and only of concern for low resourced communities and developing countries, but one in need of attention in every country in the world, including peoples in the wealthy West. This course examines the emerging pluriverse paradigm and some of the models intending to transform development: nature rights movement, community economy, solidarity movement, degrowth, transition design, and ontologies and epistemologies of First Nations in North and South America. We will contrast these development models to sustainable development goals and the green growth approach.

PA 5511. Community Economic Development. (; 3 cr. ; Student Option; Every Fall)
Contexts/motivations behind community economic development activities. Alternative strategies for organizing/initiating economic development projects. Tools/techniques for economic development analysis/planning (market analysis, feasibility studies, development plans). Implementation at local level. prereq: Grad or instr consent

PA 5512. Workforce and Economic Development. (3 cr. ; A-F or Audit; Spring Even Year)
Economic and workforce development examined from a U.S. context, exploring how rural and urban regional economies grow, why industries/employers locate where they do, and how workers decide where to live and work. Government and economic development practices related to businesses and innovation will also be addressed. prereq: Grad or instructor consent

PA 5521. Development Planning and Policy Analysis. (; 4 cr. ; Student Option; Every Spring)
Techniques of development planning/policy analysis at national, regional, and project levels. Effects of external shocks and government interventions on national/regional economies. Macroeconomic modeling, input-output analysis, social accounting matrices/multipliers, project evaluation. prereq: 5031 or equiv recommended or instr consent

PA 5522. International Development Policy, Families, and Health. (; 3 cr. ; Student Option; Periodic Fall)
Implications of paid/unpaid labor for development policy, using household as prism. Legal/cultural use of property rights. Financial effects of ill health. Caregiving. Work-family conflict, policies that alleviate it. Role of gender. Qualitativequantitative methods. Readings, lectures, discussions. prereq: Grad student or instr consent

PA 5561. Gender and International Development. (; 3 cr. ; Student Option; Periodic Spring)
Women and men are affected differently by development and participate differently in policy formulation and implementation. Gender-sensitive perspective. Historical, political context. Global South. Policy, practice, and experience (theory and measurement; international, national, local stakeholders; effects of policy and practice on development). prereq: Grad or instr consent

PA 5590. Topics in Economic and Community Development. (; 1-3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Selected topics.

PA 5601. Global Survey of Gender and Public Policy. (3 cr. ; Student Option; Periodic Fall)
Introduction to the key concepts and tools necessary for gender policy analysis. Survey of the major findings in the field of gender and public policy in policy areas such as poverty alleviation, health, international security, environment and work-family reconciliation. Scope includes local, national, and global policy arenas as well as exploration of gender and the politics of policy formulation.

PA 5622. GAINS: Gender and Intersectional Network Series, Leadership Workshop I. (0.5-1 cr. ; S-N only; Fall Odd Year)
GAINS: Gender and Intersectional Network Series, Leadership Workshop prepares students with the skills to lead effectively and challenge institutional norms and practices that perpetuate disparities based on gender, race and other structural inequalities. Women, racially marginalized individuals, and LGBTI-identified individuals are still disproportionately underrepresented in leadership roles in public, private, and nonprofit institutions in spite of high rates of educational attainment and equal opportunity legislation. Women of color and indigenous women face even greater obstacles to advancement compared to white women. Barriers to diverse leadership today stem less from overt discrimination and more from ?second generation? forms of bias ? often invisible but still powerful cultural beliefs as well as workplace structures and practices. Achieving leadership parity thus entails individual, collective and institutional change. Course pedagogy includes case studies, group discussions, self-reflection and simulations that have been proven to have a lasting impact on individual leaders in developing their own leadership capacity. Guest speakers offer potential role models and share their leadership perspectives. The workshop and two-semester format of the course allows students to benefit from a cohort model of learning and develop their own

network of practice. Moreover, GAINS focuses not just on individual leadership development, but also organizational and systems level change. Students of all genders interested in addressing personal and institutional barriers to advancement that are rooted in gender inequalities and their intersections with race and other forms of inequality are welcome to enroll. To get the most out of the network and cohort development aspects of this course, students are encouraged to participate for two semesters.

PA 5623. GAINS: Gender and Intersectional Network Series, Leadership Workshop II. (0.5-1 cr. ; S-N only; Spring Odd Year)
GAINS: Gender and Intersectional Network Series, Leadership Workshop prepares students with the skills to lead effectively and challenge institutional norms and practices that perpetuate disparities based on gender, race and other structural inequalities. Women, racially marginalized individuals, and LGBTI-identified individuals are still disproportionately underrepresented in leadership roles in public, private, and nonprofit institutions in spite of high rates of educational attainment and equal opportunity legislation. Women of color and indigenous women face even greater obstacles to advancement compared to white women. Barriers to diverse leadership today stem less from overt discrimination and more from ?second generation? forms of bias ? often invisible but still powerful cultural beliefs as well as workplace structures and practices. Achieving leadership parity thus entails individual, collective and institutional change. Course pedagogy includes case studies, group discussions, self-reflection and simulations that have been proven to have a lasting impact on individual leaders in developing their own leadership capacity. Guest speakers offer potential role models and share their leadership perspectives. The workshop and two-semester format of the course allows students to benefit from a cohort model of learning and develop their own network of practice. Moreover, GAINS focuses not just on individual leadership development, but also organizational and systems level change. Students of all genders interested in addressing personal and institutional barriers to advancement that are rooted in gender inequalities and their intersections with race and other forms of inequality are welcome to enroll. To get the most out of the network and cohort development aspects of this course, students are encouraged to participate for two semesters.

PA 5631. LGBTQ Politics & Policy. (1.5 cr. ; A-F only; Every Spring)
The advancement of LGBTQ rights in the United States has experienced unprecedented success over the last twenty years, shifting both public attitude towards and legal protection for LGBTQ Americans. This course will provide an in-depth analysis of current LGBTQ policy achievements in the United States, including the recognition of marriage equality in all 50 states, the repeal of Don?t Ask, Don?t Tell, increased anti-discrimination protections, and rights for people who are transgender or gender non-conforming. Emphasis will be placed on how these victories were achieved, including background on the strategies and tactics used to generate policy results. We will also take a critical look at such milestones and examine what they mean for the entire LGBTQ population, including queer people of color, transgender and gender nonconforming individuals, the disabled, and economically disadvantaged. Intersectionality will be a key aspect of the course, in particular, analysis on how the differential effects of policy among segments of the population that may not experience the benefits of policy passage as quickly or as broadly. Incorporated into this analysis will be readings from queer liberation scholars to help us evaluate the pros and cons of existing LGBTQ policy gains. The course will explore what full equality might look like for LGBTQ people in the United States with an examination of what can and cannot be achieved through policy. Practical application on how policy is made will be intertwined throughout the course. Topics to be covered include the meaning and measurement of LGBTQ identity; estimates of those who identify as LGBTQ; the measurement of Americans? attitudes on LGBTQ issues and how these attitudes have changed over the past few decades; assessment of changes in law and policies at the national, state and local levels; and the implications of these changes for the lived experience of LGBTQ people and their families, including health, well-being, stigma and discrimination.

PA 5683. Gender, Race and Political Representation. (3 cr. ; A-F only; Spring Even Year)
Explores intersection of gender, race and political issues to identify best practices for strengthening roles of under-represented groups in governance. Individual, structural and institutional factors attributed to increasing the election and appointment of under-represented groups. Theories of citizen representation. Global approach with cross-national evidence and comparative country studies.

PA 5690. Topics in Women, Gender and Public Policy. (; 0.5-3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Selected topics. prereq: Grad student or instr consent

PA 5711. Science, Technology & Environmental Policy. (; 3 cr. ; Student Option; Every Fall)
Interplay of science, technology, the environment, and society. Approaches from across the social sciences will cover how science and technology can create new environmental pressures as well as policy challenges in a range of spheres from climate change to systems of intellectual property and international development.

PA 5715. Deliberating Science, Technology, and Environmental Policy. (; 1.5 cr. [max 6 cr.] ; A-F only; Periodic Fall & Spring)
Exploration of the conceptual and ethical dimensions of science, technology, and environmental policy. Discussion-based course with rotating topics.

PA 5721. Energy Systems and Policy. (; 3 cr. ; Student Option; Every Fall)
Impact of energy production/consumption choices on environmental quality, sustainable development, and other economic/social goals. Emphasizes public policy choices for energy/environment, linkages between them.

PA 5722. Economics of Environmental Policy. (; 3 cr. ; Student Option; Every Fall)
Introduction to economic principles and methods as they apply to environmental issues such as climate change, biodiversity conservation, and water quality. Course will cover benefit-cost analysis, methods of environmental valuation, as well as critiques of market-based solutions to environmental challenges.

PA 5723. Water Policy. (; 3 cr. ; Student Option; Every Spring)
Sociocultural, legal, economic, and environmental forces affecting supply/use of water by individuals, sectors, and governance institutions. Historical trends; water laws in United States and internationally. Institutional structures for managing water at federal, state, and local levels. Current water-related issues/policies. prereq: Grad student or instr consent

PA 5724. Climate Change Policy. (3 cr. ; Student Option; Every Fall)
Existing and proposed approaches to mitigate and adapt to climate change through policies that cross scales of governance (from local to global) and impact a wide range of sectors. Exploration of climate change policy from a variety of disciplinary approaches and perspectives, emphasizing economic logic, ethical principles, and institutional feasibility. How policy can be shaped in the face of a variety of competing interests to achieve commonly desired outcomes. Students develop a deep knowledge of climate change in particular countries through a team final project. prereq: Intro microecon (such as Econ 1101 or equiv)

PA 5731. Emerging Sciences and Technologies: Policy, Ethics and Law. (; 3 cr. ; Student Option; Periodic Fall & Spring)
This interdisciplinary course will examine issues at the nexus of public policy, ethics, law, and emerging sciences and technologies (ES&T) including nanotechnology, genetic and biomedical engineering, synthetic biology, and artificial intelligence. Topics we will explore include the role of science and technology as both a tool for and the subject of policy and law; the policy, ethical, economic, and legal implications of ES&T research and development; environmental and human health risk analysis and regulation (e.g., EPA, FDA, OSHA, and state and local regulatory mechanisms); intellectual property issues; liability issues; and global impacts. Topics will be approached from the perspective of different stakeholders (e.g., federal agencies, industry, academic researchers, the environment, international organizations, and the public) and in the context of different application areas (e.g., drugs, devices, food, agriculture, energy, environmental remediation) using a variety of interdisciplinary approaches. Students with a

broad range of interests are encouraged to enroll.

PA 5741. Risk, Resilience and Decision Making. (; 1.5 cr. [max 3 cr.] ; Student Option No Audit; Every Spring)
Interplay between risk analysis, decision making, and policy in the context of new and emerging technologies, environmental and human well-being, risk and resilience. Assessment methods; risk management processes, issues and methods; role/treatment of uncertainty; factors in decision making; risk-based rule making; public values; risk communication and perception. Scientific, technical, social, political, and ethical issues. prereq: Grad student or instr consent

PA 5751. Addressing Climate and Energy Challenges at the Local Scale. (3 cr. ; A-F or Audit; Every Spring)
Examine energy and climate innovations at local and community scales. Understand how to implement local policies, projects, and programs with a diverse set of perspectives on energy issues. Develop professional and analytical skills that support solutions to energy and climate challenges.

PA 5761. Environmental Systems Analysis at the Food-Energy-Water Nexus. (3 cr. ; Student Option; Every Spring)
Agricultural lands, water resources, and energy production and transport are interconnected systems with implications for policy and management at local to global scales. This course will explore contemporary issues at the nexus of food, energy, and water with a focus on Midwestern landscapes. Specific topics include farm policy, permitting of pipelines and energy production, mitigation of air and water pollution, and strategies to incentivize the conservation and restoration of landscapes. Students will develop professional skills in systems thinking, scenario analysis, science communication, facilitation, and collective leadership.

PA 5771. Change Leadership for Environmental, Social and Governance Action. (; 3 cr. ; Student Option No Audit; Every Fall)
Sustainability is increasingly being defined broadly to include the environmental, social and governance (ESG) actions, and effects of organizations. ESG concepts integrate environmental sustainability with diversity, equity, and inclusion. Individuals working within organizations or seeking to join those organizations have expressed desires to affect the actions of an organization. This course aims to give students hands-on experience with a project investigating, designing, advocating for and implementing an ESG improvement in an existing or new organization. We imagine students in this course as future intrapreneurs (an employee of an organization who creates new opportunities or products in the style of an entrepreneur) transforming practices in existing organizations or as entrepreneurs seeking to create new sustainable organizations, or both. Non-degree-seeking students possessing a bachelor's degree are encouraged to contact the instructor for permission to register.

PA 5790. Topics in Science, Technology, and Environmental Policy. (; 1-3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Selected topics.

PA 5801. Global Public Policy. (3 cr. ; Student Option; Every Spring)
Creation of rules, norms, institutions to regulate global activities. Policy making. How global policy making regulates interstate, national, transnational activities. Creation/enforcement of global rules. Applications to international security, political economy. prereq: Grad or instr consent

PA 5805. Global Economics. (3 cr. ; A-F only; Every Fall)
Global trade, exchange rates, finance, international business, and migration in context of theories and evidence that inform the policies pursued at national level. Operation of main international organizations dealing with these issues will also be examined. prereq: [5021 or equivalent] or instr consent

PA 5813. US Foreign Policy: Issues and Institutions. (3 cr. ; Student Option No Audit; Every Fall)
Taught by the Humphrey School diplomat in residence, this course helps students develop a deep understanding of how US foreign policy institutions function, how that is being challenged, and the broader global implications of those changes. Through readings, class discussions, and guest lectures, we look at the institutions and processes involved in developing and managing US foreign policy, and use case studies to advance students? knowledge, including of how the Department of State works, and the expanding role of the Department of Defense, the National Security Council, and intelligence agencies. We examine how economic instruments like sanctions are used to advance policy; and how American citizens, lobbyists, and foreign governments influence policy. We incorporate discussions of current events into each class. Students develop writing and presentation skills critical to foreign policy careers.

PA 5814. Global Diplomacy in a Time of Change. (3 cr. ; Student Option No Audit; Every Spring)
Taught by the Humphrey School?s diplomat in residence, this course examines the changing world of twenty-first century global diplomacy and how state and nonstate actors are challenging the status quo. We look at the dynamics behind major international developments?with case studies including BREXIT, the Iran Agreement, climate negotiations, and China?s global initiatives? placed in the context of an examination of how states operate in the international diplomatic sphere and how multilateral organizations enhance or challenge the concept of state sovereignty. Students gain knowledge about the complexities of diplomacy and negotiation through readings, classroom discussions, and guest speakers and develop professional skills through writing and presentation assignments.

PA 5823. Human Rights and Humanitarian Crises: Policy Challenges. (3 cr. ; Student Option No Audit; Periodic Fall & Spring)
Examines response of governments, international organizations, NGOs, and others to global humanitarian and human rights challenges posed by civil conflict and other complex emergencies in places such as Syria, Ukraine, South Sudan, Somalia, Burma, and elsewhere. Course will also consider and assess UN and other institutions established to address these issues (like UNOCHA and UNHCR). In addition, course will examine US policy toward humanitarian issues and refugees (including US refugee admissions).

PA 5825. Crisis Management in Foreign Affairs. (1.5 cr. [max 3 cr.] ; Student Option; Every Spring)
Crisis decision making in foreign policy. Examination of the organization and structure of crisis decision-making within U.S. national security apparatus. Analysis of in-depth four foreign policy crises (Cuban Missile Crisis, Vietnam ? Tet, Iraq, and a current crisis). Crisis simulation with students in the role of national security leaders.

PA 5826. National Security Policy. (3 cr. ; Student Option; Every Fall)
This course will analyze U.S. national security policy and process from the viewpoint of the National Security Council staff. Students will examine the organization and structure of the U.S. national security apparatus and the national security decision-making process, including individual and political factors; assess central threats to U.S. and international security and develop and discuss policy options to deal with those threats; undertake a major policy review on a specific national security challenge facing the United States, including analysis and recommendations; produce products, both written and oral, crucial to national security policy making (e.g., concise information and action memorandum), and put themselves in the position of national security leaders as part of a policy simulation. Grades will be based on oral participation, papers, and class reports.

PA 5880. Exploring Global Cities. (; 1-3 cr. [max 6 cr.] ; Student Option; Every Spring)
Study abroad offered in cities across globe. Opportunities to study policy/planning issues in varied contexts from comparative/inter-cultural perspective. Study/work with practitioners/ peers in field. Tanzania odd years/Austria even years. Additional countries may be added in future.

PA 5885. Human Rights Policy: Issues and Actors. (3 cr. ; Student Option; Every Fall)
Politics of human rights issue emergence; relevant international, regional, and domestic norms; correlates of state repression; measurement of human rights abuse and remedies; human rights promotion by states, political parties, international organizations, NGOs, social movements, faith-based organizations, and providers of international development assistance.

PA 5886. Master of Human Rights Cohort Seminar I. (1 cr. ; S-N only; Every Fall)
The Master of Human Rights Cohort Seminar is a required course for all first-year MHR students. The course is intended to create a

cohort group and ensure that all MHR students have an opportunity to work together to explore current issues related to human rights practice, focusing on emerging events or crises, and debates over policy, practice, or theory and for direct contact with and networking particularly with counterparts in the Global South. This course is in a series with, and taken before, PA 5887. prereq: First-year MHR

PA 5887. Master of Human Rights Cohort Seminar II. (1 cr. ; S-N only; Every Spring)
The Master of Human Rights Cohort Seminar is a required course for all first-year MHR students. The course is intended to create a cohort group and ensure that all MHR students have an opportunity to work together to explore current issues related to human rights practice, focusing on emerging events or crises, and debates over policy, practice, or theory and for direct contact with and networking particularly with counterparts in the Global South. This course is in a series with, and taken after, PA 5886.

PA 5890. Topics in Foreign Policy and International Affairs. (; 0.5-5 cr. [max 15 cr.] ; Student Option; Periodic Fall & Spring)
Selected topics.

PA 5910. Developing Your Public Service Career. (; 1 cr. ; S-N or Audit; Every Fall)
Students investigate/analyze interests, skills, and abilities and combine them in a career plan. Develop tools to demonstrate abilities, document experiences/knowledge, and explore public service career options.

PA 5920. Skills Workshop. (; 0.5-4 cr. [max 48 cr.] ; Student Option; Every Fall & Spring)
Topics on public policy or planning skills. Topics specified in Class Schedule.

PA 5926. Presentation Skills: How to Inspire Your Audience and Change the World. (1 cr. [max 2 cr.] ; Student Option No Audit; Every Fall)
Learn techniques for making effective, persuasive presentations to different kinds of audiences. Practice is essential to improve speaking skills and reduce anxiety. Students practice by recording brief weekly presentations and making class presentations in a supportive environment. Techniques for using Powerpoint to create effective slides are practiced. Course components include presentation assignments; peer reviews; readings/videos and reflections; and class participation. May be repeated once.

PA 5927. Effective Grantwriting for Nonprofit Organizations. (; 1.5 cr. ; Student Option No Audit; Every Spring)
Grantwriting skills, processes, problem,s and resources for nonprofit organizations. Researching and seeking grants. Communication with potential funders and generating financial support. Collaborating effectively with the organization and clients to create substantive, fundable proposals.

PA 5928. Data Management and Visualization with R. (1 cr. ; Student Option; Every Fall)
Introduction to R Studio software. Use of R Studio to carry out R file and related database management functions. Tools and techniques for data analysis and statistical programming in quantitative research or related applied areas. Topics include data selection, data manipulation, and data and spatial visualization (including charts, plots, histograms, maps, and other graphs). Prerequisite knowledge: Introductory statistics; ability to create bar graphs, line graphs, and scatter plots in MS Excel; and familiarity with principles of data visualization.

PA 5929. Data Visualization: Telling Stories with Numbers. (; 2 cr. ; Student Option; Every Fall & Spring)
Tools for communicating quantitative information in an intelligent, effective and persuasive way. Topics covered include 1) writing and speaking about data; 2) data management in Excel in order to prepare data for charting; 3) understanding and ability to deploy core concepts in of design, layout, typography and color to maximize the impact of their data visualizations 4) determining which types of statistical measures are most effective for each type of data and message; 5) determining which types of design to use for communicating quantitative information; and 6) designing graphs and tables that are intelligent and compelling for communicating quantitative information.

PA 5932. Working with Data: Finding, Managing, and Using Data. (1.5 cr. ; Student Option; Every Spring)
Hands-on experience with common issues that arise when using secondary data sets. After successful completion of the course, students should be able to: 1. Determine where to find data and information about data (metadata) for policy-related topics. 2. Repurpose, manipulate, and/or clean data collected by someone else or for a different purpose in order to answer questions. 3. Determine appropriate units of analysis, weights, data structure, and variables of interest in order to answer policy-related questions. 4. Document workflow to allow reproducibility and protect the confidentiality of the data. 5. Conduct basic data manipulation tasks (making tables) using existing software including Excel and Stata. 6. Learn how to find answers for questions through online support. This course will focus on Excel and Stata equally. Previous experience in Stata is preferred, but the course will include a brief introduction to relevant skills.

PA 5933. Survey Methods: Designing Effective Questionnaires. (2 cr. [max 3 cr.] ; A-F only; Periodic Fall & Spring)
Applied (hands-on) introduction to survey questionnaire design. Student teams design a questionnaire for a client. For example, students may draft and revise questions about respondents' demographics and employment; life histories; knowledge, use, and opinions about services; and/or anxiety and well-being. The syllabus evolves depending on the needs of the client and the class' decisions about how to build the survey; a complete syllabus will not be available at the beginning of class for this reason. Readings include a textbook and articles related to the client's survey. Students actively engage in class and in groups about draft questions, thus learning how to improve them, with regular feedback from the instructor. Questions are tested on volunteers. Students learn: the process of questionnaire design in a team; pitfalls of survey design; and how to track questions, coded responses, and prompts for interviewers. This class is not a substitute for a comprehensive survey research class or a statistical course on sampling and weighting. Students will learn: - The process of questionnaire design in a team - Basic pitfalls of survey design ? names, definitions, examples. - How to use Excel to track questions, coded responses, and prompts for interviewers - How to use interviewing software SurveyToGo This class is not a substitute for a comprehensive survey research class or a statistical course on sampling and weighting.

PA 5934. HPAR - Humphrey Public Affairs Review Board Seminar. (1.5 cr. [max 3 cr.] ; S-N only; Every Fall)
This course provides a seminar context for the work of members of the editorial board for the Humphrey Public Affairs Review (HPAR). It meets seven times over the course of Fall semester to provide logistical and technical guidance for the Board as it produces the online journal. Students engage in the various activities required to publish the journal. In the beginning of the semester, students conduct outreach to solicit submissions and discuss the selection criteria for submissions. They work closely with the conventions of APA style and citations, while developing their copyediting abilities. Central to journal production is engaging with the peer-review process, through providing feedback to authors and discussing critiques with editing teams. Finally, students submit their own pieces of writing to the journal for publication. As a result, students participate in peer-review as both an editor and an author.

PA 5951. Humphrey International Fellows Seminar. (; 1 cr. ; S-N only; Every Fall)
This seminar introduces Humphrey International Fellows to the public policy landscape of Minnesota and the US, and provides opportunities for professional growth. Through a series of discussions, trainings, and site visits, fellows will be exposed to professional development, skills building, and networking opportunities. The seminar provides a forum for fellows to exchange views with one another and with guest speakers.

PA 5962. State Governing and Legislating: Working the Process. (3 cr. ; A-F only; Every Spring)
The Minnesota Capitol and rules and reality of state governance and legislating. Classroom discussions, high-profile guest speakers (including legislators, lobbyists and potentially the governor), and an extensive State Capitol practicum to explore state politics and policies.

PA 5971. Survey of Election Administration. (; 3 cr. ; Student Option No Audit; Every Fall & Spring)
Survey of building blocks of election administration, from voter registration to recounts.

PA 5972. Elections and the Law. (; 2 cr. [max 3 cr.] ; Student Option No Audit; Periodic Fall & Spring)
Theories and basic structure of the American legal system. Experience with basic tools and skills for using the law to understand and analyze issues facing election administrators across the nation. Use of election-related and non-election related materials to prepare election administrators for interacting with counsel, legislators and the courts in carrying out their responsibilities.

PA 5973. Strategic Management of Election Administration. (; 2 cr. ; Student Option No Audit; Every Fall)
Strategic management for election administrators in the political environment. Election official tools and challenges. The role of the lawmaking process in budgeting and organizational planning.

PA 5975. Election Design. (; 2 cr. ; Student Option No Audit; Every Spring)
Election administration design principles, including ballot and polling place design and poll worker training materials. Application of principles of field.

PA 5976. Voter Participation. (; 1 cr. ; Student Option No Audit; Periodic Fall & Spring)
Voter participation issues and challenges including historical survey of voter participation in US and methods to increase voter turnout.

PA 5982. Data Analysis for Election Administration. (; 2 cr. ; Student Option No Audit; Periodic Fall & Spring)
Evidence-based election administration. Collection and analysis of quantitative data to solve problems and identify opportunities for improvement. Emphasis on pre-election forecasting for planning purposes and post-election auditing of election results.

PA 5983. Introduction to Election Security. (; 1 cr. ; Student Option No Audit; Every Fall)
This course will examine the history of cyberattacks on the United States and the American election system, with special attention to the 2016 election cycle. Students will explore the types of cybersecurity threats that exist and strategies to protect against them; understand the roles different levels of government can play in the process, and hear from key officials about the issues raised by the official response to election security threats at the federal, state and local levels as well as in related private sector communities.

PA 5984. Elections Security: How to Protect America?s Elections. (; 2 cr. ; A-F or Audit; Every Spring)
?Elections Security? uses the Russian efforts to influence the 2016 election as a case study to identify the vulnerabilities of US elections (especially state voter registration databases) as well as catalogue new protections. Readings and discussion will focus on best practices and technology options available to the public (social media) and elections professionals (cybersecurity) in guarding against future influence efforts and assuring public confidence in election outcomes. Special focus will be given to describing how local election officials can protect their election technology, most notably those vulnerabilities associated with their voting system and voter registration database. ?Elections Security? will draw heavily on concrete cases and challenges facing election professionals, using government and independent reports and an indepth analysis of new resources created by the US Department of Homeland Security and its collaborations with election professionals.

PA 5985. Physical Election Security. (; 2 cr. ; Student Option No Audit; Periodic Spring & Summer)
U.S. Homeland Security designated election security as a ?critical infrastructure? after threats from foreign governments, and collaborates with states in detecting and responding to foreign interference. This course will provide students with a deeper understanding of the current security context and best practices and processes for physically safeguarding elections based on 2016 and 2020. Students will learn the difference between physical and cyber threats to U.S. systems; tangible steps to protect election offices and their equipment; the use of audits to ensure the accuracy of elections; the integration of security into vendor relationships; and the connection between physical election security and citizen trust in elections. Content will be explored through readings (including government documents and studies), videos, discussions, and writing assignments.

PA 5990. Topics: Public Affairs - General Topics. (; 0-3 cr. [max 18 cr.] ; Student Option; Periodic Fall & Spring)
General topics in public policy.

PA 5993. Directed Study in Public Affairs. (1-3 cr. ; Student Option; Periodic Fall, Spring & Summer)
Self-directed study, with faculty advice.

PA 8003. Integrative Doctoral Seminar in Public Affairs I. (3 cr. [max 6 cr.] ; A-F only; Every Fall)
Lays foundation for doctoral-level study of public affairs through introduction of key concepts, literature, research questions of public affairs. Critically examines paradigms/ methodologies through readings, discussions, writing assignments, research presentations. Facilitates development of dissertation research ideas. prereq: Public Affairs doctoral student

PA 8004. Integrative Doctoral Seminar in Public Affairs II. (3 cr. ; A-F only; Every Spring)
Continues PA 8003. Lays foundation for doctoral-level study of public affairs through introduction of key concepts, literature, research questions of public affairs. Critically examines paradigms/methodologies through readings, discussions, writing assignments, research presentations. Facilitates development of dissertation research ideas. prereq: Public Affairs doctoral student

PA 8005. Doctoral Research Seminar in Public Affairs. (3 cr. ; A-F only; Every Spring)
Conduct of research, including ethics. Students develop and refine their research ideas. Facilitates development of dissertation research prospectus. prereq: Public Affairs doctoral student

PA 8006. Current Research in Public Affairs: Topics, Approaches, and Cultures. (1.5 cr. [max 3 cr.] ; S-N only; Every Fall & Spring)
Students participate in research seminars exploring current topics, approaches, and cultures in public affairs. Students responsible for discussion, presentation, and evaluation of research, including peer review of papers and presentations. Discussion of research ethics and skills, including literature reviews, research design, data visualization, public engagement, presentation, and project management.

PA 8081. Capstone Workshop. (; 3 cr. [max 6 cr.] ; A-F only; Every Fall, Spring & Summer)
Project for external client on issue agreed upon by student, client, and instructor. Students apply interdisciplinary methods, approaches, and perspectives from core courses. Written report with analysis and policy recommendations. Oral presentation. Topics vary by term. prereq: completion of core courses or instr consent

PA 8082. Professional Paper-Writing Seminar. (3 cr. ; A-F or Audit; Every Fall & Spring)
Facilitates completion of research paper on current issues in public policy, management, and science, technology and environment. Students apply interdisciplinary methods, approaches, and perspectives studied in core courses. Written report includes analysis of issue, policy recommendations. All topics accepted. Plan A students welcome. prereq: completion of core courses, or instr consent

PA 8151. Organizational Perspectives on Global Development & Humanitarian Assistance. (3 cr. ; A-F only; Every Fall)
Organizational analysis of international development and humanitarian assistance, including perspectives from sociology, political science, psychology, public administration, and management. Examines efforts of multiple organizational players, including NGOs, governments, bi-lateral and multi-lateral organizations, corporations, foundations, and international organizations. Critical analysis of aid organizations, especially regarding ways in which they reflect and create power and privilege, the manner in which individuals' needs and desires interact with, support, or challenge the needs of the organization, and how all of this is influenced by forces outside the boundary of the organization. Students increase analytical capabilities in understanding international aid organizations in the context of multiple (and often contested) perspectives on global development and stakeholder demands. Class time involves class discussions, mini-lectures, simulations, and case analyses. Main graded work is a research prospectus or longer research paper.

PA 8190. Advanced Topics in Public and Nonprofit Leadership and Management. (; 1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)

Selected topics.

PA 8206. Planning Theory. (3 cr. ; A-F only; Every Spring)
An overview of the major theories that have shaped the field of urban and regional planning, including the analysis of theories related to the process and substance of urban planning. prereq: Public Affairs Ph.D. student, urban planning subplan

PA 8290. Advanced Topics in Planning. (; 1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Selected topics.

PA 8302. Applied Policy Analysis. (4 cr. ; Student Option No Audit; Periodic Fall & Spring)
Design/evaluation of public policies. Emphasizes market/non-market contexts. Microeconomics and welfare economics of policy analysis. Econometric tools for measurement of policy outcomes. Applications to policy problems. prereq: Intermediate microeconomics, introduction to econometrics

PA 8312. Analysis of Discrimination. (4 cr. ; Student Option; Periodic Fall & Spring)
Policy analysis/other applied social sciences as tools for measuring/detecting discrimination in market/nonmarket contexts. Application of modern tools of labor econometrics/race relations research to specific problems of market/nonmarket discrimination.

PA 8331. Economic Demography. (3 cr. ; A-F or Audit; Every Spring)
Classical theory, advanced econometric methods, recent empirical work, and available datasets for research in economic demography. Topics include the economics of mortality, fertility, migration, marriage, women's labor supply, intra-family bargaining, and age structure. Students develop critical analysis and academic discourse skills through in-depth discussions and replications of papers, presentations, referee-style writing assignments, and a term paper. prereq: Grad-level economic theory (PA 5021 or equiv) and econometrics (PA 5033 or equiv) and instructor permission

PA 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

PA 8390. Advanced Topics in Advanced Policy Analysis Methods. (; 1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Selected topics.

PA 8444. FTE: Doctoral. (1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
FTE: Doctoral prereq: Doctoral student, adviser and DGS consent

PA 8461. Global and U.S. Perspectives on Health and Mortality. (3 cr. ; Student Option; Every Fall)
The health of populations in developing and developed countries is very different. Within countries, great health disparities exist between more advantaged and more disadvantaged populations. When crafting policies that aim to improve population health, it is crucial to know how to measure health and how to think about the health needs of the specific population in question. This course will provide an overview to the factors driving health, mortality, and aging across different populations. In addition, students will learn the best sources of data and measures to use to describe the health status of a population. They will also be able to assess policy options that address the health of their population.

PA 8490. Advanced Topics in Social Policy. (; 1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Selected topics.

PA 8590. Advanced Topics in Economic and Community Development. (; 1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Selected topics.

PA 8601. Global Survey of Gender and Public Policy. (3 cr. ; A-F only; Every Fall)
Graduate level introduction to the key theoretical concepts and tools necessary for gender policy analysis. Survey of the major findings in the field of gender and public policy in policy areas such as poverty alleviation, health, international security, environment and work-family reconciliation. Scope includes local, national, and global policy arenas as well as exploration of gender and the politics of policy formulation.

PA 8666. Doctoral Pre-Thesis Credits. (1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Doctoral Pre-Thesis Credits prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr.

PA 8683. Gender, Race and Political Representation. (3 cr. ; A-F only; Spring Even Year)
Explores intersection of gender, race and political issues to identify best practices for strengthening roles of under-represented groups in governance. Individual, structural and institutional factors attributed to increasing the election and appointment of under-represented groups. Theories of citizen representation. Global approach with cross-national evidence and comparative country studies.

PA 8690. Advanced Topics in Women, Gender and Public Policy. (; 1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Selected topics.

PA 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

PA 8790. Advanced Topics in Science, Technology, and Environmental Policy. (; 1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Selected topics.

PA 8888. Thesis Credit: Doctoral. (1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Doctoral thesis credit. prereq: [Max 18 cr per semester or summer], 24 cr required

PA 8890. Advanced Topics in Foreign Policy and International Affairs. (; 1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Selected topics.

PA 8921. Master's: Professional Paper (Individual Option). (; 1-3 cr. ; Student Option; Every Fall, Spring & Summer)
Students work under guidance of paper adviser and committee members to complete their Professional Paper (individual option). prereq: instr consent

PA 8922. Master's Paper: Plan B. (; 1-3 cr. ; Student Option; Every Fall, Spring & Summer)
Masters of science in science, technology, and environmental policy majors work under guidance of paper adviser to complete their Plan B. prereq: instr consent

PA 8991. Independent Study. (; 0.5-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent study. Limit of 6 credits applied toward a Humphrey School of Public Affairs degree or post-baccalaureate certificate program.

Public Health (PUBH)

PUBH 5231. Emergency Preparedness: A Public Health Perspective. (; 2 cr. ; A-F only; Every Spring)
Public health emergency preparedness, response, recovery. Introduction to field's core competencies. Various components of course, including online modules, intended to stimulate interactions among learners. Purpose, history, organization, functions, tools, activities used in field. prereq: Upper-level undergraduate students and grad/professional students in academic health sciences and fields related to public health emergency preparedness, response, and recovery. Credit will be not granted if student has completed the PubH 5230 topic course with same title.

PUBH 6000. Topics: Community Health Promotion. (; 0.5-4 cr. ; Student Option; Every Fall)
New course offerings or topics of interest in Community Health Promotion.

PUBH 6004. Global Health Capstone. (; 1 cr. ; Student Option; Every Spring)
This course is designed to facilitate learners? synthesis of the skills, knowledge, and attitudes learned throughout the Global Health Certificate courses and practiced during field experience. Each student will be guided through the creation of a portfolio of carefully selected assignments, reflections, and experiences completed during the Certificate program, along with a resume and a final reflection. Each student will then present a portfolio at the end of the course.

PUBH 6011. Public Health Approaches to HIV/AIDS. (; 3 cr. ; Student Option; Every Fall)
Survey of public health approaches to AIDS epidemic. Epidemiological/clinical features of HIV infection. Impact of AIDS on certain

communities/populations. Behavior change principles as they apply to AIDS interventions. prereq: Grad student or professional school student or instr consent

PUBH 6020. Fundamentals of Social and Behavioral Science. (; 2 cr. [max 3 cr.] ; A-F only; Every Fall, Spring & Summer)
Three major approaches to social sciences in public health: psychosocial, community approaches, economic and policy interventions. Covers theories of behavior change, program and policy development, community engagement, and policy implementation and advocacy. Not open to students in Community Health Promotion or Public Health Nutrition MPH programs.

PUBH 6034. Evaluation I: Concepts. (3 cr. ; Student Option; Every Spring)
Developing useful program evaluations. Emphasizes skills for program administrators, planners. Needs assessments. Assessment of program design, implementation, impact. Cost-effectiveness analysis. Quantitative and qualitative data collection methods. Ethical considerations.

PUBH 6035. Evaluation II: Applications. (3 cr. ; Student Option; Every Fall)
This course teaches basic research skills needed to plan, conduct, and analyze data from a quantitative research project. Skills include developing research questions;performing literature searches; performing literature searches;developing questionnaires; implementing a study; coding, entering and analyzing data using STATA software; and writing reports.

PUBH 6045. Skills for Policy Development. (; 1 cr. ; Student Option; Every Spring)
Skills relevant to policy development and implementation for public health-related issues.

PUBH 6049. Legislative Advocacy Skills for Public Health. (; 3 cr. ; A-F only; Every Spring)
State legislature as arena for public health practice. Skills necessary to operate in that arena. Analyzing emergence, development, and resolution of legislative issues of public health importance.

PUBH 6050. Community Health Promotion I: Integrating Theory, Evidence, and Context. (3 cr. ; Student Option; Every Fall)
This course examines personal, social, and environmental factors that influence health-related behaviors, as well as the role of individuals, groups, institutions, societal structures, and policy in encouraging and discouraging healthy behaviors. The course focuses on behavior change theories and application of these theories to health promotion.

PUBH 6051. Community Health Promotion II: Developing, Implementing, and Justifying Interventions. (3 cr. ; A-F only; Every Spring)
Skill development for developing community health interventions, budgets, implementation plans, and grant proposals. Credit will not be granted if credit has been received for PubH 6673.

PUBH 6055. Social Inequalities in Health. (; 2 cr. ; Student Option; Every Spring)
Extent and causes of social inequalities in health. Degree to which understanding of these inequalities is hampered by methodological limitations in health research. Focuses on individual, community, and policy approaches to reducing social inequalities in health.

PUBH 6060. Motivational Interviewing: Strategies to Effect Behavior Change. (1 cr. ; Student Option; Every Summer)
Introduction of the theoretical basis of motivational interviewing (MI) style. Using MI style in diverse contexts (clinical, community program, research) and relative to diverse behavioral issues (addictions, healthy lifestyle behaviors, chronic disease adherence).

PUBH 6066. Building Communities, Increasing Health: Preparing for Community Health Work. (; 2 cr. ; Student Option; Every Fall)
Taught with Powderhorn-Phillips Cultural Wellness Center. Introduction to community building/organizing. Using culture as a resource for health, reducing barriers, identifying community assets, planning organizing strategy, understanding the impact of history. Emphasizes self-reflection and skill-building for authentic, grassroots community work.

PUBH 6074. Mass Communication and Public Health. (; 3 cr. ; Student Option; Every Fall)
This course provides an overview of theory and research that lies at the intersection of mass communication and public health. We examine the potential for media exposure to influence public health outcomes, both as a product of people's everyday interactions with media and the strategic use of media messages to accomplish public health goals. To this end, we will explore large-scale public health campaigns in the context of tobacco, obesity, and cancer screening. We also will explore news media coverage of controversial health issues, such as the human papillomavirus (HPV) vaccine, and health information in entertainment media, such as smoking in movies. This course seeks to understand whether media messages have had intended and/or unintended effects on public attitudes and behavior. Although our focus is on mass media, interpersonal, medical, and digital media sources will be considered as well.

PUBH 6078. Public Health Policy as a Prevention Strategy. (; 2 cr. ; Student Option; Every Fall)
Philosophical, ethical, economic, political, efficacy rationale for policy approach to prevention. Historical/current application of prevention policy to public health problems. prereq: 2nd yr MPH or public health MS student or [Epi, Biostats, Env Hlth, HSRPconcurrent registration is required (or allowed) in A PhD student] or instr consent

PUBH 6081. Sex, Sexuality, and Sexual Health. (2 cr. ; Student Option; Every Fall)
This course is a graduate-level class for students preparing for careers in public health research and practice where sex, sexuality, and sexual health are key components. It is a highly applied, highly interactive course focused on developing skills needed in sex research and sexual health practice. The teaching pedagogical approach is a "flipped classroom" where students are expected to learn the content from the assigned audiotaped lectures, movies and readings, and to come to class ready to participate in exercises, discuss case studies, complete assignments and immerse themselves in public health practice and research focused on sex, sexuality, and sexual health. The purpose of this graduate level course is to prepare health professionals for a professional career addressing community and population sexual health concerns by deepening their knowledge of and exposure to research practice in the field, increasing comfort familiarity and ability to speak on sexual health topics, and by practicing their skills. The assignments focus on hot topics in sex and sexual health, and are designed to increase knowledge of the field of sexual health, while developing skills in conceptualization, measurement, intervention design, and evaluation. Please note this course addresses the greatest challenges in sexual health facing our world, including such hot topics as the zika virus and HIV prevention, clergy sexual abuse, campus sexual climate, sexual harassment, LGBT health disparities, contraception, abortion, women's rights, teen sex, and unplanned pregnancy.

PUBH 6094. Interventions to Address Weight-Related Health and Eating Disorders. (2 cr. ; Student Option; Every Spring)
Examine obesity epidemic, eating disorders, prevention and treatment approaches at multiple levels (individual, social, environmental, policy), links between obesity and eating disorders.

PUBH 6100. Topics: Environmental Health. (; 1-4 cr. [max 20 cr.] ; Student Option No Audit; Every Spring)
New course offerings/topics in environmental health.

PUBH 6102. Issues in Environmental Health. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Current issues, principles, and methods of environmental/occupational health practice. prereq: Public health [MPH or MHA or certificate] student or health journalism MA major or nursing MS student or instr consent

PUBH 6107. Excel Skills for Data Management in Public Health Settings. (; 1 cr. ; Student Option; Every Spring)
Hands-on course on computer skills to learn a wide range of methods to manipulate public health data. Students will be given ?raw? datasets and practice computer methods to clean, filter, recode, combine, tabulate and report data within the Excel and Access environments. The course is ideal for students who may not pursue more advanced quantitative training but still want to feel comfortable using these widely available programs to produce quality datasets for further analysis, and to generate summary

results or reports in their work as public health practitioners.

PUBH 6108. Foundations of Global Health. (2 cr. ; A-F only; Every Fall)
This course provides an introduction to key principles and topics in global health including measures of global burden of disease, identification of key health problems around the world and the main determinants, health systems and international public health organizations. In addition, we will discuss cross-cutting and timely issues in health promotion, disease control programs, and operational research in international settings. Class exercises and discussions will focus on challenging global health problems, and strategies to address them. This course is required for those students enrolled in the School of Public Health Global Health Certificate program, and is also open to other qualified students (see Course Prerequisites). Examples of diseases and illustrations of global health problems in this class will include both infectious and non-infectious diseases and should be of interest to students in various programs.

PUBH 6110. Foodborne Hazards. (; 2 cr. ; Student Option; Every Spring)
The "Foodborne Hazards" Course is designed to provide students with a good understanding of the public health impact of food contamination with various physical, chemical, and biological hazards. The course consists of two parts. The first part is to deliver didactic teaching about the biological or chemical features of a wide range of foodborne hazards. The second part (from Week 10) is designed to help the students understand contemporary food safety issues in the context of public health based on the information about foodborne hazards provided in the first part. Furthermore, this course will consider how societal, cultural, and environmental factors affect the prevalence and transmission of foodborne hazards and what control measures can be used to mitigate the risk of human exposure to foodborne hazards. The fundamental knowledge from the course will help the students take other courses related to food safety in the School of Public Health.

PUBH 6112. Environmental Health Risk Assessment: Application to Human Health Risks from Exposure to Chemicals. (2 cr. ; Student Option; Every Fall)
Introduction to risk in context of regulatory decision making. prereq: PubH 6102 or instructor permission.

PUBH 6115. Worker Protection Law. (; 1 cr. ; Student Option; Every Spring)
Role of government in protecting rights of citizens. Labor movement history as starting point for discussion of systems for protecting workers in unsafe workplaces and compensating them for injuries. Laws against class-based discrimination.

PUBH 6116. Environmental Law. (; 1 cr. ; Student Option; Every Spring)
Questions when pollution protection law conflicts with policy encouraging the use of natural resources. Conflicts when government restricts use of property without compensating its owner. Increasing authority of government to audit businesses.

PUBH 6120. Injury Prevention in the Workplace, Community, and Home. (; 2 cr. ; Student Option; Every Spring)
Injury epidemiology: analyses of major injury problems affecting the public in the workplace, community, and home using epidemiologic model and conceptual framework; emphasis on strategies/program development for prevention and control.

PUBH 6123. Violence Prevention and Control: Theory, Research, and Application. (; 2 cr. ; Student Option; Every Spring)
Analysis/critique of major theories and of epidemiological research pertinent to violence, including characteristics of violence and relevant risk factors, reporting/treatment protocols, and current/potential intervention efforts and prevention initiatives. Emphasizes interdisciplinary contributions to violence prevention/control.

PUBH 6130. Occupational Medicine: Principles and Practice. (2 cr. ; S-N only; Every Spring)
Pathogenesis of diseases caused by occupational hazards. Evaluating work-related illnesses. Overall regulatory framework governing occupational health/safety. prereq: Environmental health major; toxicology course recommended or instr consent

PUBH 6131. Working in Global Health. (2 cr. ; Student Option; Every Spring)
Introduction to key issues in global health. Global burden of disease. Cultural issues/ health. Nutrition. Infectious diseases. Environmental problems. Women/children. Prereq Grad student.

PUBH 6132. Air, Water, and Health. (; 2 cr. ; A-F only; Every Spring)
Issues related to providing adequate levels of clean air/water. Local water quantity/quality, air quality in developed/developing world, global air/water quality, policies meant to protect these resources.

PUBH 6134. Sustainable Development and Global Public Health. (2 cr. ; Student Option; Every Spring)
Effects of globalization on social/sustainable development. Population, war, economics, urbanization, environment, water/sanitation, communicable/non-communicable conditions. New infectious/chronic diseases, food security/ environmental health. prereq: Credit will not be granted if received for 6100 or 6365

PUBH 6135. Job Search Strategies and Career Professional Development. (1 cr. ; S-N only; Every Spring)
This course is intended for students who are interested in learning how to develop a meaningful career in Public Health and related fields. Students will learn skills that they can apply to finding an Applied Practice Experience or internship, and to finding employment. The skills include the following: assessing self-awareness/strengths, researching job/ internships and employers, relationship-building (networking), interviewing, self-marketing (e.g. resumes, cover letters), identification of professional goals, and professionalism in the workplace. The focus is primarily non-academic careers but some class content and work may also apply to academic job searches and careers.

PUBH 6140. Occupational and Environmental Epidemiology. (; 2 cr. ; Student Option; Every Spring)
Principles/concepts in identifying health effects in workplace. Strategies for identifying excess risk, evaluating strengths/weaknesses of research techniques, assessing bias/ confounding. prereq: Coursework in epidemiology, biostatistics

PUBH 6141. GIS & Spatial Analysis for Public Health. (3 cr. ; Student Option No Audit; Every Fall)
This course examines how to incorporate and handle spatial data to address public health questions, such as evaluating environmental exposures or identifying vulnerable and at-risk populations. We will utilize a Geographic Information System (GIS) to incorporate and visualize data for public health research. Classwork will be presented in the form of health-related case studies where GIS helps to formulate and address scientific hypotheses based on research topics in the School of Public Health. Specifically, the ArcGIS software will be used as a tool to integrate, manipulate, and display spatial health data. Topics include understanding spatial data, mapping, topology, spatial manipulations related to data structures, online data, geocoding, remote sensing imagery, and reviewing public health literature. The course will emphasize how to prepare spatial data for a formal statistical analysis. All coursework will be discussed in the context of statistical frameworks for evaluating geostatistical, point pattern, and area-level (or lattice) data examples. The intended audience for this course are masters and doctoral students who seek a more advanced understanding of GIS and spatial data beyond exploratory skills. Their goal should be a working knowledge of spatial analysis that can be readily applied in future research or employment. Students should leave this course prepared to take more advanced spatial analysis courses, map geographic trends, formulate scientific hypothesis for epidemiological applications, with the knowledge to acquire online spatial data, and the skills to critically evaluate published papers that utilize GIS.

PUBH 6150. Interdisciplinary Evaluation of Occupational Health and Safety Field Problems. (; 3 cr. ; Student Option; Every Spring)
Guided evaluation of potential health/safety problems at work site, recommendations and design criteria for correction/evaluation of occupational health/safety programs.

PUBH 6151. Occupational and Environmental Health Nursing Seminar. (; 1 cr. [max 6 cr.] ; S-N only; Every Fall & Spring)
Synthesize information from coursework/ professional experience to enhance critical

thinking/application to field of occupational/ environmental health nursing. prereq: Enrolled in OEHN program, MS, MPH, PhD degrees

PUBH 6154. Climate Change and Global Health. (3 cr. ; Student Option; Every Spring)
Interconnected relationships between global climate change/human health. Develop computer models to predict climate change from natural/anthropogenic forces, predict human health outcomes as result of changing climate. prereq: Students must have elementary computer skills.

PUBH 6159. Principles of Toxicology I. (2 cr. ; A-F only; Every Fall)
This is the first of two courses that covers fundamental principles of exposure, uptake and metabolism. This course focuses on identifying the mechanisms and effects of chemical, biological, and physical agents on human health. Discussions will focus on the action of environmental agents and how they interact with humans to cause disease. Emphasis is on understanding the principles of toxicology as they apply to understanding toxicant-human interactions.

PUBH 6160. Principles of Toxicology II. (3 cr. ; Student Option; Every Spring)
This second part of the Principles of Toxicology course is focused on toxicodynamics. In this course,students will learn to apply their knowledge of basic toxicokinetic principles and metabolic systems to elucidate mechanisms of toxicity induced by xenobiotic compounds. In addition, they will learn basic principles of omics-based approaches and methodologies, and how such data can be integrated to assess and predict adverse effects of chemical exposures across multiple levels of biological complexity. At the end of the course, students will give a scientific presentation on a published article of their choice (approved by instructors) that explores the mechanism of a toxicodynamic process. prereqs: Biochemistry and PubH 6104 or permission of the instructor

PUBH 6161. Regulatory Toxicology. (; 2 cr. ; Student Option; Every Spring)
In-depth introduction to laws (and associated regulations) of U.S. federal regulatory agencies, such as CPSC, EPA, FDA, OSHA, and DOT, that require/use toxicological data/ information in their mission of protecting human/environmental health. prereq: Background in toxicology or pharmacology or related field is recommended

PUBH 6170. Introduction to Occupational Health and Safety. (; 3 cr. ; Student Option; Every Fall & Summer)
Concepts/issues in occupational health/safety. Application of public health principles/decision-making process in preventing injury/disease, promoting health of adults, protecting worker populations from environmental hazards. Observational visit to manufacturing facility. prereq: Environmental health major or instr consent

PUBH 6172. Industrial Hygiene Applications. (; 2 cr. ; Student Option; Spring Odd Year)
Recognition, evaluation, and control of occupational health/safety hazards. Practice application to specific industrial hygiene problems related to gases/vapors, aerosols, and physical agents.

PUBH 6173. Exposure to Physical Agents. (; 2 cr. ; Student Option; Spring Even Year)
Nature, health effects, monitoring, and control of physical agents in working/living environments. Ionizing/non-ionizing radiations (including lasers, ultraviolet, visible, and infrared light). Noise/vibration, heat/cold stress. Dose, response, and engineering interventions.

PUBH 6174. Control of Workplace Exposure. (; 3 cr. ; Student Option; Spring Odd Year)
Hierarchy of options for controlling human exposures to airborne contaminants, both gaseous/aerosol. Science/practice of process control/exhaust ventilation in workplaces/ other indoor air spaces/air cleaning. Control of emissions to ambient environment.

PUBH 6175. Environmental Measurements Laboratory. (; 2 cr. ; A-F only; Spring Even Year)
Measuring exposures to potentially hazardous agents in air or water. Sampling the agent. Preparing sample for analysis. Conducting analysis. Interpreting results. prereq: EH or instr consent

PUBH 6176. Hazardous Materials and Waste Management. (; 2 cr. ; Student Option; Fall Even Year)
Generation, control, and disposal of hazardous materials/wastes. Recognizing, evaluating, controlling, and preventing hazards from chemicals that threaten occupational/ environmental health. Lectures, case studies, workshops, field trips. prereq: [6170, [courses in [chemistry, organic chemistry] or equiv]] or instr consent

PUBH 6177. Nanotechnology Health and Safety. (3 cr. ; Student Option; Every Fall)
As defined by ASTM, nanotechnology is the emerging field of "technologies that measure, manipulate, or incorporate materials and/or features with at least one dimension between approximately 1 and 100 nm". Toxicology studies have indicated that exposures to nanomaterials present unique health risks not encountered with their parent materials. After completing this course, students will understand how the fundamental concepts and methods of occupational hygiene are applied specifically to nanomaterials. Students will learn to use aerosol science, toxicology, product lifecycle assessment, exposure assessment, and occupational hygiene data interpretation methods comprehensively to evaluate workers' disease risks from nanomaterial exposures and to guide intervention efforts. Emphasis will be placed on control measures appropriate for nanomaterials, and control banding approaches when data are lacking. Participants will study the handling of waste products and potential impacts of released nanoparticles on the public and the ambient environment. The course is aimed at graduate and upper-level undergraduate students in the health and basic sciences, engineering, public health, and industrial hygiene.

PUBH 6180. Ecology of Infectious Diseases. (; 3 cr. ; Student Option; Every Fall)
Ways in which host, agent, and environmental interactions influence transmission of infectious agents. Environmental dissemination, eradication/control, evolution of virulence, analytical/molecular tools.

PUBH 6181. Surveillance of Foodborne Diseases and Food Safety Hazards. (; 2 cr. ; Student Option; Every Fall)
Principles/methods for surveillance of foodborne diseases. Investigation of outbreaks, assessment of food safety hazards. Focuses on integration of epidemiologic/lab methods.

PUBH 6182. Emerging Infectious Disease: Current Issues, Policies, and Controversies. (; 3 cr. ; Student Option; Every Spring)
Issues/controversies surrounding emerging infectious diseases. Framework for considering realistic/innovative policies. Bioterrorism, public health preparedness. Pandemic influenza preparedness, smallpox vaccination, antibiotic resistance. prereq: AHC student, instr consent

PUBH 6183. Theory and Practice in Foodborne Disease Outbreak Detection, Investigation and Control. (1 cr. ; S-N only; Every Spring)
This course focuses on the practical basis for developing and implementing methods for foodborne disease outbreak detection, investigation and control; using recent outbreaks to highlight underlying principles. The course will review biological characteristics of major foodborne disease pathogens, clinical features of the illnesses they cause and epidemiologic presentations of foodborne outbreaks. The implications of these characteristics will be discussed in a problem solving, seminar format that examines theory and practice in the context of recent outbreaks. Strategies to promote timely decision-making will be emphasized.

PUBH 6184. Field and laboratory methods in public health entomology. (2 cr. ; Student Option; Periodic Fall & Spring)
Pathogens transmitted by arthropods, particularly mosquitoes and ticks, inflict human disease all over the world. These pathogens represent a broad diversity of persistent foes as well as emerging challengers. PubH 6184: Field and laboratory methods in public health entomology will provide students with the tools and experiences that they will need to be conversant on the topic with both the general public and public health entomology experts. This course is intended to prepare MPH, Veterinary, and other graduate and undergraduate student to work alongside these experts and be able to contribute intelligently to entomological problems they might encounter during their future careers. To this end, rather than having a heavy emphasis on lectures and textbooks, the course has many field trips to professional entomology facilities, field work, and laboratory projects.

PUBH 6190. Environmental Chemistry. (; 3 cr. ; Student Option; Every Fall)

Overview air, water, and soil chemistry. Pertinent environmental problems. Human/ecological multimedia exposures to chemicals in the environment. prereq: One course each in [gen chem, org chem] or instr consent

PUBH 6192. Measurement and Properties of Air Contaminants. (; 2 cr. ; A-F or Audit; Every Fall)
Gaseous/particulate air contaminants, their occurrence in workplaces. Factors governing generation/dispersal. Criteria, rationales, and standards for measurement in workplace. Industrial hygiene measurement. Aerosol-related ill-health. prereq: Good grasp of [elementary physics, chemistry, mathematics including calculus]

PUBH 6193. Advanced Topics in Human Exposure Science. (; 2 cr. ; A-F only; Every Fall)
Designing exposure studies for epidemiologic investigations and health risk assessments. Techniques to measure/estimate human exposures to hazardous agents in non-occupational and occupational environments. prereq: 6192 or instr consent

PUBH 6194. Climate Change and Public Health: The Science and Public Health Responses. (; 2 cr. ; Student Option No Audit; Every Fall)
Climate change presents an almost unimaginable crisis to our existence. Its profoundness is coupled with an urgency to find solutions that contribute to collective and transformative actions. There is scientific consensus that the existence of human beings (and many other species) on the planet is in danger because of fossil fuel emissions. Human activity has led to increasing greenhouse gases (especially carbon dioxide) and a warming planet. A warming planet has negative consequences in terms of environmental degradation, extreme weather events, and social disruption?all of which have health and economic consequences. While the basic problem is acknowledged by scientists in diverse fields, many of the proposed responses to the current and projected climate-related changes are contrary to powerful political, cultural, industrial, and economic interests. The challenges posed by these interests, as well as the complexity (and sometimes imprecision and uncertainty) of the science, make it difficult for individuals to clearly understand the threats and the opportunities that must be addressed in the next several decades if the earth is to remain habitable for almost 9 million species. Hearts and minds must change quickly. Public and professional educational efforts must be massive, with clear messages of hope, urgency, and direction. Local, national, and global adaptation and mitigation responses must thus be palatable and accessible to diverse communities as well as to powerful economic and political entities. Public health policies, programs, services, and educational efforts must necessarily be created by multidisciplinary teams using community-focused approaches. These efforts must reach all affected individuals and entities, especially those who are most vulnerable to the negative sequalae of climate change. They must also effectively address the many political, social, and cultural barriers to the kind of transformative actions that are necessary to maintain the habitability of the planet. The course will take a public health perspective to encourage students to learn and critically evaluate information about three major content areas: (1) the science of climate change and its public health contextualization; (2) the existing, and projected, consequences of climate change to the environment, to human health, and to institutions and infrastructures that affect public health; and (3) public health mitigation and adaptation responses for industries, governments, communities, and individuals. A special emphasis will be placed on public health communications of climate change science, risks, and public actions. Credit will not be granted if credit has been received for PubH 7200 Climate Change and Public Health

PUBH 6200. Topics: Foundations of Interprofessional Communication and Collaboration. (; 0.5-4 cr. [max 80 cr.] ; S-N only; Periodic Fall)
First of three phases of the Center for Interprofessional Education's 1 HEALTH curriculum. Online hybrid course requiring students to attend small group face-to-face sessions. prereq: [MHA or MPH or MS] student

PUBH 6241. American Indian Public Health and Wellness, Health Policy, Law, Health Services Administration. (2 cr. ; A-F only; Every Fall)
As sovereign nations, American Indian Tribes are responsible for the overall health and well-being of their members along with the land and environment of their respective tribe. Tribes are becoming increasingly involved in more public health activities and regulations, and deliver public health services through various funding sources, grants, and contracts, alone or in collaboration with other tribes and local governments, county and state health departments. This course provides a general basis for understanding American Indian public health and wellness. Central to this area of study, is an appreciation to understand the unique governmental relationship based on how the federal government relates to tribal nations as distinct sovereign political entities, not as a racial classification. The trust responsibility is a government to government relationship as established in the U.S. Constitution. In this course students will learn about the legal responsibility of the United States to the 574 federally recognized tribes, to provide health services to American Indians. Students will examine the public health issues facing American Indian communities; review historical implications, analyze legislation, apply specific financing requirements, and gain an understanding of the unique American Indian public health system and the complex set of services, activities, collaborations, and stakeholders that varies by tribe and region. This is a required course for those seeking a certificate or minor. It is designed to help students understand how to work respectfully and effectively with tribes and American Indian communities, to understand the basis of health services and implications of specific tribal (local and federal) law to help improve the devastating health issues currently experienced by American Indians. While this course focuses on American Indian Public Health and Wellness, Health Policy, Law, Health Services Administration, there are many parallels that can be made by students related to other governance structures from around the world. The lessons can help fortify the knowledge of all students regardless of race, and culture, that can be utilized in individual professional endeavors.

PUBH 6242. Cultural Humility with American Indian Populations. (; 2 cr. ; Student Option; Every Spring)
The course will present evidence that cultural humility is a lifelong quest toward achieving positive outcomes in work with American Indian Tribes and American Indian communities. It is essential that health care and health service providers learn the respective cultures of the American Indian population they are serving. Equally important is the fact that every federally recognized tribe, of which there are 573, has their own unique traditional customs, history with other tribes, and often subpopulations within the governance of a single tribal government. The realization of understanding how populations have been driven by their respective cultures to their overall health and well-being is necessary to promote achievement of positive outcomes for stakeholders and communities. The course will target methods to help health professionals to ensure that health services take into account individual understanding of the professional?s knowledge and how this knowledge should be respectful of individual cultural preferences. A systematic process will be provided to assist in how to learn community policies, learning processes, and traditions; as well as learning about various structures by which the culture of governments, organizations and individuals develop and support the attitudes, behaviors, practices and systems that are needed for effective cross-cultural interactions between health professionals and community members. Students will learn that ultimately, cultural humility effectiveness is determined by the individual who is receiving the services. The course is grounded in the understanding that cultural humility can effectively be used to strive for continuous improvement, to effectively utilize assets and address the health needs of individual American Indian communities.

PUBH 6243. American Indian Research, Evaluation and Collaborations. (; 2 cr. ; A-F only; Every Spring)
As sovereign nations, American Indian Federally Recognized Tribes are responsible for the overall health and well-being of their populations, as well as controlling research and evaluation activities; and development of formal collaborations. A duly elected Tribal government is responsible for all functions and activities of the Tribe. Tribes have an inherent and legal responsibility to protect Tribal affairs, businesses, and traditional values and customs. Included in Tribal responsibilities

is the ability to develop and maintain policies to protect the integrity of operations and guard against predatory and harmful use of data against the population they serve. This is an absolute and non-negotiable function of a Tribe to ensure present and continued viability of all future generations. This course will provide specific examples of data sharing agreements, Memorandums of Agreement or Understanding, legal basis for confidentially, discuss community readiness, and community evaluations. It is designed to help students understand how to work respectfully and effectively with Tribes and American Indian communities, and to understand the basis of research, evaluation, and collaboration. This course focuses on stakeholder driven: participation, issue identification, data sharing, and benefit to community. To help ensure ethical and cultural values are protected an increasing number of Tribes are forming their own Institutional Review Boards (IRBs) under 45 CFR 46. The course will offer examples of Tribal IRBs and specific IRB components for American Indian populations. Tribal governments represent communities with distinctive social, cultural, and spiritual qualities that embody a unique context for the review and conduct of research. This course will provide numerous examples of Tribally developed research and review mechanisms that are tailored to specific community needs and interests.

PUBH 6244. American Indian Health & Wellness Equity. (; 2 cr. ; Student Option No Audit; Every Fall)
American Indian health-related problems and the lack of adequate health care and services has resulted in a disproportionate burden of disease and social suffering on the population. History indicates that time and again health inequities are directly and indirectly associated with colonization, social support, hope, general resilient coping abilities, traditional cultural and spiritual practices, ethnic pride/enculturation, community mastery, and political inequities. It is also important to understand how American Indians ?survived? to this day. Resilience is a major factor in understanding health and wellness equity. It is also important to understand the unique differences between each of the 574 tribal governances, cultural traditions, respect for elders, community reciprocity, historical trauma, kinship, food security, healing, economy, social dependence and extended family of each of the 574 federally recognized tribes and American Indian Communities. While this course focuses on American Indian public health and wellness equity, there are many parallels that will be discussed as this history relates to other oppressed populations. These historical lessons help fortify the knowledge of all students regardless of race, and culture, by learning accurate American Indian heath and wellness equity issues, and other experiences of ?tribal-like? populations from around the World that can be utilized in individual professional endeavors. From the earliest days of colonization, the diseases brought from the ?Old World? proved far more lethal than any weapon in the European arsenal. Infectious diseases, including measles, smallpox, and plague, among others, annihilated entire communities lost forever from history. The toll taken by infectious disease, when combined with the effects of war, the expulsion of virtually all American Indians from their ancestral lands, and the destruction of traditional American Indian ways of life, effectively destroyed the historical governance structures previously employed by American Indians. As a consequence, American Indians became dependent on the federal government for the provision of health services as noted in the U.S. Constitution. American Indians are dying of preventable diseases including: diabetes, alcoholism, tuberculosis, suicide, unintentional injuries, and other health conditions at shocking rates above the general U.S. population. This course will discuss the differences of health disparities and health assets from the Northern Plains Tribes to other regional areas and other populations. The course will offer examples about communication plans, hopelessness behaviors, public perceptions, resilience, and social marketing in Indian Country. Constructs learned from this course can be advantageous for students to adapt to other unique populations around the world. Learning how American Indian?s resiliences and assets have allowed this population to exist today are valid examples that can be utilized (with adaptations) for non-American Indian populations.

PUBH 6245. American Indian Environmental Health Tribal Case Studies. (; 2 cr. ; Student Option No Audit; Every Spring)
Unique legal, political, and cultural dynamics surround environmental health in federally recognized American Indian Tribal communities. From the earliest days of colonization, the diseases brought from other populations proved far more lethal than any arsenal. Infectious diseases, including measles, smallpox, and plague, among others, annihilated entire communities lost forever from history. The toll taken by infectious disease, when combined with the effects of war, and the expulsion of virtually all American Indians from their ancestral lands, destroyed knowledge about traditional healing plants and natural resources. This lost knowledge has a direct impact on using historical practices that was based on practicing environmental protection as a means of survival. While this course focuses on American Indian environmental case studies and resulting inequities, there are many parallels that will be discussed as this history relates to other oppressed populations. These historical lessons help fortify the knowledge of all students regardless of race, and culture, by learning accurate American Indian environmental issues, and other experiences of ?tribal-like? populations from around the World to be utilized in individual professional endeavors. American Indian tribes are sovereign governments, with inherent and Constitutional powers of self-governance over their citizens and their territories. Historically, tribes had utilized a governance structure to advance and maintain natural resources, traditional diets, life styles, food sources, spiritually that respects earthly harmony, and preservation of resources for future generations. Case studies will be used that utilize current best or promising practices that have served as model programs to address diabetes, smoking, cancer, integration of traditional healing, health policy, community engagement, private sector partnerships, and tribal self-determination in health and wellness systems. This course will offer an examination of historical environmental health case studies and the resulting inequities to justify methods for learning and gaining confidence in working with tribal communities, establishing collaborations to improve awareness of social and cultural contexts, honoring traditional customs, and respecting traditional spiritually practices. The focus of the course will be promotion/development of policies that include tribal participation that advances positive tribal public and environmental health. This course is designed to help students understand how to work respectfully and effectively with tribes and American Indian communities, to understand the accurate environmental history and historical trauma as it relates to understanding health inequities and the devastating health issues currently experienced by American Indians. Constructs learned from this course can be advantageous for students to adapt to other unique populations around the world. Learning the promotion and or development of policies that include community participation are critical to understanding readiness to foster public and environmental health for all populations.

PUBH 6246. General History of American Indians Post Colonization and Review of Historical Trauma. (; 2 cr. ; A-F only; Every Fall)
As sovereign nations, American Indian Tribes are responsible for the overall health and well-being of their members. Tribes are becoming increasingly involved in more public health activities and regulation, and deliver public health services through various funding sources, grants, and contracts, alone or in collaboration with other tribes and local, county, and state health departments. The history of American Indians pre and post colonization will be discussed as it relates to the health and wellness of present day American Indians. There are significant Indigenous knowledge lessons that will be shared from American Indians who lived and continue to live upon their land (including forced relocation to non-traditional land) to help understand the relationship to the land culture and its other inhabitants today. While this course focuses on American Indian history, there are many parallels that will be discussed as this history relates to other oppressed populations. These historical lessons help fortify the knowledge of all students regardless of race, and culture, by learning accurate American Indian history, and other experiences of ?tribal-like? populations from around the World to be utilized in individual professional endeavors. American Indian tribes have had a unique history with the United States that is mixed with conflict, warfare, lack of cooperation, and lack of collaboration. This history has resulted in a complex unique web of federal Indian policy,

treaties, and inter- governmental relationships. Services provided to American Indians persons have been guaranteed through treaties, executive orders, and other legal bases. The US Constitution established the current ?government to government? status federally recognized tribes and tribal organizations have with the federal government. In this course students will learn about the legal responsibility of the United States to the 574 federally recognized tribes and tribal organizations, to provide health services to American Indians. Students will examine the public health issues facing American Indian communities by reviewing historical implications of forced acculturation, warfare, and severely underfunded health services, that has lead to health inequities. Students will examine the health status of American Indian tribes and American Indian communities, that have/are suffering needless loss of life related to preventable and treatable illness as a matter of social justice and civil rights. The hostile environment against American Indians and resulting historical trauma from the federal government will be discussed, e.g. the United State voted against the United Nations Declaration on the Rights of Indigenous People in 2007. The United States subsequently reversed to approve in 2010. This course is designed to help students understand how to work respectfully and effectively with tribes and American Indian communities, to understand the accurate history and historical trauma as it relates to understanding health inequities and the devastating health issues currently experienced by American Indians. Constructs learned from this course can be advantageous for students to adapt to other unique populations around the world.

PUBH 6250. Foundations of Public Health. (; 2 cr. [max 4 cr.] ; A-F only; Every Fall, Spring & Summer)
In this course we will examine values, contexts, principles, and frameworks of public health. We will provide an introduction to public health, consider the history of public health, social/political determinants, impact of health disparities on race, class and gender, moral and legal foundations, public health structures, historical trauma and cultural competence, health and human rights, advocacy and health equity, communication and financing, and the future of public health in the 21st century. Grounded in theory and concepts, we will incorporate core competencies and skills for public health professionals and will focus on developing problem solving and decision-making skills through critical analysis, reflection, case studies, readings, and paper assignments.

PUBH 6261. Human Centered Design for Public Health Leadership, Practice and Innovation. (2 cr. ; S-N only; Every Spring)
Design has always played a significant role in public health, including the birth of Public Health, where John Snow discovered that a poorly designed water pump placement (sanitary system design) was the root cause of an 1854 cholera outbreak in London. Today, while the challenges facing public health leaders, researchers and practitioners have changed, the need for Human Centered Design (HCD) competencies such as systems thinking, interdisciplinary collaboration and creativity, has only become more apparent. 21st Century public health problems are what designers refer to as ?wicked problems? or those problems that are difficult or impossible to solve in the traditional sense because they are complex, long-term and constantly evolving, requiring a new set of tools and approaches well suited for HCD. HCD in public health is an applied research and innovation framework that: 1) prioritizes understanding the lived experiences of those individuals and populations most familiar with, and impacted by, a challenge; 2) recognizes the role of power and privilege in designing public health systems; 3) involves an inclusive and collaborative approach throughout the design process, and; 4) promotes iterative prototyping of assumptions and ideas to learn quickly and safely into unknowns. Those looking to address complex public health challenges such as obesity, mental illness, poverty or health disparities, will need to learn how to master a variety of practices that support cross-sectored collaboration, systems thinking, creativity, experimentation and equity: Human Centered Design is an effective compliment, convener and enhancer to other core public health, public policy and health system management policies and practices. This course is an introduction to Human Centered Design for 21st century public health leadership, practice and research and is a prerequisite for PUBH 6262 Human Centered Design for Public Health Studio I: Applying HCD for Community Health Innovations.

PUBH 6300. Topics: Clinical Research. (; 0.5-4 cr. [max 20 cr.] ; Student Option; Periodic Fall, Spring & Summer)
New courses or topics of interest in clinical research.

PUBH 6301. Fundamentals of Clinical Research. (; 3 cr. ; Student Option; Every Fall)
Concepts of clinical research design/ implementation/analysis. Students will learn skills needed for research in humans.

PUBH 6303. Clinical Research Project Seminar. (; 2 cr. ; S-N only; Every Spring)
Students will present their thesis and give and receive feedback. Students must have their project underway.

PUBH 6310. Clinical Epidemiology 1. (; 1 cr. ; Student Option; Every Spring)
Clinical epidemiology is the science of using population methods to answer individual patient questions. This course in clinical epidemiology I will cover the design of epidemiological studies and the analysis and interpretation of epidemiological data in order to answer clinical questions. A variety of study designs methods including cohort, case-control, and cross-sectional study designs will be taught. The design and analysis of clinical trials is covered in-depth by other courses (e.g. PubH 7420 and 7415) and hence is not covered here. This course is intended for MS students majoring in clinical research. Others including medical students, students in various MS programs, and MPH programs in the School of Public Health and other interested students are welcome to enroll as long as they meet the course requirements. PhD students in the School of Public Health will be better served by Clinical Epidemiology II, (see below). If you have already studied advanced methods in epidemiology or biostatistics or completed Epi Methods II (PubH 6342) or more advanced Epidemiology courses, please do not take this 1-credit course since there will be redundant material. You may be interested instead in Clinical Epidemiology II which focuses on more clinical aspects including prognosis, diagnosis, treatment and prevention.

PUBH 6311. Clinical Epidemiology II. (; 1 cr. ; Student Option; Every Spring)
Clinical epidemiology is the science of using population methods to answer individual patient questions. This course in clinical epidemiology will cover the design of epidemiological studies and the analysis and interpretation of epidemiological data in order to answer clinical questions. Clinical Epidemiology II will cover concepts related to prognosis, diagnosis, treatment and prevention. programs, MPH and PhD programs in the School of Public Health and other interested students are welcome to enroll as long as they meet the course requirements.

PUBH 6320. Fundamentals of Epidemiology. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
This course provides an understanding of basic methods and tools used by epidemiologists to study the health of populations.

PUBH 6325. Data Processing with PC-SAS. (; 1 cr. ; Student Option; Every Spring)
Introduction to methods for transferring/ processing existing data sources. Emphasizes hands-on approach to pre-statistical data processing and analysis with PC-SAS statistical software with a Microsoft Windows operating system.

PUBH 6333. Principles of Human Behavior I. (; 2 cr. ; A-F or Audit; Fall Even Year)
Theoretical perspective on etiology/modification of health behavior in individuals/communities. prereq: Epi PhD student or instr consent

PUBH 6334. Human Behavior II. (; 2 cr. ; A-F or Audit; Spring Odd Year)
Critical evaluation of major behavioral public health intervention research. Experience in research designs/methods in health behavior intervention. prereq: [6333, Epidemiology grad student in behavioral track] or instr consent

PUBH 6341. Epidemiologic Methods I. (; 3 cr. ; A-F only; Every Fall)
Introduction to epidemiologic concepts and methods: (1) Study design (randomized trials and observational studies); (2) Measures of exposure-disease association; (3) Casual inference and bias; (4) Confounding and effect modification.

PUBH 6342. Epidemiologic Methods II. (; 3 cr. ; Student Option; Every Spring)
Methods and techniques for designing, implementing, analyzing, and interpreting observational epidemiologic studies, including

cohort, case-control, and cross-sectional studies.

PUBH 6343. Epidemiologic Methods III. (; 4 cr. ; Student Option; Every Fall)
Analysis/interpretation of data from various epidemiological study designs. SAS used to demonstrate epidemiological/statistical concepts in data analysis. prereq: [6342, 6451] with a grade of at least B- or instr consent

PUBH 6344. Completing the Integrated Learning Experience: Secondary Data Analysis. (; 2 cr. ; Student Option; Every Spring)
The goal of PubH 6344 is to provide guidance and hands-on experience for developing and completing the Integrated Learning Experience (ILE) research project involving secondary data analysis of a cross-sectional, case-control, or cohort study. The course will help meet research project milestones and complete the project in a timely manner.

PUBH 6348. Writing Research Grants. (2 cr. ; A-F or Audit; Every Fall)
Focuses on NIH research grants. Mechanisms of grant writing: specific aims, hypotheses, innovation, background, approaches, evaluation analyses, principles of informed consent, budget development, and grant-review process.

PUBH 6350. Epidemiologic Methods III: Lab. (; 1 cr. ; Student Option; Every Fall)
Skills-based course in which students get hands-on experience in analysis of a variety of epidemiologic datasets using SAS programming to apply epidemiologic methods presented in PubH 6343, examine crude data for outliers, data errors and distributional assumptions, debug code when programs do not run correctly, and prepare a scientific presentation with appropriate content for introduction/background, methods, results and discussion.

PUBH 6355. Pathophysiology of Human Disease. (; 4 cr. ; Student Option; Every Fall)
Compendium of human diseases relevant to public health professionals. Focuses on cardiovascular disease, cancer, and infectious disease. Presented from epidemiologic perspective. Significance of diseases in terms of prevalence, incidence, morbidity, and mortality. Risk factors, prevention strategies. prereq: Epidemiology major or public health nutrition major or instr consent

PUBH 6365. Global Challenges in Infectious Disease Epidemiology. (2 cr. ; Student Option; Every Fall)
This course will focus on the considerable burden due to infectious diseases within middle and low-income countries, as well as the underlying risk factors that lead to their emergence and spread. Students will learn about and review different measures of disease burden and health status. Different diseases of international public health significance will be reviewed, with a focus on epidemiologic research and methods used describe and analyze disease determinants. The course will also expose students to different interventions (prevention and control strategies) that have been used in both emergency situation, and to reduce the burden of more endemic diseases that significantly impact the health of populations. The scientific literature concerning specific diseases of interest will be examined and discussed in order to illustrate these principles. We recognize that it is impossible to cover all subjects in global health. Using a case-study approach, the course will instead select a variety of infectious diseases of international importance. We will focus instead on approaches to dealing with these different problems, and some of the methodologies used to study them. This course will allow students to gain both skills and a greater understanding of public health research and practice as it applies to international health. prereq: [6320 or 6341, instr consent] master's or doctoral level student in School of Public Health

PUBH 6366. Modeling and Mapping for Infectious Disease Epidemiology. (2 cr. ; Student Option; Every Fall)
Infectious disease epidemiology is a topic within the field of epidemiology that covers: 1) Principles and concepts of infectious disease transmission dynamics necessary to understand how and why diseases spread, and 2) Epidemiologic methods, including study designs, needed to quantify key aspects of an infectious disease This course will discuss: 1) How to use modeling to gain insight into the spread and control of infectious disease, and 2) The role that geography and GIS plays in gaining insights into the emergence and spread of an infectious disease. Students will learn key epidemiologic concepts that determine who is at risk for acquiring an infectious disease, how infectious diseases spread, and what measures can be taken to prevent or control the spread of an infectious disease. This course will focus on how simulation modeling and spatial analyses can provide insights into what contributes to the spread of an infectious disease. In addition, students will learn how to read and critically review peer-reviewed publications on infectious disease epidemiology using examples drawn from local, national, and international settings.

PUBH 6370. Social Epidemiology. (; 2 cr. ; Student Option; Spring Even Year)
How a society's social interactions, past and present, yield differential exposures and differences in health outcomes between persons who make up populations. New disease-specific risk factors. How well-known exposures emerge and are maintained by social system.

PUBH 6381. Genetics in Public Health in the Age of Precision Medicine. (; 2 cr. ; Student Option; Every Fall)
Our understanding of human genomic variation and its relationship to health is expanding rapidly. This knowledge is now being translated primarily through the field of ?precision medicine? (finding the right drug for the right person at the right time). Public health, in contrast, seeks to abate the social and environmental factors that lead to disease and health disparities. This course will provide an introduction to the field of public health genomics at this interesting point in its history. Approximately one-half of the course is devoted to Genetic Epidemiology, or the science of detecting genetic risk factors for human disease. The other half of the course will cover public health genomics, including ?precision public health?, genetic screening programs, and the possibilities and pitfalls of direct to consumer marketing of genetic tests. How genomics relates to health equity will be a recurring theme of this course. This is a graduate course designed primarily for Epidemiology MPH and PhD students, and fulfills the ?Epi Of? requirement for the MPH in Epidemiology. Graduate students from other programs are very welcome.

PUBH 6384. Research Methods in Global Health Infectious Disease Epidemiology. (1 cr. ; Student Option No Audit; Every Fall)
This course is designed to run concurrently with PubH 6365 (Global Challenges in Infectious Disease Epidemiology) as an optional 1 credit didactic seminar/discussion section. This course will specifically focus on epidemiologic research and methods used to describe and analyze determinants for infectious diseases of international importance, as well as interventions designed for their prevention and control. The course will focus on a critical review and discussion of articles in the peer-review literature, which have been chosen to accompany topics discussed in PubH 6365, and which have been chosen to illustrate different methodologies used in infectious disease epidemiologic research.

PUBH 6385. Epidemiology and Control of Infectious Diseases. (; 2 cr. ; Student Option; Every Spring)
Principles and/ methods. Strategies for disease control and prevention, including immunization. Relevance of modes of transmission of specific agents for disease spread and prevention. Public health consequences of infectious diseases at local, national, and international levels.

PUBH 6386. Cardiovascular Disease Epidemiology and Prevention. (; 2 cr. ; Student Option; Every Spring)
The course will provide an introduction to cardiovascular disease (CVD) epidemiology. It is intended to provide a detailed perspective on the well-established risk factors for CVD, as well as an introduction to emerging risk factors. Both observational studies and clinical trials will be discussed. The class will include a main focus on prevention of cardiovascular disease, and national recommendations for treatment and prevention. Several classes will incorporate discussions of new directions and current controversies in CVD. Additionally, the class will introduce students to the CVD research in the Division of Epidemiology and Community Health.

PUBH 6387. Cancer Epidemiology. (; 2 cr. ; Student Option; Spring Odd Year)
Epidemiologic aspects of cancer. Theories of carcinogenesis, patterns of incidence and mortality, site-specific risk factors. Issues of cancer control and prevention.

PUBH 6389. Nutritional Epidemiology. (; 2 cr. ; Student Option; Fall Even Year)

Nutrition/disease relationships through application of epidemiologic methods. Characterization of various exposures to food/ nutrient intakes, biological basis for nutrition/ disease relationships. Studies of specific chronic diseases and nutritional intake. Design/ interpretation of studies using nutritional measures. prereq: [[6320 or 6330 or 6341], [Epidemiology MPH or Public Health Nutrition MPH or Epidemiology PhD student]] or instr consent

PUBH 6390. Topics: Epidemiology. (; 0.5-4 cr. [max 80 cr.] ; Student Option; Periodic Fall, Spring & Summer)
New course offerings or topics of interest in epidemiology.

PUBH 6392. The Drug Overdose Crisis in America. (2 cr. ; Student Option; Every Spring)
The drug overdose crisis is one of the most pressing public health issues in the US today. The staggering rate of deaths attributed to opioid overdose has received wide attention from the media and general public. Yet its origins are deeply rooted in America? s long and complicated relationship with chemical substances. This course explores the social, medical, and cultural aspects of the modern American substance use phenomenon. A social-ecological and structural determinants framework will be used to examine the public health impact of substance use disorder on individuals and communities. The course will open with a review of the history and epidemiology of the substance use epidemic in the US. Students will then learn the fundamentals of physiological and psychological aspects of chemical dependency, including addiction treatment options. Lastly the class will examine the public health data used to describe population level substance use, including common misinterpretations of the data. The course will also feature guest speakers from clinical medicine and with personal experience of substance use disorder to broaden insights from both clinical and experiential perspectives. The course will feature a mixture of in-class lectures, readings, an in-class lab on the use of epidemiologic data, and a final project to impart a more contextual, nuanced, and in-depth understanding of substance use in modern America.

PUBH 6396. Applied Practice Experience Global Health. (0.5-8 cr. ; S-N only; Every Fall, Spring & Summer)
Students are required to complete a supervised Applied Practice Experience (AP). Students must address three Global Health competencies. prereq: Global Health Certificate Instructor Consent

PUBH 6400. Topics: Biostatistics. (; 0.5-4 cr. [max 80 cr.] ; Student Option No Audit; Periodic Fall, Spring & Summer)
New course offerings or topics of interest in biostatistics.

PUBH 6414. Biostatistical Literacy. (; 3 cr. ; A-F only; Every Fall, Spring & Summer)
Develop ability to read/interpret statistical results in primary literature. Minimal calculation. No formal training in any statistical programming software. Biostatistical Literacy will cover the fundamental concepts of study design, descriptive statistics, hypothesis testing, confidence intervals, odds ratios, relative risks, adjusted models in multiple linear, logistic and Poisson regression, and survival analysis. The focus will be when to use a given method and how to interpret the results, not the actual computation or computer programming to obtain results from raw data. prereq: MPH or certificate student or environmental health or instr consent

PUBH 6420. Introduction to SAS Programming. (; 1 cr. ; Student Option; Periodic Fall & Summer)
Use of SAS for analysis of biomedical data. Data manipulation/description. Basic statistical analyses (t-tests, chi-square, simple regression).

PUBH 6431. Topics in Hierarchical Bayesian Analysis. (1 cr. ; Student Option No Audit; Every Summer)
Hierarchical Bayesian methods combine information from various sources and are increasingly used in biomedical and public health settings to accommodate complex data and produce readily interpretable output. This course will introduce students to Bayesian methods, emphasizing the basic methodological framework, real-world applications, and practical computing.

PUBH 6432. Biostatistical Methods in Translational and Clinical Research. (1 cr. ; Student Option No Audit; Periodic Summer)
This short course on translational and clinical research will focus on the topics of diagnostic medicine and designing clinical research methods, application of regression models and early phase clinical trials. prereq: Students will benefit from having taken one or two semester courses in biostatistics or applied statistics covering up to and including multiple regression and introductory logistic regression.

PUBH 6450. Biostatistics I. (; 4 cr. ; A-F only; Every Fall & Spring)
This course will cover the fundamental concepts of exploratory data analysis and statistical inference for univariate and bivariate data, including: ? study design and sampling methods, ? descriptive and graphical summaries, ? random variables and their distributions, ? interval estimation, ? hypothesis testing, ? relevant nonparametric methods, ? simple regression/correlation, and ? introduction to multiple regression. There will be a focus on analyzing data using statistical programming software and on communicating the results in short reports. Health science examples from the research literature will be used throughout the course. prereq: [College-level algebra, health sciences grad student] or instr consent

PUBH 6451. Biostatistics II. (; 4 cr. ; Student Option; Every Fall & Spring)
This course will cover more advanced aspects of statistical analysis methods with a focus on statistical modeling, including: ? two-way ANOVA, ? multiple linear regression, ? logistic regression, ? Poisson regression, ? log binomial and ordinal regression, ? survival analysis methods, including Kaplan-Meier analysis and proportional hazards (Cox) regression, ? power and sample size, and ? survey sampling and analysis. There will be a focus on analyzing data using statistical programming software and on communicating the results in short reports. Health science examples from the research literature will be used throughout the course. prereq: [PubH 6450 with grade of at least B, health sciences grad student] or instr consent

PUBH 6518. Equity and Long-Term Care Quality. (2 cr. ; A-F only; Periodic Spring)
The objective of this course is to help students gain a deeper understanding of long-term care quality with a focus on equity. We will pay particular attention to post-acute care settings, care integration across settings, the role of the workforce, and equity considerations across all these topics. Post-acute care settings reviewed will include home care, assisted living, alternative care arrangements, nursing homes, and hospice. There are no required prerequisites but students are encouraged to take a course on U.S. health care (e.g., PubH 6556, Health and Health Systems) prior to taking the course. Cross-listed with: GERO 5518 preq: Public Health [MPH or MHA or certificate] student or instr consent

PUBH 6524. The Twin Cities Learning Laboratory. (1 cr. ; S-N only; Every Fall)
This course provides residential Master of Healthcare Administration students with exposure to the field of healthcare administration through a series of class sessions and site visits to health systems, hospitals, payers, physician practices, FQHCs, and addiction treatment centers located within the Twin Cities. The course allows students to learn about different types of organizations, job roles, and organizational cultures. This course also serves to deepen relationships between the MHA program and School of Public Health with community-based organizations.

PUBH 6525. Introduction to Population Health: A Health System. (2 cr. ; A-F only; Every Fall)
Population health is the field of practice and research concerned with the health of groups of individuals and the equitable distribution of health within these groups. Populations may be defined by geographic area, by social and economic characteristics such as gender, socio-economic status, and race/ethnicity, by disease states such as persons with mental illness or diabetes, or by enrollment in a health care plan or utilization of a specific health care organization. Population health takes an upstream approach, focusing on the social determinants of health and fundamental issues of health equity. While improving population health requires the involvement of multiple sectors such as public health agencies, health departments, education, housing, faith-based organizations and criminal justice, here we focus on how population heath can be addressed from within the health system through partnerships with other sectors. Using

case studies, we will explore how population health innovations are applied by health systems.

PUBH 6526. Professional Development for Emerging Healthcare Leaders. (1 cr. ; S-N only; Every Fall)
This course provides the opportunity for students to explore professional development, reflect on their own professional development, and create a personalized professional development plan, built on the knowledge gained through readings, group work, guest experts, reflections, and other activities. The course will provide knowledge around professional development that is applied in the field of healthcare administration. Readings, lectures, and the development of a personalized professional development plan will help identify how students can build on strengths and address areas of improvement around business etiquette, interpersonal communications, individual strengths and preferences, business communication, public speaking, presentation development skills, and executive presence to prepare them for the residency experience, fellowship/job, and beyond.

PUBH 6527. Healthcare Leadership and Effecting Change. (; 2 cr. ; A-F only; Every Spring)
How to become effective change leader in organization. prereq: MHA student

PUBH 6528. Climate Change and Healthcare Delivery Organizations: Considerations for Healthcare Leaders and Prof. (1 cr. ; A-F only; Every Fall)
Climate change has been named the number one public health issue of the 21st century. Understanding the connection between climate and health is essential for healthcare organizations to successfully plan for future needs and scenarios. As the largest sector of our economy, health care organizations have an obligation to take action to adapt to climate-related changes and to mitigate its effects. This course will cover key topics associated with climate change that will have a direct effect on healthcare delivery organizations and their leaders and professionals. This includes the impact of climate change on underserved populations, changes in disease burden, disaster planning, environmental sustainability, and the general role of healthcare organizations and professionals as educators and advocates on this topic. Guest speakers will include remarkable leaders that are actively addressing these topics within the industry and within their organizations.

PUBH 6535. Managerial Accounting for Health Services. (; 3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Differential, absorption, activity-based costing. Budgeting, variance analysis. Financial accounting, including transaction data and accrual accounting. Developing financial statements. Ration analysis. prereq: MHA student or instr consent

PUBH 6539. Change Management. (2 cr. ; A-F only; Every Spring)
Although a great deal is known about strategy formulation and planning, many strategic plans fail to achieve their full potential due to problems and issues surrounding strategy (or operations) implementation and execution. Therefore, in order to address these issues, this course will focus on strategy implementation, as well as highlight the decisions, actions, and conditions that facilitate the successful attainment of strategic goals. Students will analyze change cases, create strategies, and respond to others as employees impacted by the change. In addition, due to the fact that many managers face high-stake challenges in their roles as change agents, we will adopt the perspective of general administrative officer. In doing so, we will focus on the long-term strategic success of the health care organization, the proper positioning of the change efforts, articulating the vision, and creating a culture designed to achieve goals. Finally, because change management is not easily dichotomized into categories, we will not study it as such. Rather, we shall use an Organizational- Process-Leadership? approach in order to examine how successful change is shaped, how it can be implemented, and how leaders must continually renew changes and organize to meet ongoing competitive challenges.

PUBH 6540. Health care Organizational Behavior. (; 2 cr. ; A-F or Audit; Every Fall)
Human behavior in organizations. Motivation, leadership, influence of organizational structure, informal group behavior, interpersonal relations, supervision. Emphasizes preventing/solving problems among individuals/groups in organizations. prereq: Health care admin student or instr consent

PUBH 6541. Statistics for Health Management Decision Making. (; 3 cr. ; Student Option; Every Fall)
Variation. Frequency distribution, measurement, probability, graphing. Significance tests, estimation, trends; data handling. Modeling, odds ratios. Prevalence, incidence and vital statistics. Research applications. Statistical approach to rational administrative decision making. Inductive teaching, lectures, computer/lab exercises. prereq: Health care admin student or instr consent

PUBH 6542. Management of Health Care Organizations. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Role of hospital in health services delivery. Relationships with other systems and the community. Emphasizes governance, medical staff, and role of administrator. Lectures, on-site visits to health services organizations. prereq: MHA student or permission of instructor

PUBH 6544. Principles of Problem Solving in Health Services Organizations. (; 3 cr. ; A-F only; Every Spring)
Problem-solving theory/technique. Solving a management problem within a health services organization. Presenting a report. Lectures, seminars, demonstrations. prereq: 6541, completed 30 hours of MHA coursework, health care administration student

PUBH 6545. Advanced Problem Solving in Health Services Organizations. (; 4 cr. ; A-F or Audit; Every Spring)
Defining, analyzing, and solving significant senior management-level operational or health public policy problems. prereq: 6544 or concurrent registration is required (or allowed) in 6544, Healthcare Administration student

PUBH 6547. Health Care Human Resources Management. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Concepts in human resources management as applied to health services organizations. Relationship between human resources management and general management. Work and human resources. Compensation/benefits, personnel planning, recruitment/selection, training/development. Employee appraisal/ discipline. Union-management relations. prereq: Health care admin student or public health admin student or instr consent

PUBH 6548. Medical Group Management. (; 2 cr. ; A-F or Audit; Every Spring)
Overview of physicians group management in integrated delivery systems. Physician/ administrative roles, operational/strategic issues, alternative organizational models, risk-contracting, provider payment methods, managing change, effective communication. prereq: Health care admin student or instr consent

PUBH 6551. Contemporary Problems in Health Care. (; 1-2 cr. ; Student Option; Every Fall & Spring)
Current concepts, problems, principles, and future developments of health and health care, selected by students. Developing models based on current literature and research. Verbal/written presentations from policy/issue perspectives. prereq: Grad student

PUBH 6553. Health Care Management Ethics. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall & Spring)
Ethical issues faced by health care managers as leaders of an organization, members of a profession, and coodinators of clinical processes. Perspectives of managerial, organizational, professional, and clinical ethics. prereq: Public health MPH or MHA or certificate student or instr consent

PUBH 6554. Healthcare Strategy and Marketing. (2 cr. [max 3 cr.] ; A-F or Audit; Every Spring)
Managing the marketing function, marketing planning, strategy, management concepts. Identifying marketing problems/opportunities. Constructing, evaluating, and managing a marketing plan. prereq: MHA student or permission of instructor

PUBH 6555. Health Economics. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
General principles of health economics applied to issues in health. Implications for health policy.

PUBH 6556. Health and Health Systems. (3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
U.S. health care system and health policy process, including current challenges in the

areas of health care delivery, financing, and policy.

PUBH 6557. Health Finance I. (; 3 cr. ; Student Option; Every Fall & Spring)
Principles of corporate/not-for-profit finance. Net present value, financial analysis, capital budgeting, financing options/decisions, capital structure, capital asset pricing model, financial planning, working capital management. prereq: [[Health care admin or public health admin/ policy major], familiarity with computerized spreadsheets] or instr consent

PUBH 6558. Health Finance II. (; 3 cr. ; A-F only; Every Fall & Spring)
Principles of corporate/not-for-profit finance and insurance concepts integrated/applied to health care. Capital/operating budgets. Medicare's payment systems for hospitals/ physicians, risk-adjusted capitation payment systems. Population-based health care finance, managed care. Financing aspects of public health policy and health care reform. prereq: MHA student, familiarity with computerized spread-sheets]] or permission of instructor

PUBH 6560. Operations Research and Quality in Health Care. (3 cr. ; A-F only; Every Fall)
Using a systems perspective to develop models to analyze/improve health care operations. Identifying data needs/sources to model structures, processes, and outcomes of care. Applying quality improvement, management sciences/operations research techniques to real world health care problems. prereq: Grad-level statistics/management coursework

PUBH 6561. Quantitative Methods Applied to Health Administration Problems. (; 2 cr. ; A-F or Audit; Every Spring)
Application of Quantitative methods to secondary data, including analysis, data handling, stepwise multiple linear regression and discriminate analysis, pert, queuing, scheduling, inventory and simulation used to solve health administrative problems. Group research thesis with verbal/written presentations. prereq: Health care admin student or instr consent

PUBH 6562. Information Technology in Health Care. (; 2 cr. ; Student Option; Every Fall)
Managing information as a strategic resource within health care organizations. Designing information technology systems to capture, combine, and transform information to measure processes/outcomes of care, support collaborative clinical decision making, support management decisions, empower patients, and improve health care operations. Prereq: MHA student or instructor consent.

PUBH 6563. Integrated Delivery Systems. (; 2 cr. ; A-F only; Every Fall & Spring)
Integrated models of health care delivery. Emphasizes organizational design, governance, operations, strategy, resource deployment, and the role of the "embedded medical practice." prereq: Hlth care admin student or instr consent

PUBH 6564. Private Purchasers of Health Care: Roles of Employers and Health Plans in U.S. Health Care System. (; 2 cr. ; A-F or Audit; Every Fall)
Development and organization of HMOs and PPOs: risk sharing, provider contracts, utilization management, quality improvement, marketing, and new product development; employer relations; Medicare and Medicaid contracting; budget processing; financial performance; pricing; government regulations. prereq: MHA or MBA or HSRP or PHA student or instr consent

PUBH 6565. Innovation of Healthcare Services. (; 2 cr. ; A-F only; Every Fall)
Designing/creating new care delivery services/ experiences. Exploiting opportunities for innovation. Overcoming obstacles. Capturing value. prereq: MHA student only

PUBH 6568. Interprofessional Teamwork in Health Care. (; 2 cr. ; Student Option; Every Fall & Summer)
Leading/participating in interdisciplinary teams. Team communication, problem solving, conflict management, organizational support. prereq: [Public health MPH or MHA or certificate student] or [health services research, policy/ admin] MS student or instr consent

PUBH 6569. Healthcare Policy. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall)
Public policy environment surrounding health care and public health systems. Political context of health policy. Approaches to policy formation/analysis. Tools/strategies for influencing health policy outcomes. prereq: Public health [MPH or MHA or certificate] student or instr consent

PUBH 6570. Healthcare Administration. (; 1-4 cr. [max 8 cr.] ; A-F only; Periodic Fall, Spring & Summer)
Selected readings in healthcare administration. Discussion based on readings. prereq: dept consent

PUBH 6571. Quality, Patient Safety, and Performance Improvement. (; 2 cr. ; A-F only; Every Spring)
Introduction to concepts of performance improvement in health care institutions. prereq: MHA or MPH or certificate student or instr consent

PUBH 6572. Management for Clinical Research. (; 2 cr. ; Student Option; Every Fall)
Management for clinical research. prereq: Pursuing clinical research recommended

PUBH 6573. The Nature of Clinical Care. (; 2 cr. ; A-F only; Every Spring)
Discussing clinical matters with colleagues. Students participate as peers in managing health care performance in hospitals, medical groups, and other health care delivery and public health institutions. prereq: School of Public Health student

PUBH 6574. Managing Medical Practices as Components of Integrated Health Systems. (; 2 cr. [max 4 cr.] ; A-F only; Every Spring)
Management of medical practices owned/ operated by integrated health systems. Design, strategy, and operation of medical practices integrated with hospitals and other components of comprehensive systems of health care. Embedded medical practice. prereq: MHA student or instr consent

PUBH 6576. Understanding Clinical Quality Using Administrative Data. (2 cr. ; A-F only; Periodic Fall)
This is an introductory course designed for students interested in learning how to effectively use administrative data (e.g., billing or claims data, clinical registries, enrollment records) to inform program development, program or policy evaluation and mandatory reporting. During the course, students will learn about quality frameworks; payment systems and how they translate into available administrative data; common coding and billing systems; structure of administrative data; common data available from each source; approaches for linking data across sources; reporting considerations; strategies for risk adjustment and applications to current local and national quality improvement programs. The course will provide practical, hands-on training for individuals to lead teams who analyze and report outcomes using administrative data-- - without the need to analyze the data themselves.

PUBH 6577. Advanced Problem Solving in Health Services Administration. (; 2 cr. ; A-F only; Every Spring)
Capstone course. Students integrate/ synthesize knowledge, attitudes, and skills acquired in curriculum and apply them to resolve management problem. prereq: MHA student

PUBH 6578. Negotiation Strategies. (2 cr. ; A-F only; Every Spring)
The central issues of this course deal with understanding the behavior of individuals, groups and organizations on the context of competitive situations. prereq: MHA student or instructor permission

PUBH 6580. Behavioral Health Services Delivery. (; 2 cr. ; A-F only; Every Spring & Summer)
The purpose of this course is to introduce and develop students? knowledge- and understanding of mental health disorders and business principles of service delivery. The course is designed to give students an understanding of mental health care services delivered across different organizational and governmental structures as well as payment models. Students will be able to apply a deeper understanding of mental health disorders and treatment models in the context of a dynamic and varied healthcare continuum. Students will complete a mix of individual and group assignments to demonstrate their understanding of the subject matter. Course lectures will be delivered through an asynchronous design to allow students the flexibly during the week. There will be check in sessions weekly or as needed for class discussion and review of material.

PUBH 6589. Medical Technology Evaluation and Market Research. (; 2 cr. ; Student Option; Every Spring)

Analytical tools for formulating evaluations of innovations in medical technologies. Disseminating results to get a new product to market.

PUBH 6596. Legal Considerations in Health Services Organizations. (; 2 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Laws affecting administration of hospitals and other healthcare organizations. Administrative law, corporate/business law, labor law, civil liability, tax-related issues. Legal issues relevant to administration, decision making, and planning. prereq: Health care admin student

PUBH 6597. Legal & Ethical Considerations in Health Services Organizations. (3 cr. ; A-F only; Every Spring)
The course is oriented to current and future healthcare professionals and administrators who have not had previous academic exposure to legal theory, caselaw, statutory interpretation or health law related issues, and those who may or may not have previous coursework in ethics or moral philosophy. The course presents an overview of the American legal system and some of the ethical and health law issues health care leaders confront in health care service organizations. Although this course introduces basic areas of American health law and ethics, the course will emphasize contemporaneous legal and ethical issues arising in the course of everyday work of a health care leader in a health organization. Health care is one of the most heavily regulated and legally complex industries in the United States. The course begins with a short introduction to ethics as compared with and contrasted to the American legal system and its weighing of policy values, legal precedent and intertwining of judicial, statutory and regulatory authorities. In particular, we will examine how disparities in health outcomes are created or exacerbated by these legal structures and systems and explore the ethical ramifications that result. We will explore how the law affects the internal governance and decision making processes of health care organizations, while identifying ways that decisions made solely on the standards found in legal authorities often falls short of accounting for important ethical issues and values that arise in health care situations. Examples of specific areas we will explore include the ethical considerations or expectations and legal duties: ? In multiple contexts between an individual and a provider, a health plan, or an employer, especially with respect to perceptions or values of power, duty and autonomy; ? Confidentiality, patient privacy and data security and their limits; ? Unique standards imposed in health care transactions to prevent fraud or behaviors deemed unethical or inappropriate, such as anti-trust, false claims and anti-kickback laws; ? Obligations or expectations to provide care, especially with respect to uninsured patients and those with emergency medical conditions; ? Quality and safety of care including malpractice, doctrines of negligence including community standard of care, disclosure of mistakes or adverse health events; ? Values and laws regarding health plan and benefit design, including interpretations and perspectives of what constitutes and who decides what is ? medically necessary;? and ? Care decision making including informed consent and end-of-life decisions. Health care situations raising complex legal and ethical issues involve competing perspectives, values or interests in topic areas that can be controversial in nature. This course does not aim to resolve those controversies or reach conclusions about which perspectives or interests have more merit than others. Instead, the course and our discussions will seek to highlight the tensions and balancing of interests that often underly ethical considerations and guide the legal analysis in specific situations, and how these different perspectives and interests lead to changes in society?s perceptions of ethics and its laws, and in some circumstances, to litigation as parties attempt to resolve disputes and establish ethical norms between competing interests.

PUBH 6600. Topics: Maternal and Child Health. (; 0.5-4 cr. [max 20 cr.] ; Student Option; Periodic Fall, Spring & Summer)
New courses or topics of interest.

PUBH 6601. Born a Girl: Global Women's Health. (; 1 cr. ; Student Option; Every Summer)
Women's health conditions, programs, services, and policies in developed/developing countries. Social, economic, environmental, behavioral, and political factors affecting health behaviors, reproductive health, chronic and acute diseases, premature mortality and longevity. prereq: Grad level student

PUBH 6602. Global Matenal and Child Health. (; 2 cr. ; Student Option; Every Spring)
This course provides an overview of global maternal and child health and examines MCH health needs, programs, services, and policies globally with a focus on the Global South/ low-middle income economies. The work completed throughout the semester will have three areas of focus: (1) disease burden among MCH populations and the social, political, cultural, and economic determinants of health; (2) sources of data for the assessment of maternal and child health needs, and (3) heath system and workforce development to address the needs of MCH populations.

PUBH 6605. Sexual, Reproductive, and Perinatal Public Health. (; 2 cr. ; Student Option; Every Fall)
Overview of perinatal, sexual, and reproductive health surveillance, programs, services, and policies in the U.S., with an emphasis on vulnerable populations and methods to assess and interpret perinatal, sexual, and reproductive health data. prereq: Public health student or grad student or instr consent

PUBH 6606. Children's Health: Life Course and Equity Perspectives. (; 2 cr. ; Student Option; Every Spring)
This course is focused on 1) major causes of illness at each phase of fetal, infant, and child development, 2) how the social determinants of health interact with underlying biology in early life to shape health over the life course, and 3) evidence-based child public health programs and interventions.

PUBH 6607. Adolescent Health: Issues, Programs, and Policies. (; 2 cr. ; Student Option; Spring Even Year)
This two-credit course focuses on the major public health issues of adolescents and the programs and policies that impact the health and well-being of this population. Course readings and discussion focus primarily on adolescents in the United States, although international contexts are also considered. The course is designed to examine the prevalence and etiology of health and wellness indicators for youth, including mental health; sexual and reproductive health; physical activity and nutrition; and prevention of tobacco, alcohol, and other drug use, violence involvement, and injury. In addition, the course analyzes contemporary social movements and issues that impact adolescents through a public health lens (e.g., Black Lives Matter, DACA and the DREAM Act, achievement gap, inequitable distribution of wealth and economic opportunities, gender equity, civic engagement). The course is designed for graduate public health students with professional interests in preventive interventions to reduce health inequities. Students in other related health professions (e.g., medicine, nursing) or human services professions (e.g., public affairs, social work) with an interest in health issues are also welcome. The course meets the requirement for the Health Equity Minor in the School of Public Health.

PUBH 6613. Children and Youth With Special Health Care Needs. (; 2 cr. ; Student Option; Every Fall)
Principles, programs, policies, and practices for identifying/meeting needs of children/youth with special health care needs in the United States. Epidemiology, historic/current legislation, organization/delivery. Readings, online discussions, written assignments. prereq: Graduate-level student in [AHC programs or education or social work or psychology]

PUBH 6627. Sexuality Education: Criteria, Curricula, and Controversy. (; 1 cr. ; Student Option; Every Fall)
Issues and controversies affecting K-12 sexuality education. Current research and guidelines for effective, responsible education and curricula selection. Various curricula being used in the United States. Challenges in teaching sensitive issues inherent in sexuality education.

PUBH 6630. Foundations of Maternal and Child Health Leadership. (; 3 cr. ; Student Option; Every Fall)
Historical/current principles, programs, policies, and practices related to women, children, adolescents, and families. Articulating a personal leadership style/plan for development of leadership competencies. Leadership principles, skills, and models applied to improving health of MCH populations. prereq: Public Health MCH major or instr consent

PUBH 6636. Qualitative Research Methods in Public Health Practice. (2 cr. ; Student Option No Audit; Every Spring)

Qualitative inquiry, selected data collection, management, analysis methods for qualitative research in public health. Current approaches to assess strength of evidence of qualitative studies in public health. Provision of practical skills that can be applied in public health settings.

PUBH 6673. Grant Writing for Public Health. (; 1 cr. ; Student Option; Every Spring)
Hands-on workshop. Identifying successful elements of a grant application. Grant review process. Critiquing a grant. Writing an application.

PUBH 6675. Women's Health. (; 2 cr. ; Student Option; Every Fall)
Programs, services, and policies that affect women's health in the United States. Methodological issues in research. Emphasizes social, economic, environmental, behavioral, and political factors. Measurement/interpretation of factors, how they translate into interventions, programs, and policies.

PUBH 6702. Integrative Leadership Seminar. (; 3 cr. ; Student Option; Every Fall)
Are you interested in working across government, business, and the non-profit sector for public good? Are you wondering how you can create sustainable shared leadership on challenges that can best be addressed together? This course explores multi-sector leadership and related governance and management challenges from a variety of perspectives and provides an opportunity for students to work together to apply what they are learning individually and in teams through in-class exercises and a final team project. The course is taught by a team of interdisciplinary faculty and considers different contexts, forms, and specific examples of multisector leadership that can enable transformative action to tackle a significant societal issue and achieve lasting change. prereq: University of Minnesota doctoral student or master's student

PUBH 6711. Public Health Law. (; 2 cr. ; Student Option; Every Spring & Summer)
Basic concepts of law, legislative process, and legal bases for existence/administration of public health programs. Legal aspects of current public health issues/controversies, regulatory role of government in health services system. prereq: Grad student or professional school student or instr consent

PUBH 6715. India: Global Health, Globalization, & Leadership. (; 3 cr. ; S-N only; Every Spring)
This course will provide a global health learning experience with field observations in Mysuru (Mysore), India. Participants will learn about health and health care delivery in the context of globalization in India. The course is meant to convey the significance of the social determinants of health in a globalized world. The course will emphasize the leadership skills needed to function in the fields of global health and development and includes an intensive leadership workshop. Additionally, participants will collaboratively observe the grass-root level activities in public health, health care delivery, and other community activities.

PUBH 6717. Decision Analysis for Health Care. (; 2 cr. ; Student Option; Every Fall)
Introduction to methods/range of applications of decision analysis and cost-effectiveness analysis in health care technology assessment, medical decision making, and health resource allocation.

PUBH 6719. International Humanitarian Crisis Simulation. (1 cr. ; S-N only; Every Spring)
The International Humanitarian Crisis Simulation is an applied, operational course that teaches students how to operate in an international humanitarian crises as a responder or volunteer. Learners assume the role of an NGO responder in this simulation that involves active teamwork, intense interaction with role-players, and on-the-spot decision-making. Students will work in interdisciplinary teams to learn and practice the critical collaboration and teamwork objectives essential in humanitarian response. Please contact organizers should you have concerns regarding physical challenges presented in extended outdoor activity in an extensive (but walkable) site, rain or shine. Arrangements for remote attendance to post classroom sessions will be available. Students must first register and pay a fee at https://globalhealthcenter.umn.edu/HumSim to receive a permission number to register. Simulation fee covers meals, accommodation in primitive cabins, and equipment during the simulation. A full packing list will be supplied to participants (e.g., sleeping bag, rain gear, flashlight, etc).

PUBH 6724. The Health Care System and Public Health. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Overview of health care delivery, finance systems within public health context. Components of health care system: financing, role of employers/public programs, health care delivery system, managed care. Collaborative interventions between managed care, public health. prereq: Public health or grad student or instr consent

PUBH 6727. Health Leadership and Effecting Change. (; 2 cr. ; Student Option; Every Fall, Spring & Summer)
Analysis of leadership models and competencies, particularly as applied to organizational change. Applications to individual self-development and to health care organizations. prereq: Public hlth MPH or MHA or certificate student or [health services research, policy/admin] MS student or instr consent

PUBH 6730. International Comparative Health Systems. (2 cr. ; Student Option; Spring Odd Year)
History and development of health systems from a socio-political perspective. Overview of relative importance and meaning of health outcomes data. Role of WHO. Students use OECD health database.

PUBH 6732. Topics and Methods in Global Health Assessment. (; 2 cr. ; Student Option; Spring Odd Year)
Evaluation of health populations relative to specific topics important to global health, including methodology appropriate to particular issue. Focuses on developing countries. prereq: [6705, [concurrent registration is required (or allowed) in PUBH 6705 or concurrent registration is required (or allowed) in PUBH 6320 or concurrent registration is required (or allowed) in PUBH 6341 or concurrent registration is required (or allowed) in grad course in epidemiology], [public health MPH or environmental health [MS or PhD] or health services research/policy/administration [MS or PhD] or epidemiology PhD or clinical research MS]] or instr consent

PUBH 6735. Principles of Health Policy. (; 3 cr. [max 6 cr.] ; A-F or Audit; Every Fall)
The purpose of this course is to introduce students to the policy environment that influences and shapes public health and the provision of health care services, to enhance understanding of the historical and political context of health policy, to develop strategies for analysis of health policy issues, and to communicate effectively in the policy environment. Credit will not be granted if credit has been received for PubH 6835.

PUBH 6737. Structural Racism and Health. (2 cr. ; Student Option; Every Spring)
This course offers an examination of U.S. health inequities from a historical lens and discussion of present-day issues. Through the readings, discussions, and assignments in this class, students will better understand historical policies, events, and movements that have led to health inequities and connect those to contemporary issues in the United States and within the field of public health. The course takes an intersectional perspective (to race, ethnicity, gender, and class) to examine health inequities, with a specific focus on inequities related to race and racism.

PUBH 6739. Data Dashboards and Visualization with Tableau. (; 1 cr. ; Student Option; Every Spring & Summer)
The ability to analyze data is an essential skill for public health practitioners in all areas of professional practice. Data analysis is necessary to identify important emerging and/or current trends, problems, and issues that require action. It is important for anyone engaged in public health work to be able to locate relevant and accurate sources of data relative to public health issues, analyze it, synthesize it, and format it in a way that it is clear and compelling to specific audiences. This course provides an introduction to data analysis and presentation through the creation of a dashboard to present data. While this course uses Tableau software, the concepts covered in this course apply to any public health setting and are transferable to other dashboard and data visualization tools.

PUBH 6741. Ethics in Public Health: Professional Practice and Policy. (; 1 cr. ; A-F only; Every Fall, Spring & Summer)
Introduction to ethical issues in public health practice/policy. Ethical analysis, recognizing/analyzing moral issues. prereq: Public health [MPH or MHA or certificate] student or environmental health [MS or PhD] major or instr consent

PUBH 6742. Ethics in Public Health: Research and Policy. (; 1 cr. ; A-F only; Every Fall, Spring & Summer)
Introduction to ethical issues in public health research/policy. Ethical analysis. Recognizing/analyzing moral issues.

PUBH 6744. State Health Policy and Politics. (; 2 cr. ; Student Option; Every Spring)
Half semester. Federal health reform debate and debate over reinstating the MN General Assistance Medical Care program. Intergovernmental relationship between the federal and state governments in health policy and finance; role of state and local policy makers and policy advocates. Political context for state health policy development.

PUBH 6745. Rural Health. (; 2 cr. ; Student Option; Every Fall)
This course will cover some of the broad issues related to rural context, social determinants of health, health care, and health disparities, with the purpose to provide an introduction to the field of rural health. The focus of the course will primarily be on the U.S., although it will touch on the global context and students are welcome to explore rural health issues in other countries in some of their assignments.

PUBH 6748. Analyzing Administrative Data for Healthcare Operations and Research. (2 cr. ; Student Option; Every Fall)
This is an introductory course designed to teach students how to effectively analyze administrative data (e.g., billing or claims data, clinical registries, enrollment records) for use in both healthcare operations and research. During the course, students will learn about accessing common administrative data sources; the structure of administrative data; coding and billing systems; best practices for developing and implementing analytic plans; creating cohorts; strategies for risk assessment; developing measures; approaches for missing data; approaches for linking across data sources; reporting considerations; quality control; and strategies for effective data presentation. The course will provide practical, hands-on training for individuals to effectively analyze and report healthcare outcomes for operations and research using administrative data. COURSE PREREQUISITES Some basic programming (e.g., SAS, Stata, R) and statistics knowledge preferred. Please feel free to email the instructors to discuss options for gaining this background. Students from all academic programs welcome.

PUBH 6751. Principles of Management in Health Services Organizations. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Understanding of and improvement in the competencies of managers in organizations, particularly as applied to health services and public health organizations. prereq: [Public hlth MPH or MHA or certificate] student or [environmental health MS or PhD] student or dentistry MS student or instr consent

PUBH 6755. Planning and Budgeting for Public Health. (; 2 cr. ; Student Option No Audit; Every Fall & Summer)
Principles of budgeting, planning, forecasting, and analyzing in nonprofit/government organizations applied to health care administration and public health. prereq: Academic Hlth Ctr grad student or instr consent

PUBH 6758. Managing Public Health Systems. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Problem solving, process management, quality improvement, collaboration/partnership management. Organizing public health core functions and essential services. prereq: [6751 or concurrent registration is required (or allowed) in 6751], [public health [MPH or certificate] student or environmental health [MS or PhD] major or HSRPA [MS or PhD] major]

PUBH 6762. Health Finance Applications. (; 2 cr. ; Student Option; Every Spring)
Top management perspective of healthcare financial management responsibility in context of strategic issues. Emphasizes balancing theory and applications. Capstone course. prereq: [6558, [grad or professional school] student] or instr consent

PUBH 6765. Continuous Quality Improvement: Methods and Techniques. (3 cr. ; Student Option; Every Fall)
Theory/practical applications of concepts, tools, techniques of continuous quality improvement (QI) in public health/health care.

PUBH 6772. Health Disparities Capstone Seminar. (; 1 cr. [max 2 cr.] ; Student Option No Audit; Every Spring)
Readings and discussion-based seminar. Readings emphasize practice and policy solutions to health disparities. prereq: CSPH 5115 OR PubH 6066 OR PUBH 6055 OR PUBH 6855, 2d yr MPH student completing SPH health disparities interdisciplinary concentration] or instr consent

PUBH 6780. Topics in Public Health Administration and Policy. (; 1-3 cr. [max 60 cr.] ; Student Option; Periodic Fall, Spring & Summer)
New courses or topics of interest in public health administration/policy.

PUBH 6800. Topics: Health Services Research and Policy. (; 0.5-4 cr. [max 80 cr.] ; Student Option; Periodic Fall, Spring & Summer)
New courses or topics of interest in health services research and policy.

PUBH 6803. Conducting a Systematic Literature Review. (; 3 cr. ; Student Option No Audit; Every Spring)
Project-based class to develop systematic review skills for evidence-based practice. Draws from AHRQ and Cochrane systematic review methodology; supported by examples from the Minnesota Evidence-based Practice Center. Use for master?s thesis, dissertation, or to support research proposals. Prereq: research study design or epidemiology.

PUBH 6804. Mental Health Policy. (2 cr. ; Student Option; Periodic Spring)
Social-psychological processes that shape experience of mental health/illness. Consequences of disorders for individuals, families, and communities. Epidemiology research, theories of mental health/illness. Effect of policies related to organizing/financing services.

PUBH 6805. Introduction to Project Management for Health Professionals. (2 cr. [max 4 cr.] ; Student Option; Every Spring)
Core concepts/skills for managing projects effectively, making sure they are completed on time, within budget, meeting performance objectives. prereq: Matriculation in master's program in School of Public Health, or instr consent

PUBH 6806. Principles of Public Health Research. (; 2 cr. ; Student Option; Every Fall & Spring)
Evaluation of public health research literature and planning for independent research projects. Formulation of research question, research design, sampling techniques, use of research concepts, and data analysis. Data collection techniques, including questionnaires, interviews, and data analysis. prereq: Pub hlth or grad or professional school student or instr consent

PUBH 6809. Advanced Methods in Health Decision Science. (; 3 cr. ; Student Option No Audit; Every Spring)
Methods applicable to issues of medical decision making. Analyses of environmental/safety decisions. How to apply methods at cutting-edge of clinical decision science. prereq: [6717 or intro course in decision analysis], some facility with mathematical notation/reasoning

PUBH 6810. Survey Research Methods. (; 3 cr. ; Student Option No Audit; Every Spring)
Theory/application of survey research in data collection. Sampling, item development, instrument design/administration to conduct survey or be aware of issues related to design/implementation. Identification of sources of error in survey research.

PUBH 6813. Managing Electronic Health Information. (2 cr. ; Student Option No Audit; Every Spring)
Managing health information is a central function of health care organizations. Information is used for managing population health, profiling providers, and measuring quality. This course describes relational data theory, normalization, and Structured Query Language (SQL) will be used to create and query databases. Students will be introduced to the basic programming skills necessary to manage data in research projects. Programming aspects of the course will use SQL procedure in the SAS language. prereq: Admission to a University of Minnesota Masters program or Permission of instructor.

PUBH 6815. Community-based Participatory Research. (; 2 cr. ; Student Option No Audit; Periodic Spring)
This introductory course is intended for junior faculty, post-docs, graduate students and community practitioners interested in adding CBPR to their repertoire of effective

approaches to understanding and addressing social and health disparities. Topics will explore the purpose and applications of CBPR; partnership formation and maintenance; issues of power, trust, race, class, and social justice; conflict resolution; ethical issues; CBPR's relationship to cultural knowledge systems, and funding CBPR projects. This is NOT a methodology course. CBPR is an approach to conducting research that is amenable to a variety of research designs and methodologies and will NOT cover topics such as survey design, quantitative methods, qualitative methods, focus groups, community needs assessment procedures, etc.

PUBH 6817. Adult Development and Aging. (2 cr. ; Student Option; Every Spring)
The objective of this course is to examine the dynamic interaction of individual development and aging. Students will review the principal theories applied to understand individual development and aging. Subsequent course models will explore methodological Issues in adult development and aging; cognitive aging; social and health factors that influence developmental trajectories in aging and vice versa; and psychopathological issues in aging. Grad student or instructor consent.

PUBH 6819. Qualitative Research Theory and Methods for Health and Health Services Research. (2 cr. [max 4 cr.] ; Student Option; Every Fall)
This course is designed for graduate students who expect to use qualitative methods in their research and/or those who desire to expand their knowledge base with a deeper understanding of the types of qualitative methods and mixed methods being used in health and health services research today. The course gives students a broad overview of various data collection and analysis methods. The purpose of the course is to prepare students to conduct a variety of approaches or methodologies in qualitative research design and mixed methods suited to the health and health services research and health policy research questions they wish to pursue. PubH 6819 is intended for students interested in pursuing academic qualitative research and/or as a follow-up to an introductory course like PubH 6636 Qualitative research methods in public health practice.

PUBH 6832. Economics of the Health Care System. (; 3 cr. ; Student Option; Every Fall)
Examines applications of microeconomic principles to the U.S. health care system. Topics include demand for medical care, insurance theory and selection issues, provider payment, competition in health care markets, the health care workforce, pharmaceutical prices and innovation, health care spending growth, quality of care, externalities, the relationship between income and health, and the economics of the opioid epidemic. Prerequisite: an introductory economics or microeconomic theory course ? or permission of the instructor.

PUBH 6845. Using Demographic Data for Policy Analysis. (; 3 cr. ; A-F only; Every Spring)
How to pose researchable policy questions, locate existing data, turn data into a usable format, understand data documentation, analyze data, communicate findings according to standards of the professional policy community. Quantitative issues. prereq: [Grad level research methods course, basic statistics course] or instr consent

PUBH 6852. Program Evaluation in Health and Mental Health Settings. (; 2 cr. ; A-F only; Every Spring)
Understanding an evaluation study. Program evaluation. Applications to health and mental health settings. emphasizes public health.

PUBH 6855. Medical Sociology. (; 3 cr. ; Student Option; Every Spring)
Introduction to common theoretical/empirical approaches used by sociologists to study health/illness. How content reflects social inequalities in health/illness. Social processes that shape experience of health/illness. prereq: [[Grad or professional school] student, previous experience with statistical software] or instr consent

PUBH 6862. Cost-Effectiveness Analysis in Health Care. (; 3 cr. ; Student Option; Every Spring)
Government regulations. New technologies. Diagnosis/treatment protocols. Strengths, limitations, appropriateness of different approaches. prereq: instr consent; introductory econ course recommended

PUBH 6863. Understanding Health Care Quality. (; 2 cr. ; A-F only; Every Fall)
Introduction to assessing/assuring quality of care. Emphasizes both process and outcomes approaches, paralleling interest in appropriateness/effectiveness of care. Issues around creating needed behavioral changes.

PUBH 6864. Conducting Health Outcomes Research. (; 3 cr. ; Student Option; Every Spring)
Major concepts/principles in conducting health outcomes research that evaluates medical care. Developing study designs matched to research questions. Frequently used study designs. Evaluating health outcomes. Analytical approaches. prereq: Introductory course in epidemiology or health services research methods or instr consent

PUBH 6877. Public Health Systems Analysis and Design - Practicum. (2 cr. ; Student Option No Audit; Every Fall)
Hands-on group project to practice skills of design, development, and implementation of public health information systems. Project teams employ site visits, interviews, surveys, and other data collection methods to gather system requirement specifications. Experience full system development lifecycle, including problem definition, feasibility analysis, logical modeling, and system architecture implementation. prereq: Grad or professional student or instr consent, [completion of or concurrent registration is required (or allowed) in 6876]

PUBH 6879. Public Health Systems Analysis and Development Practicum. (2 cr. ; S-N only; Every Spring)
Individual students or student teams will conduct a full systems analysis for a public health information system for a client.

PUBH 6880. Introduction to Public Health Informatics. (; 2 cr. ; Student Option; Every Fall)
Information is key to effective public health administration. Surveillance systems provide information on infectious disease tracking, disease clusters, food-borne outbreaks, and injuries. Environmental monitoring systems provide information on health risks such as toxic chemicals or airborne pollutants. Registries contain information on vital statistics such as birth, death, and immunization. e-Public Health integrates information from electronic health records to use in improving population health. Introduction to Public Health Informatics describes these public health information systems and key issues in managing this information effectively, such as data standards, common functions, decision support, meaningful use, health information exchange, privacy and security. prereq: School of Public Health student or graduate student

PUBH 6882. Aging and Society. (2 cr. ; Student Option; Every Fall)
Examines the broad range of topics and issues related to aging, and how the process of aging is shaped by social context and relationships in connection with individual factors, including family, the economy, health care, and the political system. Students in Master's or doctoral programs most likely to benefit. Students new to the field of aging studies are recommended to begin with GERO 5105/PubH 6883: Multidisciplinary Perspectives in Aging. Grad student or instructor consent.

PUBH 6883. Multidisciplinary Perspectives on Aging. (2 cr. ; Student Option; Every Fall)
Obtain a broad understanding of the multidisciplinary perspectives, theoretical underpinnings, and advancements in the study of aging ("gerontology"), in the inter-related domains of clinical geriatrics, psychology, sociology, and policy as related to aging. Grad student or instructor consent.

PUBH 6900. Topics: Public Health Nutrition. (; 0.5-4 cr. [max 80 cr.] ; Student Option; Periodic Fall, Spring & Summer)
New courses or topics of interest in public health nutrition.

PUBH 6901. Foundations of Public Health Nutrition Leadership. (; 2 cr. ; Student Option; Every Fall)
Principles of public health nutrition. Roles/function of public health nutritionists. Programs/delivery mechanisms for promoting nutritional status of populations. Students explore their beliefs/competencies in relation to principles/philosophy of public health nutrition. This course has a strong focus on policy, systems and environmental changes to improves access to health foods for individuals and communities.

PUBH 6904. Nutrition and Aging. (; 2 cr. ; Student Option; Every Summer)
Current literature on nutrition needs/factors affecting nutritional status of adults and the

elderly. Relevant community resources. prereq: Grad student or professional school student or instr consent

PUBH 6906. Global Nutrition. (; 2 cr. ; Student Option; Every Spring)
Nature/scope of chief nutritional issues and problems in the world. Emphasizes developing countries. Nutrient deficiencies, nutrition-related aspects of infectious/chronic disease. prereq: Grad student

PUBH 6907. Maternal, Infant, Child and Adolescent Nutrition. (3 cr. ; Student Option; Every Fall & Summer)
This course provides an overview of nutrition issues affecting pregnant and postpartum women, females of reproductive age, infants, children and adolescents. The course integrates public health practice and policy recommendations with evidence-based clinical practice guidelines to provide a comprehensive view of maternal and child health (MCH) nutrition issues seen by practitioners in community settings. The course addresses nutrition education, community/ population nutrition intervention strategies, and programs and policies to promote healthy eating and physical activity and to reduce obesity and chronic disease risk among MCH populations. The course also provides an opportunity for students to develop social marketing and media communication skills and messages appropriate for maternal and child health (MCH) populations as well as to evaluate child nutrition assistance programs and policies.

PUBH 6914. Community Nutrition Intervention. (; 3 cr. ; Student Option; Every Spring)
Tools for developing community nutrition interventions. Using behavioral therapy, conducting needs assessments, writing program objectives, developing intervention strategies, evaluating program implementation and effectiveness, planning a budget, writing grant proposals.

PUBH 6915. Nutrition Assessment. (2 cr. ; Student Option; Every Fall)
Common nutritional assessment using dietary, biochemical, and anthropometric approaches. Applications of methods, interpretation of results. Hands-on experience, training in common anthropometric methods. prereq: Public health nutrition major or instr consent

PUBH 6920. Foundations of Interprofessional Professional Communication and Collaboration. (1 cr. ; S-N only; Every Fall)
Explore nature of/need for interprofessional communication, qualities of successful teams/interprofessional interactions, professional identity, ethics, integrity, values, communication/decision making in interprofessional environment.

PUBH 6933. Nutrition and Chronic Diseases. (; 2 cr. ; Student Option; Every Spring)
Issues in nutrition and public health. How nutrition research is translated into dietary recommendations for public health. Relation of nutrition to obesity, cardiovascular disease, diabetes, and cancer.

PUBH 6954. Personal, Social and Environmental Influences on the Weight-Related Health of Pediatric Populations. (2 cr. ; Student Option; Every Fall)
Overview of public health strategies for the prevention of pediatric obesity. Includes overview of epidemiology of child and adolescent obesity with a focus on social-ecological risk factors. Discusses implications for developing interventions and programs. prereq: completed one of the following: a) basic intro to nutrition course, b) PubH 6094, or c) 1 year work experience in the field of obesity and/or public health or instructor consent.

PUBH 6955. Using Policy to Address the Weight-Related Health of Child and Adolescent Populations. (; 1 cr. ; Student Option; Every Spring)
Overview of federal, state, local policy approaches. National initiatives for prevention of child and adolescent obesity. Specific policies will be discussed at local, state, federal levels. Extensive discussion on evidence of impact of policies on child and adolescent weight.

PUBH 6956. Public Health Approaches to Addressing Food Insecurity in U.S. Populations and Developing Nations. (; 2 cr. ; Student Option; Every Spring)
The course Public Health Approaches to Addressing Food Insecurity in U.S. Populations and Developing Nations provides an introduction to the burden of food insecurity and its impact on health disparities. Assumptions of the course include (1) having a dignified manner to access adequate food to support one?s health is a basic human right and (2) improving access to nutritionally-dense foods and potable water will lead to reduced rates of pediatric health problems as well as chronic diseases of adulthood. With this perspective, there is a need to support, evaluate, and strengthen existing strategies and policies to prevent food insecurity. There will be extensive discussion of social-ecological factors risk factors for food insecurity and implications for the development of interventions and policies.

PUBH 6995. Community Nutrition Practicum. (; 7 cr. [max 8 cr.] ; A-F only; Every Summer)
Didactic/experiential learning opportunities in community nutrition program delivery/ management. Students complete at least 40 hours each week for ten weeks guided by on-site preceptor and course instructor. prereq: Public health nutrition MPH degree student, instr consent

PUBH 6996. Clinical Nutrition Practicum. (; 7 cr. [max 9 cr.] ; A-F only; Every Summer)
Didactic/experiential learning in clinical nutrition. Application of nutrition care process/ model to medical conditions. Students complete at least 40 hours each week for ten weeks guided by on-site preceptor and course instructor. prereq: Public health nutrition MPH degree student, instr consent

PUBH 7091. Independent Study: Community Health Promotion. (; 1-4 cr. [max 20 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent study supervised by community health promotion faculty member. prereq: CHP major, instr consent

PUBH 7094. Integrative Learning Experience: Community Health Promotion. (; 1-6 cr. ; S-N only; Every Fall, Spring & Summer)
MPH students complete an integrative learning experience (ILE) that demonstrates synthesis of foundational and concentration competencies. Students in consultation with faculty select foundational and concentration-specific competencies appropriate to the student's educational and professional goals. prereq: CHP program, instr consent

PUBH 7096. Applied Practice Experience: Community Health Promotion. (; 1-5 cr. ; S-N only; Every Fall, Spring & Summer)
MPH students are required to complete a supervised Applied Practice Experience (APEx). Students must address five competencies and must submit two products that demonstrate attainment of the competencies. prereq: CHP program, instr consent

PUBH 7193. Directed Study: Environmental Health. (; 1-4 cr. [max 20 cr.] ; Student Option No Audit; Every Fall, Spring & Summer)
Directed study in a topic agreed upon by student and faculty member. prereq: instr consent

PUBH 7194. Integrative Learning Experience: Environmental Health. (1-5 cr. [max 25 cr.] ; S-N only; Every Fall, Spring & Summer)
MPH students complete an integrated learning experience (ILE) that demonstrates synthesis of foundational and concentration competencies. Students in consultation with faculty select foundational and concentration-specific competencies appropriate to the student?s educational and professional goals. prereq: Environmental health program, instr consent

PUBH 7195. MS in Environmental Health Sciences Plan B Project. (1-5 cr. ; S-N only; Every Fall, Spring & Summer)
Students must complete a written plan B project where they are required to synthesize and integrate knowledge acquired in coursework and other learning experiences and apply theory and principles in a context that reflects an aspect of professional practice. The culminating experience must be used as a means by which faculty judge whether the student has mastered the body of knowledge and can demonstrate proficiency in the required competencies through written and oral presentation. All master?s degree candidates are required to pass a final comprehensive oral examination to be taken after submission of the Plan B project(s).

PUBH 7196. Applied Practice Experience: Environmental Health. (; 1-5 cr. ; S-N or Audit; Every Fall, Spring & Summer)
MPH students are required to complete a supervised Applied Practice Experience (APEx). Students must address five competencies and must submit two

products that demonstrate attainment of the competencies. prereq: Environmental health student, instr consent

PUBH 7200. Topics: Public Health Practice. (; 0.5-4 cr. [max 80 cr.] ; Student Option No Audit; Every Fall, Spring & Summer)
New course offerings or topics of interest in public health practice.

PUBH 7210. Topics: Global Food Systems. (; 0.5 cr. [max 3 cr.] ; S-N only; Every Summer)
Food systems related to specific food products, including inputs, processes, and outputs from production sites to consumers. Context for food safety policy. Concept of food system biosecurity as prerequisites for a safe, abundant, affordable, and diverse food supply. Case studies of food-borne disease outbreaks illustrate critical controls in food production.

PUBH 7214. Principles of Risk Communication. (; 1 cr. ; Student Option No Audit; Every Summer)
Key concepts of risk communication theory and their practical application to collection/sharing of information in support of individual and community decision-making about public health issues. Application of risk communication principles to routine, ongoing public health issues and those that arise out of emergency/ crisis.

PUBH 7215. Food Safety: Risk Assessment and Risk Management. (; 1 cr. ; Student Option No Audit; Summer Even Year)
Risk assessment methods/strategies for managing risk for specific foods and across the food system. Students work in groups to identify a specific risk management question to be addressed by risk assessment and develop a specific risk management strategy.

PUBH 7216. Food Safety Risk Management. (; 1 cr. ; Student Option No Audit; Summer Even Year)
Strategies for managing risk of food-borne diseases for specific foods and across food system.

PUBH 7217. Advances in Molecular Epidemiological Analysis. (; 1 cr. ; Student Option No Audit; Summer Even Year)
Overview of molecular laboratory techniques used to detect, identify, and characterize infectious disease agents. Application of molecular subtyping techniques to surveillance and outbreak investigations. Implications for public health practice.

PUBH 7221. Planning for Urgent Threats. (; 1 cr. ; Student Option No Audit; Every Summer)
Role of public health in disaster preparedness, response, and recovery. How public health agencies plan for managing the crisis. Providing surge capacity to maintain public health and health care functions. Assisting a community's recovery from a disaster.

PUBH 7222. Best Practices in Emergency Response. (1 cr. ; S-N only; Periodic Summer)
Best practices in PH preparedness & response are evolving & continually tested with new experiences & expertise. This course for PH professionals and professionals responsible for preparedness planning, response & recovery is designed to provide participants with practical applications & tools to apply learning from real incidents.

PUBH 7225. Communication and Information Technology Tools for Public Health Emergency Response. (; 1 cr. ; Student Option No Audit; Summer Odd Year)
Uses Incident Command System as framework. Application of information/ communication technology to emergency response. Communication exercise design, IT project management, backup communication methods. prereq: [FEMA IS-100a, FEMA IS-546a] with certificate of completion

PUBH 7227. Incident Management Systems: The Public Health Role. (; 1 cr. ; S-N only; Periodic Summer)
Managing personnel/resources in an emergency incident. Formalized/common management practices applicable in virtually any setting.

PUBH 7230. Topics in Infectious Disease. (; 0.5-4 cr. [max 80 cr.] ; Student Option No Audit; Every Summer)
Topics in emerging/re-emerging infectious diseases. Biology, epidemiology, diagnosis, economics, risk analysis, methods for prevention/control. Global implications.

PUBH 7231. Surveillance of Foodborne Diseases in Humans. (; 1 cr. ; Student Option No Audit; Every Spring & Summer)
Principles/methods for surveillance of foodborne diseases. Investigation of outbreaks, their application for assessment of food safety hazards. Integration of epidemiologic/lab methods for surveillance in human populations.

PUBH 7233. Food System Defense: Vulnerabilities in the Food System. (; 1.5 cr. ; Student Option No Audit; Periodic Summer)
Holistic view of food system. Tools to assess vulnerability of specific food systems/facilities. Legal, regulatory, supply chain, public health system, and technology strategies. Instructors are from public/private sectors related to food system.

PUBH 7234. Global Food Systems Leadership. (; 1 cr. ; S-N only; Periodic Summer)
Critical competencies for leadership in industry, government, and academia necessary for ensuring an abundant, affordable, and safe global food supply.

PUBH 7235. Surveillance of Zoonotic Pathogens in Animals. (1 cr. ; Student Option No Audit; Periodic Summer)
Case-study approach/field trips. Surveillance issues related to zoonotic pathogens in animals.

PUBH 7237. Using Risk Analysis Tools: Estimating Food Safety on the Farm to Table Continuum. (1 cr. ; Student Option No Audit; Periodic Summer)
This applications-based course will provide the necessary risk- and science-based tools to evaluate and mitigate the microbial and chemical risks in a food production chain?from the farm until consumption. Participants will be divided in small interdisciplinary groups to mimic a real risk analysis team and develop real-case outbreak scenarios. The attendants will follow the risk analysis process as an integral part of a science-based decision-making (risk prioritization, risk assessment, risk management and risk communication) to estimate and manage the food safety risks. The attendants will apply different qualitative (hazard analysis, decision matrices) and quantitative (risk prioritization, modeling, and web-based software) tools by using a computer. The participants will present the main outcomes from the analyses and will evaluate possible mitigation options to reduce the risk in a cost-effective way.

PUBH 7241. Culturally Responsive Communication. (; 1 cr. ; Student Option No Audit; Periodic Summer)
Design/delivery of culturally responsive health communication. Social/cultural contexts and belief systems that shape health behavior. Cultural learning styles. Overcoming cultural barriers. Cultural motivators.

PUBH 7242. War and Public Health. (; 1 cr. ; Student Option No Audit; Every Summer)
Public health problems associated with armed conflict; interdisciplinary perspective with emphasis on analyzing the complexities. Consequences of mass displacement, effects on community and family, women's roles and experiences, trauma and healing. Health intervention strategies. Seminar discussion format.

PUBH 7244. Community-based Participatory Research. (1 cr. ; Student Option; Periodic Summer)
This introductory course is intended for graduate students and community practitioners interested in adding CBPR to their repertoire of effective approaches to understanding and addressing social and health disparities. Topics such as the purpose and applications of CBPR; partnership formation and maintenance; issues of power, trust, race, class, and social justice; ethical issues; CBPR's relationship to cultural knowledge systems will be explored. The course has a required pre-course component (6-8 hours) consisting of readings, lectures and exercises designed to prepare you for in-class discussion and experiential learning.

PUBH 7250. Designing and Conducting Focus Group Interviews. (; 1 cr. ; Student Option No Audit; Every Spring & Summer)
Interactive, intensive overview of focus group procedures for public/non-profit environments. Practical approaches to determining appropriate use of focus groups. Design options, developing questions, recruiting participants, moderating. Analyzing/reporting results.

PUBH 7253. Introduction to GIS. (; 1 cr. ; S-N only; Every Summer)
Concepts/uses of Geographic Information Systems. Data structures, sources of data, tools, vendors/software, health-related applications. Exercises in spatial data display/ query, map generation, spatial analysis using ArcGIS software. Students create their own GIS project model. prereq: Experience with spreadsheet programs

PUBH 7254. Introductory Biostatistics for Health Care Professionals. (; 1 cr. ; S-N only; Every Summer)
Descriptive statistics for continuous/categorical data. Graphical representation of data. Rates, proportions. Normal distribution, z-scores, confidence intervals, p-values. Tests of significance: t-test, chi-square test. Correlation analysis. Simple linear regression. ANOVA (Analysis of Variance). Introduction to nonparametric tests, logistic regression. prereq: Experience with computerized spreadsheets

PUBH 7257. Qualitative Data Analysis. (1 cr. ; Student Option No Audit; Every Summer)
Analyze/work with qualitative data from variety of data collection methods/multiple analysis approaches. Discussion of analyzing photograph/video data will provide insights on how best to analyze these types of data.

PUBH 7258. Data Driven and Time-Sensitive Decision Making. (1 cr. ; Student Option; Periodic Summer)
This course aims to provide knowledge and equip students with techniques to transform data into information that decision makers can use in order to make time critical decisions. It has been well documented that decision-making during a crisis is difficult as information is limited and established procedures may not be followed, thus increasing the amount of stress on individuals required to make those decisions. To improve crisis decision-making data collection, analysis, and synthesis an abundant and wide-variety of data are required in order to make an informed decision. This course will have didactic and application components where students will be able to apply the skills knowledge learned.

PUBH 7260. Ergonomics and the Prevention of Workplace Injuries. (; 1 cr. ; Student Option No Audit; Summer Odd Year)
Ergonomics for prevention of workplace injuries. Engineering principles/policy issues. Cumulative/acute injuries, status of current policy/regulatory efforts, and program management issues. Applications include upper extremity disorders, back injuries, VDT workstations, and safety/productivity issues.

PUBH 7261. Ecosystem Health. (1 cr. ; Student Option No Audit; Periodic Summer)
Impact of global environmental change on human health/welfare. How major changes in the environment such as wild land degradation, increasing contaminant loads, and climate change are altering human, wildlife, and domestic animal fitness/survival. Depletion of wild resources of nutritional, social, or economic importance. Loss of biodiversity. Alterations in disease prevalence, including emerging infectious diseases. Strategies to mediate/prevent changes and their impacts on human well-being.

PUBH 7262. Globalization and Health. (; 1 cr. ; Student Option No Audit; Periodic Summer)
Global health concerns cross the borders of developed and developing nations. Effect of globalization on social and scientific consequences in public health. Interplay between global stressors such as population, war, economics, urbanization, and environment; effects on the health of women/children, spread of infectious/chronic diseases, nutrition and environmental health.

PUBH 7264. Data Visualization in R. (1 cr. ; Student Option No Audit; Every Summer)
In this course, you will learn how to manipulate data and prepare basic visualizations using the statistical software R. While the tools and techniques taught will be generic, many of the examples will be drawn from biomedicine and public health.

PUBH 7291. Independent Study: Public Health Practice. (; 0.5-3 cr. ; S-N only; Every Fall, Spring & Summer)
Independent study supervised by a public health practice faculty member. prereq: Public health practice MPH major, instr consent

PUBH 7294. Integrative Learning Experience: Public Health Practice. (; 0.5-4 cr. [max 12 cr.] ; S-N only; Every Fall, Spring & Summer)
MPH students complete an integrative learning experience (ILE) that demonstrates synthesis of foundational and concentration competencies. Students in consultation with faculty select foundational and concentration-specific competencies appropriate to the student's educational and professional goals. prereq: Public health practice MPH program, instr consent

PUBH 7296. Applied Practice Experience: Public Health Practice. (0.5-8 cr. ; S-N only; Every Fall, Spring & Summer)
MPH students are required to complete a supervised Applied Practice Experience (APEx). Students must address five competencies and must submit two products that demonstrate attainment of the competencies. prereq: public health practice student, instr consent

PUBH 7391. Independent Study: Epidemiology. (; 1-4 cr. ; Student Option; Every Fall, Spring & Summer)
Independent study supervised by epidemiology faculty member. prereq: [EPI major or grad student], instr consent

PUBH 7392. Readings in Epidemiology. (; 1-4 cr. ; Student Option; Every Fall, Spring & Summer)
Current readings in epidemiology. prereq: Epidemiology major, instr consent

PUBH 7394. Integrative Learning Experience: Epidemiology. (; 1-6 cr. ; S-N only; Every Fall, Spring & Summer)
MPH students complete an integrative learning experience (ILE) that demonstrates synthesis of foundational and concentration competencies. Students in consultation with faculty select foundational and concentration-specific competencies appropriate to the student's educational and professional goals. Epidemiology MPH student, instr consent

PUBH 7396. Applied Practice Experience: Epidemiology. (; 1-5 cr. ; S-N only; Every Fall, Spring & Summer)
MPH students are required to complete a supervised Applied Practice Experience (APEx). Students must address five competencies and must submit two products that demonstrate attainment of the competencies. prereq: epidemiology student, instr consent

PUBH 7400. Topics: Biostatistics. (; 0.5-4 cr. [max 20 cr.] ; Student Option; Periodic Fall, Spring & Summer)
New courses or topics of interest in biostatistics.

PUBH 7401. Fundamentals of Biostatistical Inference. (4 cr. ; Student Option; Every Fall)
Part of two-course sequence intended for PhD students in School of Public Health who need rigorous approach to probability/statistics/statistical inference with applications to research in public health. prereq: Background in calculus; intended for PhD students in public hlth and other hlth sci who need rigorous approach to probability/statistics and statistical inference with applications to research in public hlth

PUBH 7402. Biostatistics Modeling and Methods. (; 4 cr. ; Student Option; Every Spring)
Second of two-course sequence. Rigorous approach to probability/statistics, statistical inference. Applications to research in public health. prereq: 7401; intended for PhD students in health sciences

PUBH 7405. Biostatistical Inference I. (; 4 cr. ; Student Option; Every Fall)
T-tests, confidence intervals, power, type I/II errors. Exploratory data analysis. Simple linear regression, regression in matrix notation, multiple regression, diagnostics. Ordinary least squares, violations, generalized least squares, nonlinear least squares regression. Introduction to General linear Model. SAS and S-Plus used. prereq: [[Stat 5101 or concurrent registration is required (or allowed) in Stat 5101], biostatistics major] or instr consent

PUBH 7406. Biostatistical Inference II. (3 cr. [max 4 cr.] ; Student Option; Every Spring)
Topics include maximum likelihood estimation, single and multifactor analysis of variance, logistic regression, log-linear models, multinomial logit models, proportional odds models for ordinal data, gamma and inverse-Gaussian models, over-dispersion, analysis of deviance, model selection and criticism, model diagnostics, and an introduction to non-parametric regression methods. R is used. prereq: [7405, [STAT 5102 or concurrent registration is required (or allowed) in STAT 5102], biostatistics major] or instr consent

PUBH 7407. Analysis of Categorical Data. (; 3 cr. ; Student Option; Every Spring)
Contingency tables, odds ratio, relative risk, chi-square tests, log-linear models, logistic regression, conditional logistic regression, Poisson regression, matching, generalized linear models for independent data. SAS/S-Plus used throughout. prereq: 7405, [Stat 5102 or concurrent registration is required (or allowed) in Stat 5102 or Stat 8102 or concurrent registration is required (or allowed) in Stat 8102]

PUBH 7415. Introduction to Clinical Trials. (; 3 cr. ; Student Option; Every Fall & Summer)
Hypotheses/endpoints, choice of intervention/control, ethical considerations, blinding/randomization, data collection/monitoring, sample size, analysis, writing. Protocol development, group discussions. prereq: 6414 or 6450 or one semester graduate-level introductory biostatistics or statistics or instr consent

PUBH 7420. Clinical Trials: Design, Implementation, and Analysis. (; 3 cr. ; Student Option; Every Spring)
Introduction to and methodology of randomized clinical trials. Design issues, sample size, operational details, interim monitoring, data analysis issues, overviews. prereq: 6451 or concurrent registration is required (or allowed) in 6451 or 7406 or instr consent

PUBH 7430. Statistical Methods for Correlated Data. (; 3 cr. ; Student Option; Every Fall)
Correlated data arise in many situations, particularly when observations are made over time and space or on individuals who share certain underlying characteristics. This course covers techniques for exploring and describing correlated data, along with statistical methods for estimating population parameters (mostly means) from these data. The focus will be primarily on generalized linear models (both with and without random effects) for normally and non-normally distributed data. Wherever possible, techniques will be illustrated using real-world examples. Computing will be done using R and SAS. prereq: Regression at the level of PubH 6451 or PubH 7405 or Stat 5302. Familiarity with basic matrix notation and operations (multiplication, inverse, transpose). Working knowledge of SAS or R (PubH 6420).

PUBH 7440. Introduction to Bayesian Analysis. (; 3 cr. ; Student Option; Every Spring)
Introduction to Bayesian methods. Comparison with traditional frequentist methods. Emphasizes data analysis via modern computing methods: Gibbs sampler, WinBUGS software package. prereq: [[7401 or STAT 5101 or equiv], [public health MPH or biostatistics or statistics] grad student] or instr consent

PUBH 7445. Statistics for Human Genetics and Molecular Biology. (; 3 cr. ; Student Option; Every Spring)
Introduction to statistical problems arising in molecular biology. Problems in physical mapping (radiation hybrid mapping, DDP), genetic mapping (pedigree analysis, lod scores, TDT), biopolymer sequence analysis (alignment, motif recognition), and micro array analysis. prereq: [6450, [6451 or equiv]] or instr consent; background in molecular biology recommended

PUBH 7450. Survival Analysis. (3 cr. ; Student Option; Every Fall)
Statistical methodologies in analysis of survival data. Kaplan-Meier estimator, Cox's proportional hazards multiple regression model, time-dependent covariates, analysis of residuals, multiple failure outcomes. Typical biomedical applications, including clinical trials and person-years data. prereq: 7406, [STAT 5102 or STAT 8102]

PUBH 7460. Advanced Statistical Computing. (; 3 cr. ; Student Option; Every Fall)
Statistical computing using SAS, Splus, and FORTRAN or C. Use of pseudo-random number generators, distribution functions. Matrix manipulations with applications to regression and estimation of variance. Simulation studies, minimization of functions, nonlinear regression, macro programming, numerical methods of integration. prereq: [7405, biostatistics major, [C or FORTRAN]] or instr consent

PUBH 7461. Exploring and Visualizing Data in R. (2 cr. ; Student Option; Every Fall)
This course is intended for students, both within and outside the School of Public Health, who want to learn how to manipulate data, perform simple statistical analyses, and prepare basic visualizations using the statistical software R. While the tools and techniques taught will be generic, many of the examples will be drawn from biomedicine and public health.

PUBH 7462. Advanced Programming and Data Analysis in R. (2 cr. ; Student Option; Every Spring)
This course is intended for students who are relatively proficient with R, and are looking to improve their coding and data analysis skills. The emphasis will be on learning tools and techniques which are useful to students who will be doing non-trivial programming and/or data analysis in either a research or production environment.

PUBH 7465. Biostatistics Consulting. (; 2 cr. [max 3 cr.] ; Student Option; Every Fall & Spring)
This course examines the professional roles, responsibilities and analytic skills of the practicing biostatistician as consultant and collaborator in health science research. The spectrum of roles will be explored through lecture, readings, discussion, written assignments, and participation in statistical consulting sessions with investigators at the University of Minnesota and in the community. prereq: PubH 7405-7406 (or Stat 8051-8052) and Stat 5101-5102 (or Stat 8101-8102); Biostatistics graduate student.

PUBH 7470. Study Designs in Biomedical Research. (; 3 cr. ; Student Option; Every Spring)
Diagnostic medicine, including methods for ROC curve. Bioassays. Early-phase clinical trials, methods including dose escalation, toxicity, and monitoring. Quality of life. prereq: [[6450, 6451] or equiv], [grad student in biostatistics or statistics or clinical research], familiarity with SAS

PUBH 7475. Statistical Learning and Data Mining. (; 3 cr. ; Student Option; Periodic Spring)
Various statistical techniques for extracting useful information (i.e., learning) from data. Linear discriminant analysis, tree-structured classifiers, feed-forward neural networks, support vector machines, other nonparametric methods, classifier ensembles, unsupervised learning. prereq: [[[6450, 6452] or equiv], programming backgroud in [FORTRAN or C/C++ or JAVA or Splus/R]] or instr consent; 2nd yr MS recommended

PUBH 7485. Methods for Causal Inference. (3 cr. ; Student Option; Every Fall)
Although most of statistical inference focuses on associational relationships among variables, in many biomedical and health sciences contexts the focus is on establishing the causal effect of an intervention or treatment. Drawing causal conclusions can be challenging, particularly in the context of observational data, as treatment assignment may be confounded. The first part of this course focuses on methods to establish the causal effect of a point exposure, i.e., situations in which treatment is given at a single point in time. Methods to estimate causal treatment effects will include outcome regression, propensity score methods (i.e., inverse weighting, matching), and doubly robust approaches. The second half of the course focuses on estimating the effect of a series of treatment decisions during the course of a chronic disease such as cancer, substance abuse, mental health disorders, etc. Methods to estimate these time-varying treatments include marginal structural models estimated by inverse probability weighting, structural nested models estimated by G-estimation, and the (parametric) G-computation algorithm. We will then turn our attention to estimating the optimal treatment sequence for a given subject, i.e., how to determine ?the right treatment, for the right patient, at the right time,? using dynamic marginal structural models and methods derived from reinforcement learning (e.g., Q-learning, A-learning) and classification problems (outcome weighted learning, C-learning). PubH 8485 is appropriate for Ph.D students in Biostatistics and Statistics. The homework and projects will focus more on the theoretical aspects of the methods to prepare students for methodological research in this area. PubH 7485 is appropriate for Masters students in Biostatistics and PhD students in other fields who wish to learn causal methods to apply them to topics in the health sciences. This course uses the statistical software of R, a freely available statistical software package, to implement many of the methods we discuss. However, most of the methods discussed in this course can be implemented in any statistical software (e.g., SAS, Stata, SPSS, etc.) and students will be free to use any software for homework assignments. prereq: Background in regression (e.g. linear, logistic, models) at the level of PubH 7405-7406, PubH 6450-6451, PubH 7402, or equiv. Background in statistical theory (Stat 5101-5102 or PubH 7401) is helpful.

PUBH 7494. Integrative Learning Experience: Biostatistics. (; 1-3 cr. ; S-N only; Every Fall, Spring & Summer)
MPH students complete an integrative learning experience (ILE) that demonstrates synthesis of foundational and concentration competencies. Students in consultation with

faculty select foundational and concentration-specific competencies appropriate to the student?s educational and professional goals. prereq: Biostatistics program, instr consent

PUBH 7496. Applied Practice Experience: Biostatistics. (; 1 cr. [max 6 cr.] ; S-N only; Every Fall, Spring & Summer)
MPH students are required to complete a supervised Applied Practice Experience (APEx). Students must address five competencies and must submit two products that demonstrate attainment of the competencies. prereq: biostatistics MPH student

PUBH 7525. Introduction to Population Health: A Health System Perspective. (; 2 cr. ; A-F only; Every Summer)
We will work from the definition that Population Health is the examination of large amounts of human data to address issues of health status and issues in aggregate to address the needs of large groups of people (populations). In other words, Population Health is concerned with the distribution of resources to overcome problems that drive poor health conditions in the population. This definition will be framed by the concept of Systems, which are human processes and social linkages that come together for a purpose. In this course, we will examine the factors that differentiate population health from public health, identify purpose of population health strategies, and discuss various intervention approaches. The course centers around a final project called a ?Population Health Strategy.? Each week, students will learn skills and techniques that support the completion of a final project. Students will answer: ? What?s the health problem; ? Who is the population of interest; ? Who are the stakeholders and partners; ? What is the outcome you hope to improve; ? How will you achieve that goal; and ? How will you message this plan? As you work to build this strategy, you will be asked to consider the social and environmental influences of illness and disease as well as many of the organizational challenges of implementation and outreach. Throughout this journey, you will read a diverse selection of academic and professional writing, all focused on giving you the breadth and depth of knowledge you will need to create a strong population health strategy. One of the ways you will engage with this material is through weekly presentations (group) and writing assignments (short). These will help you progress through the material and hone skills you will need as leaders in the Health Administration workforce.

PUBH 7533. Leading with Impact in Healthcare. (1 cr. ; A-F only; Every Fall)
This course is offered in the final term of the Executive MHA degree and is designed to enhance students' abilities to be effective leaders in health care organizations. The course will discuss the core theory and concepts of leadership, the principles of managed and adaptive change methods, and leadership impact on teams, culture and community. Concepts from previous courses will be reexamined, specifically in reference to their leadership implications (management, ethics, making changes in healthcare, quality and patient safety, etc.) In addition, it is offered alongside the Capstone course so that leadership perspectives can and will be incorporated into their final Capstone deliverable. Students will conduct 360 feedback exercises to understand their strengths and areas for improvement as a leader and use the results of that assessment to develop a plan for their personal leadership career development. We will explore leadership practices that will positively affect team outcomes, organization culture, and community relations. Reading and online resource requirements include books, articles, video, and other talks focused on multiple facets of leadership, change, and culture. Small group and class discussions focus on applying concepts from the readings/ online resources to leadership in a variety of health care and public health settings. Students will be provided assignments where they will apply learnings and concepts to current leadership challenges they are experiencing. Discussion boards will be utilized to post questions, experiences, and learnings that have occurred through experimentation and theory testing. These learnings may be cited in the final Capstone deliverable.

PUBH 7534. Marketing for Health Care Professionals. (; 1 cr. [max 2 cr.] ; A-F only; Every Summer)
Application of principles of marketing to managing professional practice.

PUBH 7537. Healthcare Finance. (; 3 cr. ; A-F only; Every Fall)
Principles of corporate/not-for-profit finance/ insurance concepts integrated/applied to health care. Capital/operating budgets. Medicare's payment systems for hospitals/ physicians, risk-adjusted capitation payment systems. Population-based health care finance, managed care. Prereq: MHA student or instructor consent.

PUBH 7538. Health Financial Principles. (; 4 cr. ; A-F only; Every Summer)
This course covers basic concepts of accounting, finance, and financial management of health care organizations, including how organizations utilize and report financial data and use that data to make decisions. This course will serve as a prerequisite for the more advanced finance courses that are in the health management curriculum. The primary objective of this course is to impart administrative/ managerial knowledge and financial/accounting theory and technique required in managing healthcare organizations within today?s evolving environment. The elements of this course will teach the fundamental concepts of healthcare accounting, healthcare finance, including both accounting and financial management principles with emphasis on the current financial environment in which providers operate. The primary purpose of this course is to present the basic accounting concepts and financial management techniques (e.g. cost allocation, pricing and service decisions, budgeting) that are most critical to managerial decision making within healthcare organizations. This course is constructed in such a manner to assist each student in the development of their individual managerial skills, consistent with the National Center for Healthcare Leadership (NCHL) Competency Model Demonstration, in which the School of Public Health is a participant. Prereq: MHA student or instructor consent.

PUBH 7541. Statistics for Health Management Decision Making. (; 3 cr. ; Student Option No Audit; Every Spring)
Variation. Frequency distribution, measurement, probability, graphing. Significance tests, estimation, trends. Data handling. Modeling, odds ratios. Prevalence, incidence/vital statistics. Research applications. Statistical approach to rational administrative decision making. Prereq: MHA student or instructor consent.

PUBH 7542. Quality Improvement and Patient Safety. (; 2 cr. ; A-F only; Every Fall)
Almost 20 years ago in the United States the Institute of Medicine published To Err is Human, transparently noting that between 44,000 and 98,000 people in that country die every year as a result of medical errors; further research has shown that patients in all countries are subject to unintended harm as a result of their interaction with our healthcare systems. Not only are these errors devastating to those who have them, they harm providers and cost billions of dollars a year. Additionally, as the healthcare landscape shifts rapidly from one build upon volume to a value-based system, health systems and countries face an ever more urgent need to improve quality and safety for the populations they serve. This course will review the role of the health system leader in addressing the challenge of improving quality, safety, and value. Modules will specifically address: an overview of quality improvement and patient safety, data and common improvement models, patient safety techniques, the administrator?s role in the creation of the culture of safety, future trends in quality, safety, and value. Course Goals: a. Understand the patient, system, and population impacts of the current quality and safety challenges faced by healthcare b. Describe common models used for improvement work c. Understand the role that providers and health system leaders play in quality improvement and patient safety efforts d. Utilize common tools of quality and safety e. Balance system and personal responsibilities in quality improvement and patient safety f. Be familiar with common terminology and techniques such as PDSA, Lean, RCA, and Six Sigma Course is reserved for students enrolled in Executive Masters in Healthcare Administration Program ? School of Public Health.

PUBH 7547. Health Care Human Resource Management. (; 2 cr. ; A-F only; Every Fall)
Relationship between human resources management/general management. Work/ human resources. Compensation/benefits, personnel planning, recruitment/selection, training/development. Employee appraisal/ discipline. Union-management relations. Prereq: MHA student or instructor consent.

PUBH 7551. Principles of Management in Health Services Organizations. (; 2 cr. ; A-F only; Every Spring)
Understanding of/improvement in competencies of managers in organizations, particularly as applied to health services/public health organizations.

PUBH 7553. Health Care Management Ethics. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall)
Ethical issues faced by health care managers as leaders of organization, members of profession, coodinators of clinical processes. Perspectives of managerial, organizational, professional, clinical ethics. Prereq: MHA student or instructor consent.

PUBH 7554. Health Care Strategy and Marketing. (; 3 cr. ; A-F only; Every Summer)
Managing marketing function. Marketing planning, strategy, management concepts. Identifying marketing problems/opportunities. Constructing, evaluating, managing marketing plan. Prereq: MHA student or instructor consent.

PUBH 7555. Health Economics. (; 2 cr. ; A-F only; Every Summer)
General principles of health economics applied to issues in health. Implications for health policy. Prereq: MHA student or instructor consent.

PUBH 7556. Health and Health Systems. (; 2 cr. ; A-F only; Every Spring)
U.S. health care system/health policy process. Current challenges in areas of health care delivery, financing, policy.

PUBH 7560. Operations Research and Quality in Health Care. (; 3 cr. ; A-F only; Every Spring)
Using systems perspective to develop models to analyze/improve health care operations. Identifying data needs/sources to model structures, processes, outcomes of care.

PUBH 7562. Information Technology in Health Care. (; 2 cr. ; A-F only; Every Summer)
Managing information as strategic resource within health care organizations. Designing information technology systems to capture, combine, transform information to measure processes/outcomes of care, support collaborative clinical decision making, support management decisions. Prereq: MHA student or instructor consent.

PUBH 7564. Private Purchasers of Health Care. (; 2 cr. ; A-F only; Every Spring)
Development/organization of HMOs/PPOs. Risk sharing, provider contracts, utilization management, quality improvement, marketing, new product development. Employer relations. Medicare/Medicaid contracting. Budget processing. Financial performance. Government regulations.

PUBH 7565. Innovation of Healthcare Services. (; 2 cr. ; A-F only; Every Spring)
Designing/creating new care delivery services/ experiences. Exploiting opportunities for innovation. Overcoming obstacles. Capturing value.

PUBH 7566. Executive Capstone in Healthcare Leadership. (; 2 cr. ; S-N only; Every Fall)
Seminar course supporting students as they complete capstone project. Prereq: MHA student or instructor consent.

PUBH 7568. Interdisciplinary Teamwork in Health Care. (; 2 cr. ; A-F only; Every Summer)
Develop skills to function in inter-professional teams by using knowledge of various health care professions, principles of teamwork, knowledge of teams as they function in health care. Team formation, leading teams, decision making in teams, managing conflict in teams.

PUBH 7569. Health Care Policy. (; 1 cr. ; A-F only; Every Summer)
Public policy environment surrounding health care/public health systems. Political context of health policy. Approaches to policy formation/ analysis. Tools/strategies for influencing health policy outcomes.

PUBH 7570. Topics: Healthcare Administration. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall)
Selected readings in healthcare administration. Discussion based on readings. prereq: dept consent

PUBH 7571. Organizational Integration in Health Care Delivery. (; 2 cr. ; A-F only; Every Fall)
Introduction to integrated healthcare and integrated health systems. Design, governance, operations, strategy, and the models for effectively integrating and aligning physicians and other medical professionals in interprofessional teams.

PUBH 7572. Health Care Strategies in Competitive Markets. (; 2 cr. ; A-F only; Every Spring)
Application/understanding of competitive strategy. Prominent theories/models for health care markets.

PUBH 7573. Managing the Embedded Medical Practice. (; 2 cr. ; A-F only; Every Fall)
Build competencies in areas of design, strategy, operations, finance for embedded medical practice.

PUBH 7576. Legal Considerations in Health Services Organizations. (; 2 cr. ; A-F only; Every Summer)
Laws affecting administration of hospitals/other healthcare organizations. Administrative law, corporate/business law, labor law, civil liability, tax-related issues. Legal issues relevant to administration, decision making, planning.

PUBH 7580. Organizational Management in Long Term Care. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall)
Overview of organizational management and human resource management in long-term care setting from senior manager's perspective. Combines three days of on-campus seminars with independent study.

PUBH 7584. Health Care and Medical Needs. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall)
Differentiation between aging process and disease process. Common conditions/diseases associated with aging.

PUBH 7585. Community Health Care Leadership Development I. (; 5-10 cr. ; A-F or Audit; Periodic Summer)
Nine-month program including on-campus (two weeks) plus off-campus study including seminars and monthly dialogues with mentors. Community development of health. Cultural meaning of community. Analyzing economic/ political foundations of health. prereq: Member of a community health care group

PUBH 7586. Community Healthcare Leadership Development II. (; 5-10 cr. ; A-F or Audit; Periodic Summer)
Nine-month program including on-campus (two weeks) plus off-campus study including seminars and monthly dialogues with mentors. Innovative community health development. Leading implementation of change. Networking with national/international health communities. prereq: Member of a community healthcare group

PUBH 7587. Regulatory Management in Long-Term Care. (; 1 cr. [max 2 cr.] ; A-F or Audit; Every Summer)
Funding mechanisms, regulatory compliance mechanisms, and legal provisions currently in force for long-term care industry.

PUBH 7588. Information Uses in Long-Term Care. (; 2 cr. ; A-F or Audit; Every Fall)
Accumulation/analysis of data to inform management decision-making in long-term care. One day on-campus seminar, independent study. prereq: Some knowledge of computers

PUBH 7589. Human Resource Management in Long Term Care. (0.5 cr. [max 1 cr.] ; A-F only; Every Fall)
Covers workplace culture, accountability and fairness, and just and learning culture concepts.

PUBH 7590. Gerontology for Healthcare Managers. (1 cr. [max 2 cr.] ; A-F only; Every Spring)
Covers physical, biological, social, and psychological aspects of the aging process.

PUBH 7591. Independent Study: Health Care Administration. (; 1-4 cr. [max 20 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent study supervised by a health care administration faculty member. prereq: instr consent

PUBH 7592. Healthcare Law. (0.5 cr. [max 1 cr.] ; A-F only; Every Summer)
Covers legal and regulatory issues related to the operation of long-term care service delivery organizations.

PUBH 7596. Clerkship in Health Care Administration. (; 2 cr. ; A-F or Audit; Periodic Spring & Summer)
Survey/solution of management problems within a local health services organization. Preparation of formal management report. prereq: 6544, health care admin student

PUBH 7691. Independent Study: Maternal and Child Health. (; 1-4 cr. [max 20 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent study supervised by a maternal and child health faculty member. prereq: Maternal/child health major, instr consent

PUBH 7694. Integrative Learning Experience: Maternal and Child Health. (1-4.7 cr. ; S-N only; Every Fall, Spring & Summer)
MPH students complete an integrative learning experience (ILE) that demonstrates synthesis of foundational and concentration competencies. Students in consultation with faculty select foundational and concentration-specific competencies appropriate to the student?s educational and professional goals. prereq: Maternal/child health program, instr consent

PUBH 7696. Applied Practice Experience: Maternal and Child Health. (; 1-5 cr. ; S-N only; Every Fall, Spring & Summer)
MPH students are required to complete a supervised Applied Practice Experience (APEx). Students must address five competencies and must submit two products that demonstrate attainment of the competencies. prereq: Maternal and Child Health Student, instr consent

PUBH 7710. Setting Priorities and Framing Public Health Issues. (2 cr. [max 6 cr.] ; A-F only; Every Spring)
The course is designed to develop the skills required to define researchable policy questions, critically analyze policy issues and problems, articulate relevant policy options and bring research and data to help frame decision-making. Additionally, this course will familiarize students with the governmental public health system in the United States. In the field of health policy, there are always multiple sides to every issue and complex political and socio-economic dynamics that create a certain level of uncertainty about what to do. This complexity makes predicting outcomes and making recommendations for policy solutions difficult. Yet decisions still need to be made and are often made given the best information available at that particular time. Providing recommendations based on an analysis of available evidence is an important part of any decision-making process. Through the use of varied writing and presentation exercises students will learn to identify issues, develop problem statements, define an audience and analyze an issue based on a set of key criteria.

PUBH 7720. Data to Drive Public Health. (; 2 cr. ; A-F only; Every Fall)
Executive Public Health Administration and Policy (EPHAP) Program required core course. Must be taken A-F.

PUBH 7730. Public Health Laws, Rules, and Regulations. (1 cr. [max 3 cr.] ; A-F only; Every Spring)
This course will address basic concepts of public health law and the legal bases for the existence and administration of public health programs. Balancing the legal aspects of current public health issues, controversies, individual rights, and the regulatory role of government in health service systems will be considered.

PUBH 7740. Leadership and Leading Change. (2 cr. [max 6 cr.] ; A-F only; Every Fall)
Leadership and Leading Change, is designed for E-PHAP students who aspire to be effective leaders and effective change agents in multi-sectoral contexts. The health care sector organizations discussed will include a variety of public health settings, care delivery organizations and others including government, private and public organizations across multiple sectors. Students explore the core concepts of leadership theory and the principles of change in organizational, community, political, social, and global settings. They use a self-assessment instrument to understand their own strengths and areas for improvement as a leader and use the results of that assessment to develop a personal leadership development plan. The readings are books and articles from the general leadership literature, from the change management literature, and from public health teaching cases. In this hybrid course, the face-to-face portion includes small group discussions, guest speakers, exercises and class discussions that focus on applying concepts from the readings to a variety of settings. Students participate in small discussion groups; each small group will have an opportunity to lead a class discussion on assigned reading materials and their application to leadership in health care settings today. The on-line portion of the course focuses on principles of change and change strategies for public health leaders. Students post reflection notes and engage in discussion with colleagues on course content to critique, comment on relationships between concepts, and to provide personal reflections on the material as the course progresses through the on-line weeks. The in-person portion of the course ends with an assigned paper, the personal leadership development plan. Finally, students choose one of two options for their final course paper: (1) a critique of a change project and leadership from the field, or (2) a personal project plan that demonstrates application of change and leadership strategies.

PUBH 7784. Master's Project Seminar: PHAP and HSRP&A. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall & Spring)
Students participate in exercises to improve written/verbal communication, enhance skills related to giving constructive feedback. Ways that public health administration/policy is practiced. How to integrate knowledge into individually designed master's project. prereq: Public health administration/policy major or health services research/policy/administration major

PUBH 7791. Independent Study: Public Health Administration and Policy. (; 1-6 cr. [max 24 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent study supervised by a public health administration and policy faculty member. prereq: Public hlth admin/policy major, instr consent

PUBH 7794. Integrative Learning Experience: Public Health Administration and Policy. (; 2 cr. ; S-N or Audit; Every Fall, Spring & Summer)
MPH students complete an integrative learning experience (ILE) that demonstrates synthesis of foundational and concentration competencies. Students in consultation with faculty select foundational and concentration-specific competencies appropriate to the student?s educational and professional goals. prereq: Public health administration /policy program, instr consent

PUBH 7796. Applied Practice Experience: Public Health Administration and Policy. (; 2 cr. ; S-N only; Every Fall, Spring & Summer)
MPH students are required to complete a supervised Applied Practice Experience (APEx). Students must address five competencies and must submit two products that demonstrate attainment of the competencies. prereq: public health administration and policy student, instr consent

PUBH 7894. MS in Health Services Research, Policy, and Administration Plan B Project. (1-5 cr. [max 10 cr.] ; S-N only; Every Spring)
Plan B project. prereq: [Health Services Research, Policy/Administration] MS student

PUBH 7991. Independent Study: Public Health Nutrition. (; 1-4 cr. [max 20 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent study supervised by a Public Health Nutrition faculty member. prereq: [PubH Nutr MPH student or Nutr grad student], instr consent

PUBH 7994. Integrated Learning Experience: Public Health Nutrition. (; 1-6 cr. ; S-N only; Every Fall, Spring & Summer)
MPH students complete an integrative learning experience (ILE) that demonstrates synthesis of foundational and concentration competencies. Students in consultation with faculty select foundational and concentration-specific competencies appropriate to the student's educational and professional goals. prereq: PubH Nutr program, instr consent

PUBH 7996. Field Experience: Public Health Nutrition. (; 1-6 cr. ; S-N only; Every Fall, Spring & Summer)
Supervised public health nutrition field study in health or public health setting under academic/ professional supervision. Emphasizes application of acquired knowledge/skills to relevant issues/problems. prereq: Public health nutrition major, dept consent

PUBH 8120. Occupational and Environmental Health Sciences Research Seminar. (; 1 cr. [max 12 cr.] ; S-N or Audit; Every Fall & Spring)
Facilitates student research training in occupational health and Safety. Roundtable discussions, interdisciplinary involvement.

PUBH 8141. Doctoral Seminar in Observational Inference. (; 2 cr. [max 20 cr.] ; S-N or Audit; Every Fall & Spring)

Fundamentals of epidemiologic inference. Methods for designing, analyzing, and interpreting epidemiologic studies.

PUBH 8160. Advanced Toxicology. (; 2 cr. ; A-F only; Every Fall)
Cellular/molecular mechanisms by which xenobiotics cause toxicity. Investigative approaches to current research problems in toxicology/carcinogenesis. Apoptosis, cell cycle regulation, genetic toxicology, molecular mechanisms of chemical carcinogenesis, genetic basis for susceptibility to environmental toxicants. prereq: 6160, one course in biochem, one course in molecular biol, instr consent

PUBH 8161. Current Literature in Toxicology. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Fall)
Modern methods in toxicology, critical thinking skills. Topics vary each semester. Students read and discuss toxicological literature.

PUBH 8166. Experiences in Toxicology Research. (; 3 cr. ; A-F only; Every Spring)
Students complete research projects in labs of toxicology program graduate faculty members. prereq: Environmental health PhD student in toxicology concentration

PUBH 8194. Directed Research: Environmental Health. (; 1-6 cr. ; Student Option; Every Fall, Spring & Summer)
Research, with direction from faculty member, in environmental/occupational stresses on human health. prereq: instr consent

PUBH 8300. Topics: Epidemiology. (; 1-4 cr. [max 80 cr.] ; Student Option; Periodic Fall, Spring & Summer)
New course offerings or topics of interest in epidemiology.

PUBH 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

PUBH 8341. Advanced Epidemiologic Methods: Concepts. (; 3 cr. ; Student Option; Every Fall)
Conceptual foundations of fundamental issues in epidemiologic methodology. How/why a given method, design, or approach might help explain population health. Strengths, limits, and potential alternatives for a given approach.

PUBH 8342. Advanced Epidemiologic Methods: Applications. (; 3 cr. ; Student Option; Every Spring)
Applied methodology course designed for students in the Epi PhD program. Examples and readings are aimed at clinical/biological and social/behavioral track students.

PUBH 8343. Synthesis and Application of Methods in Epidemiologic Research. (3 cr. [max 4 cr.] ; Student Option; Every Fall)
Focuses on the extension, synthesis, and integration of research methods taught in the advanced epidemiology methods sequence (PubH 8341 and PubH 8342) and the application of these methods. Discussion of novel methods such as causal inferences related to the g-formula and penalized regression. Fosters a deeper understanding of current epidemiologic methods and how they are actually implemented in research.

PUBH 8344. Advanced Epidemiologic Methods Workshop. (; 1 cr. ; Student Option; Every Fall)
This lab course accompanies PubH 8341 - Advanced Epidemiologic Methods. The focus of this course is to gain practical experience with implementing the methods that are taught in PubH 8341. Methods that are explained in PubH 8341 will be implemented in this lab course. Students will be instructed in practical aspects of methodological implementation. Examples and readings are aimed at both clinical/biologic and social/behavioral track students.

PUBH 8345. How To Be An Anti-Racist Epidemiologist. (1 cr. ; Student Option; Every Spring)
The course is designed to educate epidemiologists about the history of scientific racism in the US and to train them to identify and disrupt the racist narratives that are widespread in health sciences research. The goal is to create a generation of epidemiologists equipped to conduct scientific research that ethically engages with issues of race and racial hierarchies. We focus most closely on anti-Black and anti-Indigenous racism, which are the expressions of White supremacy with the deepest roots in the US. However, the theories and approaches discussed will be applicable to understanding harmful racialized narratives used against other marginalized population groups.

PUBH 8392. Readings in Clinical Research. (; 1-4 cr. ; Student Option; Every Fall, Spring & Summer)
Current readings in clinical research. prereq: Clinical research major, instr consent

PUBH 8393. Directed Study: Clinical Research. (; 1-4 cr. [max 20 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed research or field practice in clinical research. prereq: Clinical research major, instr consent

PUBH 8394. Capstone Project: Clinical Research. (1-10 cr. ; S-N only; Every Fall, Spring & Summer)
Directed research toward completion of culminating experience project in clinical research.

PUBH 8400. Topics: Biostatistics. (; 0.5-4 cr. [max 20 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Topics of interest.

PUBH 8401. Linear Models. (; 3 cr. [max 4 cr.] ; Student Option; Every Fall)
This course is concerned with the theory and application of linear models. The first part of the course will focus on general linear model theory from a coordinate-free geometric approach. The second half of the course covers theory, applications and computing for linear models, and concentrates on modeling, computation and data analysis. It is intended as a core course for biostatistics PhD students and statistics PhD students. prereq: [[7405, concurrent registration is required (or allowed) in STAT 8101] or instr consent], calculus, familiar wtih matrix/linear algebra

PUBH 8403. Research Skills in Biostatistics. (1 cr. ; S-N only; Every Fall)
Introduces research skills necessary for writing/defending dissertation, career in research. prereq: Stat 8101-02 and admission to PhD program in Biostatistics. The course is meant to be taken the fall before PhD written exam is attempted, so Schedule 2 students typically wait to enroll until second year in program.

PUBH 8412. Advanced Statistical Inference. (3 cr. ; Student Option; Every Spring)
Overview of inferential methods needed for biostatistical research. Topics without overt reliance on measure-theoretic concepts. Classic likelihood inference, asymptotic distribution theory, robust inferential methods (M-estimation). prereq: Stat 8101-8102 or equivalent, students should be comfortable with multivariate normal distribution/have some introduction to convergence concepts

PUBH 8432. Probability Models for Biostatistics. (; 3 cr. ; Student Option; Every Fall)
Three basic models used for stochastic processes in the biomedical sciences: point processes (emphasizes Poisson processes), Markov processes (emphasizes Markov chains), and Brownian motion. Probability structure and statistical inference studied for each process. prereq: [7450, 7407, Stat 5102, [advanced biostatstics or statistics] major] or instr consent

PUBH 8442. Bayesian Decision Theory and Data Analysis. (; 3 cr. ; Student Option; Every Spring)
Theory/application of Bayesian methods. Bayesian methods compared with traditional, frequentist methods. prereq: [[7460 or experience with FORTRAN or with [C, S+]], Stat 5101, Stat 5102, Stat 8311, grad student in [biostatistics or statistics]] or instr consent

PUBH 8444. FTE: Doctoral. (; 1 cr. [max 8 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Advanced doctoral student, advisor and DGS consent

PUBH 8445. Statistics for Human Genetics and Molecular Biology. (; 3 cr. ; Student Option; Fall Odd Year)
Introduction to statistical problems arising in molecular biology. Problems in physical mapping (radiation hybrid mapping, DDP), genetic mapping (pedigree analysis, lod scores, TDT), biopolymer sequence analysis (alignment, motif recognition), and micro array analysis. prereq: [[[Stat 8101, Stat 8102] or equiv], PhD student] or instr consent; some background with molecular biology desirable

PUBH 8446. Advanced Statistical Genetics and Genomics. (; 3 cr. ; Student Option; Every Spring)
Genetic mapping of complex traits in humans, modern population genetics with an emphasis on inference based observed molecular genetics data, association studies; statistical methods for low/high level analysis of genomic/proteomic data. Multiple comparison and gene

network modeling. prereq: [7445, statistical theory at level of STAT 5101-2; college-level molecular genetics course is recommended] or instr consent

PUBH 8452. Advanced Longitudinal Data Analysis. (; 3 cr. ; Student Option; Every Spring)
Methods of inference for outcome variables measured repeatedly in time or space. Linear/nonlinear models with either normal or non-normal error structures. Random effects. Transitional/marginal models with biomedical applications. prereq: [Stat 5102, Stat 8311, experience with [SAS or S+], advanced [biostats or stat] student] or instr consent

PUBH 8462. Advanced Survival Analysis. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Statistical methods for counting processes. Martingale theory (transforms, predictable processes, Doob decomposition, convergence, submartingales). Applications to nonparametric intensity estimation. Additive/relative risk models. Inference for event history data, recurrent events, multivariate survival, diagnostics. prereq: [7450, 8432, Stat 5102, advanced [biostatistics or statistics] major] or instr consent

PUBH 8472. Spatial Biostatistics. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Spatial data, spatial statistical models, and spatial inference on unknown parameters or unobserved spatial data. Nature of spatial data. Special analysis tools that help to analyze such data. Theory/applications. prereq: [[STAT 5101, STAT 5102] or [STAT 8101, STAT 8102]], some experience with S-plus; STAT 8311 recommended

PUBH 8475. Statistical Learning and Data Mining. (; 3 cr. ; Student Option; Periodic Spring)
Statistical techniques for extracting useful information from data. Linear discriminant analysis, tree-structured classifiers, feed-forward neural networks, support vector machines, other nonparametric methods, classifier ensembles (such as bagging/boosting), unsupervised learning. prereq: [[[6450, 6451, 6452] or STAT 5303 or equiv], [biostatistics or statistics PhD student]] or instr consent

PUBH 8482. Sequential and Adaptive Methods for Clinical Trials. (3 cr. ; Student Option; Every Fall & Spring)
Statistical methods for design/analysis of sequential experiments. Wald theorems, stopping times, martingales, Brownian motion, dymamic programming. Compares Bayesian/fequentist approaches. Applications to interim monitoring of clinical trials, medical surveillance. prereq: Stat 8101-8102 or equivalent, [students should be comfortable with the multivariate normal distribution or instr consent]

PUBH 8485. Methods for Causal Inference. (3 cr. ; Student Option; Every Fall)
Although most of statistical inference focuses on associational relationships among variables, in many biomedical and health sciences contexts the focus is on establishing the causal effect of an intervention or treatment. Drawing causal conclusions can be challenging, particularly in the context of observational data, as treatment assignment may be confounded. The first part of this course focuses on methods to establish the causal effect of a point exposure, i.e., situations in which treatment is given at a single point in time. Methods to estimate causal treatment effects will include outcome regression, propensity score methods (i.e., inverse weighting, matching), and doubly robust approaches. The second half of the course focuses on estimating the effect of a series of treatment decisions during the course of a chronic disease such as cancer, substance abuse, mental health disorders, etc. Methods to estimate these time-varying treatments include marginal structural models estimated by inverse probability weighting, structural nested models estimated by G-estimation, and the (parametric) G-computation algorithm. We will then turn our attention to estimating the optimal treatment sequence for a given subject, i.e., how to determine "the right treatment, for the right patient, at the right time," using dynamic marginal structural models and methods derived from reinforcement learning (e.g., Q-learning, A-learning) and classification problems (outcome weighted learning, C-learning). PubH 8485 is appropriate for PhD students in Biostatistics and Statistics. The homework and projects will focus more on the theoretical aspects of the methods to prepare students for methodological research in this area. PubH 7485 is appropriate for Masters students in Biostatistics and PhD students in other fields who wish to learn causal methods to apply them to topics in the health sciences. This course uses the statistical software of R, a freely available statistical software package, to implement many of the methods we discuss. However, most of the methods discussed in this course can be implemented in any statistical software (e.g., SAS, Stata, SPSS, etc.) and students will be free to use any software for homework assignments.

PUBH 8492. Theories of Hierarchical and Other Richly Parametrized Linear Models. (; 3 cr. ; Student Option; Spring Odd Year)
Linear richly-parameterized models. Hierarchical/dynamic/linear/linear mixed models. Random regressions. Smoothers, longitudinal models. Schemes for specifying/fitting models. Theory/computing for mixed-linear-models. Richly parameterized models and the odd/surprising/undesirable results in applying them to data sets. Lectures, class project. prereq: [[8401 or STAT 8311], [[STAT 8101, STAT 8102] or equiv], [biostatistics or statistics] PhD student] or instr consent

PUBH 8494. Directed Research: Biostatistics. (; 1-4 cr. ; S-N only; Every Fall, Spring & Summer)
Research, with direction from a faculty member, in biostatistics. prereq: instr consent

PUBH 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

PUBH 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

PUBH 8800. Topics in Health Services Research and Policy. (; 1-4 cr. [max 20 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Topics and credit vary by instructor.

PUBH 8801. Health Services Policy Analysis: Theory. (; 1 cr. ; Student Option; Every Fall)
Course introduces students to the research and theoretical aspects of health policy, to enhance understanding of of the equity, historical, and socio-cultural, and political context of health policy, to develop deep fluency in the health policy process and policy-relevant aspects of health services research. prereq: PubH: HSRPA major or instr consent

PUBH 8802. Health Services Policy Analysis: Applications. (2 cr. ; A-F or Audit; Spring Odd Year)
Emphasizes relationships between health services research/policy. Uses case studies to examine how research influences policy/vice versa.

PUBH 8804. Advanced Quantitative Methods Seminar. (3 cr. [max 6 cr.] ; Student Option; Spring Even Year)
Understand/competently use advanced quantitative methods in applied social science, policy, demographic research. Methods considered largely within or related to framework of regression analysis. Effort will be made to reflect interests of class. prereq: This is an advanced, doctoral-level course. Students are expected to have completed a full year of doctoral-level introductory statistical and/or econometric classes in their respective field prior to enrolling in this course (e.g., PubH 7401-2, ApEc8211-2, SOC 8801-8811). Exceptions may be granted with instr consent.

PUBH 8805. Sociological Theory in Health Services Research. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Overview of sociological theories in medical sociology, occupations/professions. Emphasizes teaching students how to apply theories to health/social phenomena of their own interest/choice.

PUBH 8810. Research Studies in Health Care. (; 3 cr. [max 6 cr.] ; Student Option; Every Fall)
Introduction to philosophy of science, conceptual modeling, experimental design, survey/sample design, issues relevant to health services research. prereq: [Grad or professional school] student or instr consent

PUBH 8811. Research Methods in Health Care. (; 3 cr. ; Student Option; Every Fall)

Research methods commonly used in analysis of health services research and health policy problems. prereq: [8810, [grad or professional school] student] or instr consent

PUBH 8813. Measurement of Health-Related Social Factors. (; 3 cr. ; A-F or Audit; Spring Odd Year)
How social factors such as innovativeness, compliance, religiosity, and stress are measured and tested for reliability and validity. Relationships between theory, concepts, variables, data. prereq: Intro stat course, understanding of simple correlations or instr consent

PUBH 8814. Mixed Methods: Quantitative and Qualitative Strategies in Research. (2 cr. ; A-F only; Every Fall)
The purpose of this course is for students to integrate qualitative strategies with quantitative approaches in research designs. Students will examine the strengths and challenges of using a mixed-methodological framework when selecting conceptual models to guide public health research questions, frame measurement and data collection, appraise strengths and weaknesses of study designs when addressing public health questions of interest.

PUBH 8816. Implementation Science. (; 2 cr. ; A-F or Audit; Every Spring)
A major focus of health research is the design of high quality interventions. However, whether and how these interventions are deployed successfully in clinical or community settings receives less attention. Given the extensive investment of time and resource in conducting health research, surprisingly few of these intervention innovations are ever "translated" to services, programs, or policies that benefit the lives of individuals, families, and communities. To address this challenge, implementation science has emerged as a set of theories and methodological approaches to enhance the translational process of evidence to practice. The goal of this course is to provide an overview of the key methodological considerations (theory, conceptualization, design, and analysis) when translating science to real world, everyday contexts using implementation science. Prerequisite: currently enrolled in a PhD program

PUBH 8821. Health Economics II. (; 3 cr. ; A-F or Audit; Spring Even Year)
Examines application of microeconomic theory to health services research through selected reading from published and unpublished health economics literature. prereq: 8820 or instr consent

PUBH 8830. Writing for Research. (; 2 cr. ; Student Option No Audit; Every Spring)
Two-course sequence. Writing research grants/ papers. Writing skills appropriate to research proposals and scholarly papers. How to review, synthesize, and critique research proposals and published articles. prereq: HSRPA PhD student or instr consent

PUBH 8831. Writing for Research. (; 2 cr. ; Student Option No Audit; Every Fall)
Second of two course sequence. Writing research proposals and scholarly papers. How to review, synthesize, and critique papers and research proposals. prereq: 8830

PUBH 8851. Multidisciplinary Perspectives on Aging. (2 cr. ; Student Option; Every Fall)
The objective of this course is to obtain a broad understanding of the multidisciplinary perspectives, theoretical underpinnings, and advancements in the study of aging (i.e., ?gerontology?). Students will review the theoretical foundations and state-of-the-art in science and practice of the following inter-related domains: clinical geriatrics; psychology of aging; sociology of aging; and policy of aging.

PUBH 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required; For Environmental Health Students ONLY: Contact Director of Graduate Studies and the Graduate Student Coordinator.

PUBH 8893. Directed Study: Health Services Research, Policy, and Administration. (; 1-3 cr. ; Student Option; Every Fall, Spring & Summer)
tbd prereq: HSRPA grad student, instr consent

PUBH 8894. Directed Research: Health Services Research, Policy, and Administration. (; 1-8 cr. ; Student Option; Every Fall, Spring & Summer)
tbd prereq: HSRPA grad student, instr consent

Radiology (RAD)

RAD 7101. Diagnostic Radiology. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
The student gains an appreciation for the radiologic examination, its capabilities, limitations, and hazards, and will be offered a review of fundamental physical and basic science aspects of the subject. The student learns how to work with technical and other auxiliary personnel. Emphasis is on how to approach radiologic diagnosis and work with the clinician in a radiologic consultation service. There is observation and participation in daily interpretation of films, fluoroscopy, and special procedures.

RAD 7104. Externship: Diagnostic Radiology--Regions Medical Center. (; 1-15 cr. ; H-N or Audit; Every Fall, Spring & Summer)
lll prereq: enrolled med

RAD 7105. Externship in Radiology. (; 2 cr. [max 4 cr.] ; H-N only; Every Fall, Spring & Summer)
The student gains an appreciation for the radiologic examination, its capabilities, limitations, and hazards, and will be offered a review of fundamental physical and basic science aspects of the subject. The student learns how to work with technical and other auxiliary personnel. Emphasis is on how to approach radiologic diagnosis and work with the clinician in a radiologic consultation service. There is observation and participation in daily interpretation of films, fluoroscopy, and special procedures.

RAD 7110. Radiology Research. (; 2-8 cr. [max 16 cr.] ; H-N only; Every Fall, Spring & Summer)
After consultation with staff, the student performs well-defined, radiologic-related research projects adjusted to the student's level of experience and interest.

RAD 7140. Special Problems: Roentgenology. (; 1-15 cr. ; H-N or Audit; Every Fall, Spring & Summer)
N/A prereq: enrolled med

RAD 7172. Radiation Biology. (; 2 cr. ; H-N or Audit; Every Fall, Spring & Summer)

RAD 7240. Special Problems: Nuclear Medicine. (; 1-15 cr. ; H-N or Audit; Every Fall, Spring & Summer)
N/A prereq: enrolled med

RAD 7400. Interventional Radiology. (4 cr. ; H-N only; Every Fall, Spring & Summer)
Dedicated elective for prospective students to become familiar with interventional radiology and understand the clinical scope and research possibilities available in Interventional Radiology.

RAD 7511. Roentgen Technique. (; 1 cr. ; H-N or Audit; Every Fall)

RAD 7530. Nuclear Medicine. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
Provides the student with a better understanding of the various uses of radioactive materials in the practice of medicine.

RAD 7540. Special Problems: Radiological Physics. (; 1-15 cr. ; H-N or Audit; Periodic Fall)
N/A prereq: enrolled med

RAD 7910. Radiology Medical Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Radiology medical residency.

RAD 7930. Radiology Medical Fellowship. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Radiology medical fellowship.

RAD 8200. Nuclear Medicine. (; 1-15 cr. ; Student Option; Every Fall, Spring & Summer)

RAD 8210. Fundamentals of Nuclear Medicine. (; 1 cr. ; Student Option; Every Fall, Spring & Summer)
N/A prereq: 1st-yr resident

RAD 8250. Research: Nuclear Medicine. (; 1-15 cr. ; Student Option; Every Fall, Spring & Summer)

RAD 8450. Research: Radiation Biology. (; 1-15 cr. ; Student Option;)

RAD 8550. Research: Radiological Physics. (; 1-15 cr. ; Student Option;)

Rehabilitation Science (RSC)

RSC 5058. Anatomy for Rehabilitation Science. (6 cr. ; Student Option; Every Summer)
Study of gross human anatomy through lecture/laboratory experiences that include cadaver dissection of extremities, head,

neck, back, abdomen, thoracic, pelvic regions with correlation to clinical conditions. prereq: Student enrolled in Rehabilitation Science Program, instr consent, dept consent

RSC 5060. Lower Extremity Anatomy Intensive. (2 cr. ; Student Option; Every Summer)
Intensive and focused study of lower extremity gross human anatomy for graduate students. The content is presented through lecture and laboratory experiences that include cadaver dissection of human lower extremities with correlation to clinical conditions.

RSC 5065. Upper Extremity Anatomy Intensive. (2 cr. ; Student Option; Every Summer)
Intensive and focused study of upper extremity gross human anatomy for graduate students. The content is presented through lecture and laboratory experiences that include cadaver dissection of human upper extremities with correlation to clinical conditions.

RSC 5101. Mathematical Tools for Research Applications in Health, Rehab, and Human Movement Sciences. (; 1 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Quantitative research approaches in health, rehabilitation, human movement sciences. Application examples/practice problems focus of the course. Basic algebra/geometry, solving equations for unknowns, logarithmic transforms, derivatives/ integrals, matrix methods, use of macros in research applications. prereq: Basic algebra, trigonometry, and geometry. Pre-calculus or calculus is helpful but not required.

RSC 5106. Introduction to Rehabilitation Science. (1 cr. ; Student Option; Periodic Fall)
This is one of a series of seminar courses that prepares students to think critically in reading and discussing the literature in rehabilitation science and to speak and write persuasively on scientific topics. This semester, the seminar will focus on the past, present, and future of rehabilitation science. This course will include lecture presentations from rehabilitation science faculty for the first 50 minutes of the weekly class time, as well as discussion/ interaction sessions planned jointly by assigned students and faculty for the second 50 minute session each week.

RSC 5135. Advanced Biomechanics I: Kinematics. (3 cr. ; A-F or Audit; Fall Odd Year)
How to describe/measure movement. Basic/ applied biomechanics, pathokinesiology, and rehabilitation literature. Lecture, lab, seminar discussion. Meets with RSC 8135. prereq: instr consent

RSC 5200. Introduction to Neuromodulation. (1-3 cr. ; A-F or Audit; Fall Even Year)
This course will provide training in the theory, biophysics and evidence-based application of non-invasive magnetic and electric brain stimulation in humans. Course content will be delivered in three modules: (1) safety and administration of non-invasive brain stimulation, (2) neuromodulation methods, and (3) advanced assessment and modeling techniques. All registered students must take module #1. Testing methods will include various methods to assess intracortical, transcallosal and interhemispheric excitability. Neuromodulation methods presented will include non-invasive and invasive forms of brain stimulation. Hands-on instruction and laboratory applications will be provided for cortical excitability testing using transcranial magnetic stimulation (TMS) as well as for other non-invasive forms of brain stimulation. Those enrolled will both administer and receive non-invasive brain stimulation and will be asked to sign a consent form. Specific safety exclusion criteria for receiving non-invasive brain stimulation exist and enrollees who have questions should contact the Division of Rehabilitation Science.

RSC 5206. Academic Ethos. (1 cr. ; A-F or Audit; Periodic Spring)
Explicit/implicit culture unique to academia. Early understanding within/beyond rehabilitation science. Role of higher education in society, academic freedom, tenure, corporatization of education, accreditation, globalization of education, regulatory monitoring of research, faculty scholarship/ governance.

RSC 5231. Clinical Biomechanics. (2-5 cr. ; A-F only; Every Fall)
Biomechanics. Internal/external forces/ structures responsible for normal/abnormal human movement. Joint and tissue mechanics, muscle function, task analysis, and gait mechanics. Lecture and lab practice. prereq: concurrent registration is required (or allowed) in PT 6231, general physics, [intro or short] calculus, anatomy; intensive anatomy course in human cadaver dissection recommended

RSC 5235. Advanced Biomechanics II: Kinetics. (3 cr. ; A-F or Audit; Spring Even Year)
Forces that create human motion and are produced within body as a result. Measuring human motion. Clinical movement assessment, Exercise, sport, and activities of daily living. Two-dimensional rigid body dynamics models, forward/inverse dynamics solutions, hypotheses to describe whole body/joint kinetics. Lectures, lab, discussion. prereq: 5135 or equiv or instr consent

RSC 5281. Physiology for Physical Rehabilitation. (2-4 cr. ; A-F or Audit; Every Fall)
This course provides an in-depth presentation of fundamental concepts in tissue and organ system physiology as it relate to general health, aging, and physical exercise. Emphasis is on the following systems: muscle, bone & connective tissue, endocrine, immune, renal, gi, and hematology. Influence of aging on these systems will be addressed as well. prereq: Rehabilitation Science grad student

RSC 5294. Independent Study in Rehabilitation Science. (1-3 cr. [max 9 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent exploration into topics related to rehabilitation science. prereq: Rehabilitation science student or program approval

RSC 5300. Autonomic Nervous System (ANS) Function. (; 2 cr. ; A-F or Audit; Every Fall)
This course is designed to advance the student?s knowledge on how the autonomic nervous system (ANS) functions to maintain homeostasis. The student will have a strong understanding of the components of the ANS and how the ANS contributes to blood pressure regulation and control of circulation. Students will read book chapters, journal reviews, and original articles and engage in weekly discussions on topics related to the listed course objectives. In addition, students will have the opportunity to present on specific topics that will be related to their current work.

RSC 5306. Scientific and Professional Presentation. (1 cr. ; A-F or Audit; Periodic Spring)
This course will focus on the process and practice of oral presentation of scientific inquiry and discoveries. These skills are essential for scientists in all disciplines, yet often guidelines for optimal scientific presentation are not taught or practiced in an educational setting. Specific areas to be covered in this course include presentation intent, audience analysis, timing, content, keys to effective communication, vocal behavior, and important things to avoid. Context will include conference-style platform or podium presentations, poster presentations, and seminar presentation. The course will involve opportunities to prepare and practice presentation skills and receive constructive feedback in a safe, supportive environment. It is appropriate for students from all disciplines and levels of PhD study.

RSC 5310. Cardiopulmonary Physiology and Rehabilitation. (2-4 cr. ; A-F or Audit; Every Spring)
This course conveys foundational information regarding human basic physiology cardiovascular and pulmonary physiology. In addition, fundamental principles of cardiac and pulmonary systems as it relates to physical therapy and will be known in the clinic to the physical therapist as Cardiac and Pulmonary Rehabilitation will be addressed. A focus of this course is on normal and abnormal responses to exercise and the pathophysiology, assessment, evaluation, and rehabilitation of patients with cardiopulmonary disorders.

RSC 5402. The Shoulder in Sports Rehabilitation Science. (; 3 cr. ; A-F or Audit; Every Spring & Summer)
A three-credit online course for students who are interested in investigating the biomechanical and epidemiological aspects of the shoulder in athletics. The course will explore the unique demands placed on the shoulder in sports that involve throwing, swimming, swinging, and bodily impacts. The course begins with an investigation into sport-specific biomechanics, pathomechanics, and epidemiology and progresses to applied problem solving for rehabilitation and research scenarios. prereq: (1) an undergraduate or graduate human anatomy course and (2) an undergraduate or graduate biomechanics course. It is recommended, but not required,

you have an anatomy course including a detailed shoulder anatomy section and a biomechanics course including a detailed shoulder biomechanics section. Consent from course instructor or Rehabilitation Science graduate program is required.

RSC 5404. Applied Shoulder Anatomy and Biomechanics. (; 1 cr. ; A-F or Audit; Every Fall)
The shoulder is capable of more range of motion than any other joint in the human body. It is involved in virtually any motion that places the hand in space. Subsequently, the shoulder is prone to injury. There are many mechanisms of shoulder injury, and many are related to the anatomy of the shoulder joint and the anatomical relationship to movement. This course will serve as an overview of the anatomy and biomechanics of the shoulder joint complex. Students taking this course will have the opportunity to explore the intricate anatomy of the shoulder complex. In doing so, students will create their own anatomical-reference-guide that they will use beyond this class. We will build upon this anatomical knowledge and apply the purpose of these structures in the context of functional movement. Lastly, we will examine how these relationships may be altered during several common surgical techniques.

RSC 5814. Age, Exercise, and Rehabilitation. (2 cr. ; Student Option; Every Fall)
Overview of normal physiological responses to exercise in the elderly. Comparison of exercise-induced responses of physiological systems throughout aging process. Focuses on importance of exercise from rehabilitation perspective. Offered Fall semesters of even-numbered years. prereq: Rehabilitation science student or program permission

RSC 5841. Applied Data Acquisition and Processing. (3 cr. [max 4 cr.] ; A-F or Audit; Spring Odd Year)
This course will introduce students to collecting and processing biomedical time series data. Students will gain experience using data acquisition hardware common in many laboratories, as well as related software for acquisition of the data and digital signal processing. Data sources will include electromyography (EMG), wearable sensors, motion capture, and data from other systems based on the background and interests of students in the class. The overall goal of this course is to provide students with the necessary, fundamental skills to run a successful experiment, troubleshoot errors, and produce high quality data sets. prereq: prefer students to have completed general physics, introductory of short calculus

RSC 5842. Teaching and Learning in Rehabilitation Science. (; 1 cr. ; Student Option; Every Spring & Summer)
Introduction to the roles of an academic educator and the basic principles of adult education, active learning, course design, and teaching in academic environments.

RSC 5901. Scholarly Inquiry in Health Sciences. (4 cr. ; A-F or Audit; Every Spring)
How research evidence is developed, disseminated, utilized in health sciences. Qualitative/quantitative scholarly project proposal. Critique studies/peer proposals. Explore conduct of research. prereq: Three credits of undergraduate statistics. instr consent, dept consent.

RSC 8106. Critical Analysis of Scientific Literature. (2 cr. ; Student Option; Periodic Fall)
This course will focus on the process of critical review, appraisal, and synthesis of scientific literature. Overview of organizing and writing literature reviews for a traditional dissertation, systematic reviews, and peer review for scientific manuscripts will be included. The course will involve substantive review of the literature and writing in your anticipated area of dissertation work.

RSC 8130. Current Literature Seminar. (1-3 cr. [max 9 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Critical review of literature to evaluate efficacy of selected physical therapy interventions. prereq: Grad student in PT or rehabilitation science major or instr consent

RSC 8135. Human Kinematics. (3 cr. ; A-F or Audit; Fall Odd Year)
How to describe/measure movement. Basic/applied biomechanics, pathokinesiology, and rehabilitation literature. Lecture, lab, seminar discussion. Meets in conjunction with RSC 5135. prereq: [Rehabilitation science student or program permission], instr consent

RSC 8170. Special Topics in Rehabilitation Science. (; 1-3 cr. [max 9 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Topics vary by semester. Papers required.

RSC 8185. Problems in Rehabilitation Science. (1-3 cr. [max 9 cr.] ; Student Option; Every Fall, Spring & Summer)
Research practicum on selected topic. Use of systematic literature search. Critical analysis of scientific literature. Specific measurement systems. Data collection/reduction methods of on-going or new research projects. Preparing/defending research reports.

RSC 8188. Teaching Practicum. (; 1-5 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Supervised experience in teaching/evaluation. Effective use of instructional materials in lecture/lab courses. Students create learning objectives for teaching unit(s), conduct a review of current literature on topic, prepare/deliver presentations, compose test questions. Offered by individual arrangement with faculty. prereq: [Rehabilitation science student or program permission], instr consent

RSC 8192. Essentials in Rehab Research. (; 3 cr. [max 4 cr.] ; A-F or Audit; Every Fall)
The goals of this course are to develop abilities to critically evaluate peer-reviewed literature. It will also enable students to identify and apply appropriate statistical procedures, and interpret the meaning of statistical analyses. Finally, it will give students an opportunity to present the aims, methods, intended analyses, and preliminary results of their own research. Additionally, students will meet individually for 2 hours every month with the lecturer to work on the method section of a paper related to their PhD project. This paper will be critically reviewed and graded as end-evaluation for this class. prereq: instr consent

RSC 8206. Grant Writing. (2 cr. ; A-F or Audit; Periodic Fall)
Process of applying for individual National Institutes of Health (NIH) pre-doctoral research training fellowship. Overview of NIH Program Announcement PA-11-111/NIH SF424 individual fellowship application guide required for application will be included. Substantive writing of components of NIH fellowship.

RSC 8235. Human Kinetics. (3 cr. ; A-F or Audit; Spring Even Year)
Forces that create human motion or are produced within body as a result of motion. Measuring kinetics of motion. Clinical movement assessment. Measuring/analyzing exercise, sport, and activities for transfer of forces within body. Two-dimensional rigid body dynamics. Forward/inverse dynamics. Hypotheses for whole body/joint kinetics. Lectures, lab experiments, discussion. Meets with RSC 5235. prereq: [5135 or equiv] or instr consent

RSC 8282. Problems in Human Movement. (4 cr. ; A-F or Audit; Every Spring)
Fundamental principles of neurophysiology, neurology, motor control, and motor learning as a basis for therapeutic intervention in motor dysfunction. prereq: [Rehabilitation science student or program permission], instr consent

RSC 8306. Peer Review and Publication. (2 cr. ; Student Option No Audit; Periodic Spring)
This course will focus on the process of publication in the scientific literature, with emphasis on publication of original research. Overview of organizing and writing for publication, and the peer review process for scientific manuscripts will be included. The course will involve substantive writing practice in your anticipated area of scientific inquiry.

RSC 8332. Quantitative Research in Rehab Science. (; 2 cr. ; A-F or Audit; Every Summer)
This course guides students in learning how quantitative evidence is developed, disseminated, and used. Students become critical consumers of research and evidence-based practitioners by learning to analyze and critique quantitative studies and by developing and implementing their own research questions, specifying rigorous methodologies, applying appropriate statistics, and knowledgeably interpreting results. This course is the second in a three semester sequence that covers general principles of research, quantitative, and qualitative methods. It includes the University?s online training to cover topics associated with developing research questions, specifying rigorous methodologies, applying appropriate statistics, and knowledgeably interpreting results.

RSC 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

RSC 8431. Qualitative Inquiry in Occupational Therapy. (; 2 cr. ; A-F only; Every Fall)
Learners will explore the epistemological, ethical, methodological approaches, and procedures associated with qualitative inquiry. This knowledge will be applied when evaluating evidence, designing a proposal for a qualitative study in clinical therapies, specifically occupational therapy, and conducting and analyzing a small study.

RSC 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

RSC 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

RSC 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

RSC 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Thesis credit: doctoral. prereq: Max 18 cr per semester or summer, 24 cr required; RSC doctoral student who has successfully passed the prelim written exam, dept consent

Religious Studies (RELS)

RELS 5001. Theory and Method in the Study of Religion: Critical Approaches to the Study of Religion. (; 3 cr. ; Student Option; Every Spring)
Theoretical/methodological issues in academic study of religion. Theories of origin, character, and function of religion as a human phenomenon. Psychological, sociological, anthropological, and phenomenological perspectives. prereq: Sr or grad student or instr consent

RELS 5013W. Biblical Law and Jewish Ethics. (WI; 3 cr. ; Student Option; Periodic Fall & Spring)
This course introduces students to the original meaning and significance of religious law and ethics within Judaism. Law is the single most important part of Jewish history and identity. At the same time, law is also the least understood part of Judaism and has often been the source of criticism and hatred. We shall therefore confront one of the most important parts of Jewish civilization and seek to understand it on its own terms. In demonstrating how law becomes a fundamental religious and ethical ideal, the course will focus on the biblical and Rabbinic periods but spans the entire history of Judaism. Consistent with the First Amendment, the approach taken is secular. There are no prerequisites: the course is open to all qualified students. The course begins with ideas of law in ancient Babylon and then studies the ongoing history of those ideas. The biblical idea that a covenant binds Israel to God, along with its implications for human worth - including the view of woman as person - will be examined. Comparative cultural issues include the reinterpretations of covenant within Christianity and Islam. The course investigates the rabbinic concept of oral law, the use of law to maintain the civil and religious stability of the Jewish people, and the kabbalistic transformation of law. The course concludes with contemporary Jewish thinkers who return to the Bible while seeking to establish a modern system of universal ethics. The premise of the course is the discipline of academic religious studies. The assumptions of the course are therefore academic and secular, as required by the First Amendment. All texts and all religious traditions will be examined analytically and critically. Students are expected to understand and master this approach, which includes questioning conventional cultural assumptions about the composition and authorship of the Bible. Willingness to ask such questions and openness to new ways of thinking are essential to success in the course.

RELS 5071. Greek and Hellenistic Religions. (; 3 cr. ; Student Option; Periodic Spring)
Greek religion from Bronze Age to Hellenistic times. Literature, art, archaeology. Homer/ Olympian deities. Ritual performance, prayer, sacrifice. Temple architecture. Death/afterlife. Mystery cults. Philosophical religion. Near Eastern salvation religions. Meets with 3071.

RELS 5072. The Birth of Christianity. (AH; 3 cr. ; Student Option; Periodic Fall & Spring)
Early Jesus movement in cultural/historical setting. Origins in Judaism. Traditions about Jesus. Apostle Paul, controversies/interpreters. Authority, religious practice, structure. Emergence of canon. Contemporary methods of New Testament study. Biblical writings as history/narrative. CNES 3072/CNES 5072/ RELS 3072/RELS 5072 meet together.

RELS 5115. Midrash: Reading and Retelling the Hebrew Bible. (; 3 cr. ; Student Option; Periodic Fall & Spring)
How did the Jews of the first seven centuries of the common era read and understand the Hebrew Bible? What were the problems they faced -- interpretive, historical, theological -- in trying to apply their holy scriptures? This course explores key issues that led to the development of a new form of Judaism in late antiquity, rabbinic Judaism, and its methods of scriptural interpretation. The course?s study will focus on the forms and practices of rabbinic scriptural interpretation (midrash) as it developed in Roman Palestine and Sasanian Babylonia, focusing on key narrative and legal passages in the Five Books of Moses (Torah). A main focus of the course will be on the ways the rabbis adapted the Hebrew Bible to express their own core concerns.

RELS 5121. Gender and Body in Early Christianity. (AH; 3 cr. ; Student Option; Fall Odd Year)
Ancient Christians, like any other social group in the ancient world, represented themselves through images, stories, and discourses using the cultural tools available to them in their own contexts. In this course, we will explore two key texts of early Christianity (1 Corinthians and the Gospel of Mark) with special attention to how representations of the body and gender served to communicate the nature of what it meant to be Christian for these authors. The study of ancient material offers a space to acquire the skills of critical analysis of body and gender dynamics so that we can better understand the roles that the body and gender play in shaping our self-identity, social interaction, and societal structures.

RELS 5204. The Dead Sea Scrolls. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Introduction to Dead Sea Scrolls and Qumran. Contents of Dead Sea Scrolls, significance for development of Bible. Background of Judaism and Christianity. Archaeological site of Qumran. The course will focus on the material in translation and academic scholarship on the literature and archaeological site. Open to graduate students across the college; knowledge of classical Hebrew will not be required. The course is open to upper level undergraduate students with permission of the instructor.

RELS 5254. Archaeology of Ritual and Religion. (3 cr. ; Student Option; Fall Even Year)
The course discusses evidence for the origins of religion and its diverse roles in human societies over millennia. It focuses on how artifacts and architecture are essential to religious experience. It asks: What constitutes religion for different cultures? Why is religion at the heart of politics, social life, and cultural imagination?

RELS 5612. Baroque Rome: Art and Politics in the Papal Capital. (; 3 cr. ; Student Option; Fall Even Year)
Center of baroque culture--Rome--as city of spectacle and pageantry. Urban development. Major works in painting, sculpture, and architecture. Ecclesiastical/private patrons who transformed Rome into one of the world's great capitals.

RELS 5707W. Anthropology of the Middle East. (GP,WI,SOCS; 3 cr. ; Student Option; Fall Even Year)
Anthropological field methods of analyzing/ interpreting Middle Eastern cultures/societies.

RELS 5777. The Diversity of Traditions: Indian Empires after 1200. (3 cr. ; Student Option; Periodic Fall & Spring)
This class considers the development of Indian and Pakistani art and architecture from the introduction of Islam as a major political power at the end of the 12th century to the colonial empires of the 18th century. We will study how South Asia?s diverse ethnic and religious communities interacted, observing how visual and material cultures reflect differences, adaptations, and shared aesthetic practices within this diversity of traditions. Students in this class will have

mastered a body of knowledge about Indian art and probed multiple modes of inquiry. We will explore how Muslim rulers brought new traditions yet maintained many older ones making, for example, the first mosque in India that combines Muslim and Indic visual idioms. We will study the developments leading to magnificent structures, such as the Taj Mahal, asking why such a structure could be built when Islam discourages monumental mausolea. In what ways the schools of painting that are the products of both Muslim and Hindu rulers different and similar? The course will also consider artistic production in the important Hindu kingdoms that ruled India concurrently with the great Muslim powers. In the 18th century, colonialist forces enter the subcontinent, resulting in significant innovative artistic trends. Among questions we will ask is how did these kingdoms influence one another? Throughout we will probe which forms and ideas seem to be inherently Indian, asking which ones transcend dynastic, geographic and religious differences and which forms and ideas are consistent throughout these periods of political and ideological change. To do all this we must constantly consider how South Asia's diverse ethnic and religious communities interact.

RELS 5781. Age of Empire: The Mughals, Safavids, and Ottomans. (3 cr. ; Student Option; Periodic Fall)
Artistic developments under the three most powerful Islamic empires of the 16th through 19th centuries: Ottomans of Turkey; Safavids of Iran; Mughals of India. Roles of religion and state will be considered to understand their artistic production.

RELS 5993. Directed Studies. (; 1-4 cr. [max 24 cr.] ; Student Option; Every Fall & Spring)
TBD prereq: instr consent

RELS 8070. Readings in Religious Texts. (; 3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Close reading of selected literary or epigraphical texts of importance for the history of ancient Mediterranean religions, along with critical discussion of trends in recent scholarship. The texts may be read in the original languages (such as Greek, Latin, Hebrew, etc.) but may also be accessed in translation where appropriate.

RELS 8190. Comparative Seminar in Religions in Antiquity. (; 3 cr. [max 6 cr.] ; A-F or Audit; Periodic Fall & Spring)
Topics vary. Major cultural movement as it developed over several centuries. Draws on evidence in literature, archival records, inscriptions, documentary papyri, and archaeological remains. Artistic media such as wall painting, architectural ornament, funerary sculpture, or manuscript illumination. prereq: Grad student in relevant field

Robotics (ROB)

ROB 5994. Directed Research. (1-3 cr. [max 9 cr.] ; A-F only; Every Fall, Spring & Summer)
Directed research arranged with faculty member.

ROB 5996. Curricular Practical Training. (1-2 cr. [max 3 cr.] ; S-N only; Every Fall, Spring & Summer)
Industrial work assignment involving advanced computer technology. Reviewed by a faculty member. Grade based on a final report covering work assignment. prereq: robotics major, instr consent

ROB 8760. Capstone Project. (1-3 cr. [max 6 cr.] ; S-N only; Every Fall, Spring & Summer)
Project arranged between student and faculty.

ROB 8777. Thesis Credits Master's. (1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Master's thesis credits.

ROB 8970. Robotics Colloquium. (; 1 cr. [max 2 cr.] ; S-N only; Every Fall)
Recent developments in robotics and related disciplines.

Russian (RUSS)

RUSS 5404. Tolstoy in Translation. (GP,LITR; 3 cr. ; Student Option; Spring Even Year)
Novels, stories, and philosophical writings of Leo Tolstoy.

RUSS 5411. Dostoevsky in Translation. (GP,LITR; 3 cr. ; Student Option; Spring Even Year)
Novels, stories, and other writings of Fyodor Dostoevsky.

RUSS 5421. Literature: Middle Ages to Dostoevsky in Translation. (LITR; 3 cr. ; Student Option; Every Fall)
Russian literature from about 1000 A.D. to mid-19th century; emphasizing writers of the first half of the 19th century.

RUSS 5422. Literature: Tolstoy to the Present in Translation. (LITR; 3 cr. ; Student Option; Every Spring)
Survey of Russian literature from mid-19th century to the present: realism, modernism, feminism and other trends.

RUSS 5604. Russia At The Movies: A Survey Of The History Of Russian Cinema. (AH; 3 cr. ; Student Option; Every Spring)
This course is designed to provide a chronological overview of major developments, trends, experiments, searches, traditions, and conventions of Russian cinematic art examined in the context of the historical and cultural background of the 20th and early 21st centuries. The history of cinema is intrinsically connected to political, historical, cultural and social developments.For each epoch of development we will first outline the historical and cultural context before investigating the major films and themes of the period. We will elaborate on those films that have made an important contribution to cinematic or cultural history, both in Russia and the world. RUSS 3604/5604 meets the Liberal Education core requirement in Arts and Humanities. Through a close study of film we learn about how this art medium reflects and expresses human experience and engages us through the exploration of the formal and aesthetic dimensions of film, as well as the study of cultural, social, and historical background in which it is deeply steeped.

RUSS 5900. Topics in Russian Language, Literature, and Culture. (; 1-4 cr. [max 3 cr.] ; Student Option; Periodic Fall)
Variable topics in Russian language, literature, and culture. prereq: 1102 for language topics

RUSS 5993. Directed Studies. (1-4 cr. [max 16 cr.] ; Student Option; Every Fall & Spring)
Guided individual study. Prereq instr consent, dept consent, college consent.

Scandinavian (SCAN)

SCAN 5502. The Icelandic Saga. (; 3 cr. ; Student Option;)
Study of the sagas written in 13th-century Iceland. Discussion includes cultural and historical information about medieval Iceland and analysis of a selection of saga texts using contemporary critical approaches. All readings in translation.

SCAN 5604W. Living Pictures: An Introduction to Nordic Cinema. (AH,WI; 3 cr. ; Student Option; Spring Odd Year)
Since the early days of the twentieth century, debates have proliferated in the Nordic countries about film's nature and function, whether as popular entertainment, high art, or a dynamic cultural artifact important in defining national and regional identities. In this course, History of Nordic Cinema, we will survey discrete moments in Nordic film history (viewing films from Denmark, Finland, Iceland, Norway, and Sweden) and contextualize them within broader developments in global cinema. Particularly important in this regard will be Nordic Cinema's love-hate relationship with Hollywood and its complicated status as European Cinema. We will begin in the beginning, with examples of Scandinavia's often-underestimated role as an international, artistic, and popular culture powerhouse in the silent era up through WWI. We'll go on to explore Nordic film productions intended mainly for domestic audiences and juxtapose these with the emergence of a compelling modernist, art-house cinema tradition revolving around the international figure of the auteur director, including Ingmar Bergman and later, Aki Kaurism?ki. We'll consider examples of 60s and 70s political, avant-garde cinema (reverberations of the French Nouvelle Vague); talk about the unique development of state-funded structures for film production in these small countries; and end with a survey of recent Nordic films and movements such as Dogme 95 that illustrates ways in which small national cinemas continue to grapple with new iterations of globalization. In this course, students will be exposed to visual cultures from all five Nordic countries and consider the implications of reading film at regional, national, and global levels. In short, Nordic Cinema provides a vital and vibrant case study with which to consider a broad range of issues involving the aesthetics and politics of cinema in the world.

SCAN 5605. The Scandinavian Short Story. (LITR; 3 cr. ; Student Option; Fall Even, Spring Odd Year)
Short stories by 19th-20th century authors from all five Scandinavian countries. Genre theory/ practical criticism. Readings in English for non-majors.

SCAN 5614. Blood on Snow: Scandinavian Thrillers in Fiction and Film. (3 cr. ; Student Option; Periodic Fall & Spring)
Scandinavian crime novels/films against background of peaceful welfare states. Readings in translation for non-majors. Scandinavian majors/minors read excerpts in specific languages.

SCAN 5617. Scandinavian Gothic: Horror and the Uncanny in Nordic Literature and Media. (AH,GP; 3 cr. ; Student Option; Spring Even Year)
Scandinavia is popularly thought of as a bastion of social democracy, gender equality, and sleek modern design. Despite this well-earned reputation for political and aesthetic progressivism, there has also been a significant undercurrent of anti-rationalism and supernatural horror in Nordic culture. In Gothic fiction, the unwelcome appearance of primitive, irrational, and malevolent forces often takes the form of supernatural or monstrous figures?ghosts, vampires, witches, and trolls. As conventions established abroad mingled with a home-grown tradition of social realism, the Scandinavian Gothic became a vehicle for representing marginalized voices and revealing the shortcomings of Nordic societies. We will examine Gothic works of literature, film, television, popular music, and visual art. Through this examination, we will build an analytical vocabulary to formally analyze works of Gothic art in all of these media, and will practice that through in-class discussions as well as formal and informal writing.

SCAN 5634. Scandinavian Women Writers. (GP,LITR; 3 cr. ; Student Option; Fall Even, Spring Odd Year)
Issues important to women as articulated by Scandinavian women writers. Historical overview of women's writing in Scandinavia. In-depth investigation of texts by contemporary women writers. All readings in translation.

SCAN 5670. Topics in Scandinavian Studies. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Topic may focus on a specific author, group of authors, genre, period, or subject matter. Topics specified in Class Schedule. Readings in English for nonmajors. May meet with 3670.

SCAN 5701. Old Norse Language and Literature. (; 3 cr. ; Student Option; Every Fall)
Acquisition of a reading knowledge of Old Norse; linguistic, philological and literary study of Old Norse language and literature.

SCAN 5703. Old Norse Poetry. (3 cr. ; Student Option; Periodic Fall)
Reading and analysis of either eddic poetry from the Poetic Edda or skaldic poetry. Texts read in Old Norse.

SCAN 5993. Directed Studies. (1-4 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Guided individual reading and study. Prereq instr consent, dept consent, college consent.

SCAN 8500. Seminar in Medieval Scandinavian Languages and Literature. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Spring)
Sample topics: [Volsunga Saga], studies in Snorri Sturluson's [Edda], dialogue analysis in the Icelandic saga.

SCAN 8994. Directed Research. (; 1-3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
tbd prereq: instr consent; may be taken as tutorial with instr consent, dept consent

Scientific Computation (SCIC)

SCIC 8001. Parallel High-Performance Computing. (; 3 cr. ; Student Option; Every Fall)
Interdisciplinary overview of computer science aspects of scientific computation, both hardware and techniques. Parallel computing, architectures, programming, and algorithms; restructuring compilers and data structures. prereq: Undergrad degree in field using sci comp or instr consent

SCIC 8011. Scientific Visualization. (; 3 cr. ; Student Option; Every Spring)
Basic issues in scientific visualization, visualization software, graphics, representation of scientific data, modeling, hardware for visualization, user interface techniques, output, commonly used algorithms and techniques for visualization, animation, information visualization, higher dimensional data, case studies, and examples of successful visualizations. prereq: Undergrad degree in field using sci comp or instr consent

SCIC 8021. Advanced Numerical Methods. (; 3 cr. ; Student Option; Every Spring)
Interdisciplinary overview of advanced numerical methods of scientific computation, emphasizing computational aspects. Approximation methods for partial differential equations, numerical linear algebra, sparse matrix techniques, iterative methods, solution of eigenvalue problems, and case studies. prereq: Undergrad degree in field using sci comp or instr consent

SCIC 8031. Modeling, Optimization, and Statistics. (; 3 cr. ; Student Option; Periodic Fall)
Interdisciplinary overview of mathematical modeling, optimization, and statistics techniques for scientific computation. Nonlinear equations and nonlinear optimization, statistics, control theory, modeling, and simulation. prereq: Undergrad degree in field using sci comp or instr consent

SCIC 8041. Computational Aspects of Finite Element Methods. (; 3 cr. ; Student Option; Periodic Fall)
Fundamental concepts and techniques of finite element analysis. Variational equations and Galerkin's method; weak formulations for problems with nonsymmetric differential operators; Petrov-Galerkin methods; examples from solid and fluid mechanics; properties of standard finite element families, implementation. prereq: Undergrad degree in field using sci comp or IT grad student or instr consent

SCIC 8095. Problems in Scientific Computation. (; 1-3 cr. [max 9 cr.] ; Student Option; Periodic Fall)
Selected topics in interdisciplinary aspects of scientific computing. prereq: Undergrad degree in field using sci comp or instr consent

SCIC 8190. Supercomputer Research Seminar. (; 1 cr. [max 3 cr.] ; Student Option; Periodic Fall & Spring)
Series of seminars by distinguished lecturers. prereq: Undergrad degree in field using sci comp or instr consent

SCIC 8253. Computational Nanomechanics. (3 cr. ; Student Option; Every Spring)
Fundamentals of mechanical properties in nanometer scale. Role of discrete structure and underlying atomic, molecular, and interfacial forces are illustrated with modern examples. Overview of computational atomistic methods. Lectures, hands-on computing using publicly available or personally developed scientific software packages. prereq: CSE graduate student

SCIC 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

SCIC 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

SCIC 8551. Multiscale Methods for Bridging Length and Time Scales. (3 cr. ; A-F or Audit; Periodic Spring)
Classical/emerging techniques for bridging length/time scales. Nonlinear thermoelasticity, viscous fluids, and micromagnetics from macro/atomic viewpoints. Statistical mechanics, kinetic theory of gases, weak convergence methods, quasicontinuum, effective Hamiltonians, MD, new methods for bridging time scales. prereq: Basic knowledge of [continuum mechanics, atomic forces], familiarity with partial differential equations, grad student in [engineering or mathematics or physics or scientific computation]

SCIC 8594. Scientific Computation Directed Research. (; 1-4 cr. [max 9 cr.] ; Student Option; Every Fall, Spring & Summer)
tbd prereq: Undergrad degree in field using sci comp or instr consent

SCIC 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

SCIC 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

SCIC 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Security Technologies (ST)

ST 8109. Cybersecurity Foundations - Technology, Risk & Communication. (2 cr. ; A-F only; Every Fall)
Explore cyber security risks through evaluation of consumer driven technology concepts and their applicability to enterprise. Core technology concepts that face both consumers and businesses. How technology works, how to understand and communicate risks to business management, deliver actionable risk mitigation approaches. Security standards and benchmarks that guide industry. This course is also open to non-ST graduate students and non-degree graduate students who may register with permission/consent from the ST program. (DGS, DGSA or teaching faculty.)

ST 8110. Security Science and Technology Foundations. (3 cr. ; A-F only; Every Summer)
Essential areas of emerging science and pivotal technology disciplines for homeland security. Nanotechnology, sensor networks (biosensing, critical infrastructure protection), food and biosafety, cyber and control systems security, and secure energy technologies. Current state-of-the-art status for each technology, together with barriers and opportunities for commercialization. prereq: Admitted student in security technologies program

ST 8111. Methods, Theory, and Applications. (2.5 cr. ; A-F only; Every Fall)
Methods, theory, techniques and models for understanding risk and implementing security strategies. Processes, methods, and application of risk assessment and management. Approaches for building scenarios, assessing the effectiveness of alternative management strategies, and designing risk management and mitigation plans. Case studies/simulations. How to use emergency management tools, techniques, and resources.

ST 8112. Technology for Homeland Security. (2 cr. ; A-F only; Every Fall)
Technologies involved in homeland security issues from several perspectives, including science, engineering, business, policy, and society. Advanced tools for the analysis and forecasting of technology and developing strategies aligned with overall stakeholder and organizational goals. Micro- and nanotechnologies and biochemical/chemical, radiological agents. Readings/ discussion. Select a technology topic and analyze its current status and possible future trajectories for application or relevance to key issues of importance to security, both threats and opportunities. Present this in the last class session.

ST 8113. Information and Cyber Security. (2 cr. ; A-F only; Every Spring)
Existing and emerging IT, cyber, communication networks, and coordination activities during emergencies. Technological and policy issues for the need to share information through the use of interoperable technologies and to rapidly collect and synthesize data in real time in order to achieve critical national security. In addition to MSST grad students this course is also open to non-ST graduate students and non-degree graduate students who may register with permission/consent from the ST program (DGS, DGSA or teaching faculty).

ST 8200. Special Topics in Security Technologies. (0.5 cr. ; A-F only; Every Fall & Spring)
Leaders in the field related to security technologies. Special speakers.

ST 8220. Vulnerability, Risk and Threat Assessment and Management. (2.5 cr. [max 3 cr.] ; A-F only; Every Fall)
Principles, methods, and practices of threat and vulnerability assessment/risk reduction. Integration of risk assessment and management principles into strategic planning/ decision-making. Case studies. Examples of risk assessment/management. prereq: Admitted to MSST grad program

ST 8221. Communications of Risk and Security. (1 cr. ; A-F only; Every Fall)
Analyze public speaking. How to be an effective listener, how to prepare for effective public speaking, how to be an effective writer, communicate by email, write for emphasis, tone, and business writing. prereq: MSST grad student

ST 8330. Critical Infrastructure Protection. (2.5 cr. [max 3 cr.] ; A-F or Audit; Every Fall)
Systems risk analysis, engineering, economics, and public policy. Investigate infrastructure security/support design and management of complex civil infrastructure systems. Systems' vulnerability assessment, asset and risk management, investigation of infrastructure interdependencies and couplings, along with judicious analyses of policies. Contribution of science and technology to strategically enhance security/quality of life. prereq: MSST grad student

ST 8331. Dynamic Systems Modeling and Simulation Tools. (2 cr. ; A-F only; Every Fall)
Techniques for modeling complex systems and predicting and evaluating consequences, risks and the potential utility of interventions and countermeasures in the context of intentional disruption or use of the system as an attack vehicle. Importance of inter/intra system modeling. Variety of modeling approaches. How systems can be characterized focusing on the parameters that are important for consequence assessment, risk assessment, capability benchmarking, and decision support. Develop a systems and simulation-based approach to risk assessment, preparedness, intervention assessment, and problem solving.

ST 8440. Security Practicum. (0.5-2 cr. ; A-F only; Every Summer)
Seminars and focused workshops on selected areas of security science and technology. prereq: Admitted to MSST grad program

ST 8441. Internship (optional). (0.5 cr. [max 1 cr.] ; A-F only; Every Fall & Spring)
Summer internship opportunities at the university centers, companies, state, and federal agencies.

ST 8510. Psychology/Behavior Intelligence for Homeland Security. (2 cr. ; A-F only; Every Summer)
Political, psychological, sociological, and economic foundations and dynamics of both terrorism and homeland security. Contemporary debates over terrorism, counterterrorism, and homeland security. Students develop their own (informed) perspectives.

ST 8511. Public Policy. (1 cr. ; A-F only; Every Fall)
Key policies in the U.S. addressing safety and security of citizens, institutions, and systems. Complex network of actors/organizations involved in S&T and security-related areas and their multiple objectives and values. Legislative, policy, and organizational issues facing U.S. intelligence, business, academic, and S&T communities. Students reflect on how these issues relate to their own professional roles/experiences, as well as stakeholder communities with which they work. Consider a specific piece of security-related legislation/ analyze associated policy problems and how they relate to security risks. Historical and contemporary examples used to illustrate related public policy questions.

ST 8512. Partnership in Conflict Management: Security/Privacy Law, Social Responsibility and Ethics. (2 cr. ; A-F only; Every Spring)
An exploration of challenges to American civil liberties and national security in times of terrorism. prereq: MSST grad student

ST 8513. Cyber Threat Intelligence. (2 cr. ; A-F only; Every Spring)
The educational objective of this course is to provide students the foundational theory and applied skill in cyber threat intelligence analysis. This includes all phases of the intelligence life cycle: requirements development, collection, analysis methods, and reports and briefings for organizational leaders to influence risk-based cyber security decisions. The class counts as an elective for the MSST major and is also open to other graduate students after consultation with the director of graduate studies and a background check.

ST 8620. Capstone. (0.5-2 cr. ; A-F only; Every Spring & Summer)
The Capstone project is an independent, original, and applied investigation on a relevant subject, problem, or issue in the area of security technologies and homeland security. prereq: MSST grad program student

ST 8660. Independent Study. (; 1-4 cr. ; A-F only; Every Fall, Spring & Summer)
Focused study in security science, technology, business, policy or law, with a deliverable project report/presentation.

ST 8661. Securing Cyberspace (Fundamentals). (3 cr. ; A-F only; Every Fall)
The course is a two-course sequence which provides a comprehensive technical and logical foundation for defending an organization against cyber security threats. ST 8661 will be offered every fall and ST 8662 every spring.

ST 8662. Securing Cyberspace - Advanced. (3 cr. ; A-F only; Every Spring)
The course is a two-course sequence which provides a comprehensive technical & logical foundation for defending an organization against cyber security threats. The class is open to other grad students & upper undergrads after an interview with the director of graduate studies.

Slavic (SLAV)

SLAV 5900. Topics in Slavic Languages and Literatures. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Topics specified in Class Schedule.

Social Work (SW)

SW 5051. Human Behavior and the Social Environment. (; 2 cr. ; A-F or Audit; Every Fall & Spring)
Social, psychological, biological, and cultural factors of individual and group development as applied to social work practice. Behavior and life-cycle development focusing on diversity and each stage of life. Discuss development in terms of the individual, and in terms of overlapping social systems such as the multi-generational family, culture, community, and society.

SW 5101. Historical Origins and Contemporary Policies in Social Welfare. (; 3 cr. [max 4 cr.] ; A-F or Audit; Every Fall)
Contemporary policies and programs in social welfare are examined in light of their historical origins and evolution. A framework is then developed for analysis of concepts and principles in contemporary social policy for social welfare programs and services. The emergence of the profession of social work also examined.

SW 5562. Global Social Work and Social Development. (3 cr. ; Student Option; Every Fall)
Theories/strategies of social work and social development in industrial/developing countries. Applying international perspective and comparative framework to analyze basic human needs, social problems, and social work and social development strategies in different countries.

SW 5903. Substance Abuse and Social Work. (; 2 cr. ; Student Option; Every Fall)
Students gain skills in eliminating the detrimental impact of substance use disorders at multiple levels (families, groups, organizations, and communities) through an ability to identify, assess, intervene, and evaluate those struggling with substance abuse and dependency throughout the life span.

SW 5904. Facilitation and Conflict Management: Humanistic Approach. (; 2 cr. ; Student Option; Every Spring)
Humanistic approach to facilitating meetings in small human service organizations and units within large bureaucratic structures. Managing conflict among individuals, groups, and communities in multiple settings.

SW 5905. Permanency in Child Welfare. (; 2 cr. ; A-F or Audit; Every Spring)
Depth/breadth in knowledge/skill acquisition in achieving permanency for children receiving services within public, tribal, and private child welfare systems. Out-of-home/permanency placements, specific permanency interventions, and child/family responses to different permanency options.

SW 5907. School Social Work. (; 1 cr. ; Student Option; Periodic Fall, Spring & Summer)
Apply social work knowledge/skills in school settings through prevention, assessment, intervention, and evaluation from an ecological multilevel approach focused on students, families, and the school community.

SW 5912. Grief and Loss in Social Work Practice. (1 cr. ; Student Option; Every Fall & Spring)
Review current concepts of grief/loss. Historical/modern views, symptoms of grief, implications of diverse losses, including expected, sudden, or traumatic losses, ambiguous grief.

SW 5913. Working with Immigrant Populations. (; 2 cr. ; Student Option; Periodic Fall & Spring)
Trends in immigration to US and public policy responses. Acculturation processes, issues, problems. Common social service needs of immigrants/refugees. Skills for engagement/ interventions with immigrants and refugees across main fields of social work.

SW 5991. Independent Study in Social Work. (; 1-4 cr. ; Student Option; Every Fall, Spring & Summer)
Independent study in areas of special interest to students and faculty. This course is open to graduate students in the School of Social Work with an approved independent study proposal. MSW students may apply a maximum of 4 credits of SW 5991 to their program of study.

SW 8010. Seminar: Field Practicum I. (; 1-6 cr. [max 8 cr.] ; S-N only; Every Fall, Spring & Summer)
Integrates classroom learning with direct experience of a social work field internship. Professional support/learning groups focus on student-and facilitator-identified issues. Students discuss professional/personal biases, ethical dilemmas, and supervisory issues. Cross-cultural understanding, implications of cross-cultural practice.

SW 8020. Field Practicum II. (; 1-6 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Integrates classroom learning within a concentration with the direct experience of an internship. Students expand competency in cross-cultural practice.

SW 8030. Advanced Standing Social Work Practicum. (; 1-6 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Integrates classroom learning with direct experience of a social work field internship. Professional support/learning groups discuss issues raised in field placement. Groups focus on professional/personal biases, ethical dilemmas, supervisory issues, cross-cultural sharing, and implications of students' privilege/ power in relation to client systems.

SW 8041. Specialized Field Placement. (; 1-4 cr. ; S-N only; Every Fall, Spring & Summer)
Field placement added to required foundation/ concentration field placements (or to concentration placement for advanced standing students). prereq: [8020 or 8030], instr consent

SW 8151. Social Work Methods: Practice With Individuals and Systems. (; 2 cr. ; A-F or Audit; Every Fall)
Develops foundation knowledge and skills for social workers to work with individuals and systems.

SW 8152. Social Work Practice Methods: Families and Groups. (; 2 cr. ; A-F or Audit; Every Spring)
Develop foundational knowledge and skills in relationship building, engagement, interviewing, and assessment with families and groups using the ecological-systems theoretical framework and resiliency-based approach. prereq: MSW student or instr consent

SW 8153. Social Work Practice Methods: Macro Practice and Organizations. (; 2 cr. ; A-F only; Every Fall)
Models of community intervention, community practice and macro-level interventions as integral to professional social work. Building upon theoretical approaches to human service organizations and their distinct attributes, the course addresses key practice knowledge, skills, and values that promote, develop, and maintain human service organizations that effectively meet community and client needs.

SW 8251. Social Work Practice in Health, Disabilities, and Aging. (3 cr. ; A-F or Audit; Every Fall)
Social work practice in health/disabilities/ aging. History in social work, practice contexts/ settings, service delivery systems. Practice/ population overlaps, distinctions, co-operations.

SW 8261. Advanced Social Work Practice in Health Care. (3 cr. ; A-F only; Every Fall, Spring & Summer)
Advanced social work practice in health care. Theoretical models/evidence-based interventions. Psychosocial assessment, treatment interventions, interdisciplinary teamwork, ethics, leadership

SW 8262. Empowerment Practice With Persons With Disabilities. (3 cr. ; A-F or Audit; Every Spring)
Models of disability, types of disability, common social work practices. Knowledge/skills for use across lifespan/ cultures/various settings.

SW 8263. Essential Skills and Perspectives for Working with Older Adults. (3 cr. ; A-F or Audit; Every Fall)
Intervention skills that are tailored for older adults in individual, family, group, residential, and community settings. Focus on bio-psycho-social-cultural-spiritual perspectives and evidence-based approaches.

SW 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

SW 8351. Assessment and Engagement with Families and Children. (3 cr. ; A-F or Audit; Every Fall & Spring)
Utilizing evidence-informed, culturally respectful assessments/engagement models with families/children. Factors internal/external to families. Work with families/children around broad scope of stressors. Resiliency.

SW 8352. Intervention Methods with Families. (3 cr. ; A-F or Audit; Every Fall & Spring)
Work with families/children in family-centered, community, preventive practice. Engagement, assessment, intervention, evaluation.

SW 8361. Identification and Assessment of Family Violence. (3 cr. ; A-F or Audit; Every Fall)
Identification/assessment of family violence. Contextual knowledge of behaviors of perpetrators, victims, survivors. Gender, race, culture, age, ability, SES, sexual orientation.

SW 8363. Social Work in Child Welfare. (3 cr. ; A-F or Audit; Every Spring)
Public, private, tribal child welfare related to assessment of strengths/risks. Develop appropriate plans that secure child safety/well-being.

SW 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

SW 8451. Assessment and Engagement in Clinical Social Work Practice. (3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Mental health diagnostic codes/classifications. Interviewing skills, assessment writing skills/ techniques. Biopsychosocial perspective/ engagement strategies.

SW 8452. Core Concepts in Clinical Social Work Practice. (3 cr. ; A-F or Audit; Every Fall & Spring)
Interpersonal process skills. Developing/ maintaining effective therapeutic alliances/ positive intervention outcomes with diverse populations.

SW 8461. Advanced Clinical Social Work Practice with Adults. (3 cr. ; A-F or Audit; Every Fall & Spring)
Research-informed clinical interventions for adults with mental health distress. Application of cognitive behavioral/psychodynamic psychotherapies through brief/long-term models across diverse populations.

SW 8462. Advanced Clinical Practice With Children and Adolescents. (3 cr. ; A-F or Audit; Every Fall & Spring)
Social work interventions using normative developmental supports/mental health case planning. Develop advanced clinical social work practice knowledge/skills for working with children/adolescents with mental health risks. Provide knowledge for community social workers serving children exposed to stress.

SW 8463. Practice Interventions with Persons Who Experience Serious Mental Illness. (3 cr. ; A-F or Audit; Every Spring)
An overview of SW practice in community mental health services to improve the lives of persons (adults and children) who experience serious mental illness. Topics: context of mental health care and recovery, stigma, needs and strengths assessment, service planning, and current evidence-based interventions.

SW 8551. Advanced Community Practice: Assessment, Organizing, and Advocacy. (3 cr. ; A-F or Audit; Every Spring)
Community practice, including community organizing, policy advocacy, social service/ change leadership. prereq: [5051, 5101, 8151, 8152, 8153, 8154] or MSW Adv Standing or instr consent

SW 8552. Advanced Community Practice: Leadership, Planning, and Program Development. (3 cr. ; A-F or Audit; Every Fall)
Advanced community practice knowledge/ skills. Strategic planning, program design, organizational leadership/management, work groups.

SW 8563. Advanced Policy Advocacy. (3 cr. ; A-F or Audit; Every Spring)
Students paired with social service, social policy, social justice agencies, coalitions. Agenda setting, legislative research, legislative advocacy in relation to specific legislation proposed in Minnesota state legislature. Tie policy theory to real-world practice.

SW 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

SW 8693. Directed Study. (; 1-6 cr. ; Student Option; Every Fall, Spring & Summer)
Independent study under tutorial guidance. prereq: instr consent

SW 8694. Directed Research. (; 1-6 cr. ; Student Option; Every Fall, Spring & Summer)
Individual or small group research inquiry translating introductory course content into research design and study. Projects may be conducted in conjunction with field learning experiences or other coursework. prereq: instr consent

SW 8804. Child Welfare Policy. (3 cr. ; A-F or Audit; Every Spring)
Develops advanced policy knowledge/skills for social workers practicing in or collaborating with public or private child welfare services.

SW 8805. Aging and Disability Policy. (3 cr. ; A-F or Audit; Every Spring)
Social policy related to disability/aging. Major policy areas of income support, health, education, caregiving, employment, housing, retirement.

SW 8806. Health and Mental Health Policy. (3 cr. ; A-F or Audit; Every Spring)
Critically engage in health/mental health policy debate, analysis, development, implementation.

SW 8807. International and Comparative Social Welfare Policy. (3 cr. ; A-F or Audit; Every Spring)
Cross-national comparisons of social welfare policies, major international conventions, treaties. Social welfare, social development theories/policies. In-depth analyses of selected countries' policies, international agreements, social development strategies.

SW 8821. Social Work and Difference, Diversity and Privilege. (; 2 cr. ; A-F only; Every Spring & Summer)
Essential knowledge/awareness/skills to support culturally competent social work practice.

SW 8841. Social Work Research Methods. (; 2 cr. ; A-F or Audit; Every Fall)
Develops foundational research methods knowledge/skills fundamental to evidence-based social work practice.

SW 8842. Advanced Social Work Evaluation. (; 1-3 cr. [max 6 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Students design/carry out evaluation of program or own direct practice. Purposes/ types of evaluations. Instrument design, data analysis, ethical issues. Organizational, political, social, cultural factors affecting evaluation in diverse human contexts.

SW 8843. Social Work Program Evaluation. (1-2 cr. [max 3 cr.] ; A-F only; Every Fall & Spring)
Students design, implement, and present an evaluation of a program either in their field practicum or of particular interest to them. Class topics include the purpose and types of evaluations; instrument design; data collection techniques and management; data analysis; ethical issues; and organizational, political, social, and cultural factors influencing evaluation in diverse human contexts.

SW 8851. Social Welfare History and Historical Research Methods. (; 3 cr. ; A-F only; Periodic Spring)
Methods of historical research in, and survey of, history/evolution of social welfare/work, using primary/secondary source materials. prereq: Completed research courses for soc work PhD student or [equiv research methods courses, grad student]

SW 8855. Social Policy Formulation and Analysis. (; 3 cr. ; A-F only; Periodic Fall & Spring)
Application of theoretical perspectives, conceptual frameworks, and research methodologies to analysis of social issues and

analysis/formulation of social welfare policy. prereq: Soc wk PhD student or instr consent

SW 8861. Theory and Model Development in Social Work. (; 3 cr. ; A-F only; Periodic Fall)
Intervention research methods, contemporary social work practice models. Direct intervention in systems, from individual to community. Theoretical, value, empirical foundations of practice models for intervention research. prereq: Soc wk PhD student or instr consent

SW 8871. Social Work Research Seminar I. (; 3 cr. ; A-F only; Every Fall)
Concepts/methods of social research. Issues in social science, social work research, and knowledge development. Development of research questions. Sampling, measurement, data collection in qualitative/quantitative research. prereq: Soc wk PhD student or instr consent

SW 8872. Social Work Research Seminar II. (; 3 cr. ; A-F only; Every Spring)
Methods/design of quasi-experiments, surveys, descriptive research. Grounded theory. Analysis of quantitative/qualitative data. prereq: 8871 or instr consent

SW 8875. Research Practicum. (; 2 cr. [max 6 cr.] ; S-N or Audit; Every Fall & Spring)
Experience in conduct of research, following completion of 8871 and 8872. Students work under faculty direction. prereq: Soc wk PhD student or instr consent

SW 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

SW 8901. Assessment and Treatment of Trauma. (2 cr. ; Student Option; Every Spring & Summer)
Sociopolitical context of trauma. Impact on diverse populations of individuals, families, communities. Evidence-based approaches for addressing trauma on multiple system levels. Applications to case conceptualization, treatment planning.

SW 8902. Social Work Supervision, Consultation, and Leadership. (2 cr. ; Student Option; Every Fall & Spring)
Principles, practice skills, models of supervision: administration, education, support. Power/authority, leadership, use of self in supervising. Ethics, risk management, legal obligations. Simulated skills practice, experiential learning.

Social, Adm, and Clinical Phar (SACP)

SACP 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Master's student, [adviser, DGS] consent

SACP 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student, [adviser, DGS] consent

SACP 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

SACP 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Plan A

SACP 8888. Thesis Credits: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd

Social/Administrative Pharmacy (SAPH)

SAPH 5100. Pro-Seminar. (; 1 cr. ; A-F or Audit; Every Fall)
History, foundational frameworks, and key research domains for social and administrative pharmacy through examining landmark literature. Students think critically, reflect on important works, and create a cognitive map of the discipline and their own focus for study.

SAPH 5610. Pharmacoepidemiology. (3 cr. ; A-F only; Fall Odd Year)
Application of epidemiologic principles to study/use. Beneficial/adverse outcomes of drugs in human populations.

SAPH 8054. Advanced Studies in Pharmaceutical Care Practice. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Analyzing practice/implementation of pharmaceutical care. Students confront their assumptions about pharmacy profession, pharmacy practice, and pharmaceutical care. Discussions, guest speakers, intensive literature searches/evaluation.

SAPH 8100. Seminar. (; 1 cr. [max 8 cr.] ; A-F only; Every Fall & Spring)
Contemporary issues and research problems in sociobehavioral pharmacy, pharmacoeconomics and policy, and clinical research. prereq: Grad SAPh major or instr consent

SAPH 8173. Principles and Methods of Implementing Research. (; 3 cr. ; Student Option; Every Fall)
Integrates scientific, statistical, and practical aspects of research. Interrelationships among design, sample selections, subject access, human subjects requirements, instrument selection and evaluation, data management, analyses plans, grant writing, and research career issues. Field experiences. prereq: Two grad stat courses

SAPH 8200. Research Problems. (; 1-8 cr. [max 16 cr.] ; Student Option; Every Fall, Spring & Summer)
Individually designed research experience directed at contemporary problems related to drug use process. prereq: Grad SAPh major or instr consent

SAPH 8235. Pharmaceutical Economics and Policy. (; 3 cr. ; A-F or Audit; Every Fall)
Economic analysis of pharmaceutical sector of health care systems. Problems of pricing production and distribution of pharmaceuticals. Domestic or international policy issues relevant to price and access of pharmaceuticals. prereq: Grad SAPh major or instr consent

SAPH 8255. Pharmaceutical Marketing. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Historical development of distributive systems, marketing channels, institutions, policies, and practices as they relate to pharmaceutical industry. Contemporary issues/theory related to pharmaceutical marketing. Pharmaceutical proportion, especially directed to consumer advertising. prereq: Grad SACP major or instr consent

SAPH 8270. Clinical Conferences. (; 2 cr. ; Student Option; Every Fall)
N/A prereq: Grad SAPh major or instr consent

SAPH 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

SAPH 8420. Social and Behavioral Aspects of Pharmacy Practice. (; 3 cr. ; A-F or Audit; Every Spring)
Historical development of the profession, its growth and development, emphasizing forces of education, professionalization, attitude modification, and changes occurring as a product of legal and organizational forces in society. prereq: Grad SAPh major or instr consent

SAPH 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

SAPH 8500. Pharmacy and Its Environment. (; 3 cr. ; A-F or Audit; Every Spring)
Cultural foundations of pharmacy. Development of present state of pharmacy practice. Role of pharmacist as health practitioner in relation to other health practitioners. Identification of factors (health policy, regulation, economics, research and development, promotion) that affect individual responses to drug therapy. prereq: Grad SAPh major or instr consent

SAPH 8610. Pharmacoepidemiology. (3 cr. ; Student Option; Periodic Fall)
Pharmacoepidemiology is the study of the uses and effects of drugs in patient populations. The science of pharmacoepidemiology borrows from pharmacology and epidemiology. This course will introduce students to the field of pharmacoepidemiology including study methodology, relevant statistics, data sources, measurement of treatments and outcomes, sources of bias and control of confounding, techniques to reduce bias and confounding, survival analysis and regression techniques,

interpretation of results, and drug safety surveillance and risk management.

SAPH 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Doctoral pre-thesis credits. prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

SAPH 8700. Hospital Pharmacy Administration. (; 3 cr. ; A-F or Audit; Periodic Fall)
History, classification, organization, and functions of hospital departments in relation to the pharmacy service. prereq: Grad SAPh major or instr consent

SAPH 8702. Hospital Pharmacy Survey. (; 1 cr. [max 3 cr.] ; Student Option; Periodic Fall)
Readings for self-directed students to explore contemporary issues in hospital pharmacy practices. prereq: Grad SAPh major or instr consent

SAPH 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

SAPH 8810. Social Psychology of Health Care. (; 3 cr. ; Student Option; Periodic Spring)
Behavioral and social aspects of recovery responses to drugs and other therapies, patients' compliance with prescribed therapies, relationships between healthcare professional and patient. prereq: Grad SAPh major or instr consent

SAPH 8840. Social Measurement. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
How social factors such as innovativeness, compliance, religiosity, and stress are measured and tested for reliability and validity. Relationships between theory, concepts, variables, data. prereq: Intro stat course, understanding of simple correlations or instr consent

SAPH 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Sociology (SOC)

SOC 5090. Topics in Sociology. (; 1-3 cr. [max 9 cr.] ; Student Option; Periodic Spring)
Topics specified in Class Schedule. prereq: Undergrad soc majors/minors must register A-F

SOC 5101. Sociology of Law. (3 cr. ; A-F or Audit; Every Fall & Spring)
This course will consider the relationship between law and society, analyzing law as an expression of cultural values, a reflection of social and political structure, and an instrument of social control and social change. Emphasizing a comparative perspective, we begin by discussing theories about law and legal institutions. We then turn our attention to the legal process and legal actors, focusing on the impact of law, courts, and lawyers on the rights of individuals. Although this course focuses on the U.S. legal system, we will explore issues of the relationship between U.S. law and global law and concepts of justice. prereq: graduate student

SOC 5104. Crime and Human Rights. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
This course addresses serious violations of humanitarian and human rights law, efforts to criminalize those violations (laws and institutions), and consequences of these efforts. Special attention will be paid to the impact interventions have on representations and memories of atrocities on responses and the future of cycles of violence. Case studies on Holocaust, Balkan wars, Darfur, My Lai massacre, etc. Criminal justice, truth commissions, vetting, compensation programs. prereq: at least one 3xxx SOC course recommended

SOC 5171. Sociology of International Law: Human Rights & Trafficking. (GP; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
This course takes a sociological approach to international law, considering how history, institutions, power, and interests shape the phenomenon. What is international law, where does it come from, and how does it work? What does international law tell us about globalization and nation-states? Does it make a difference in the world? Does it have a real impact on the day-to-day lives of individuals? When is it followed; when is it ignored? This course takes a broad sociological view of international law. We analyze the actors and processes that constitute international law and then focus on particular substantive areas, including human rights, economic development,environmental concerns, trafficking, and drug interdiction. prereqs: Graduate student or instructor consent

SOC 5221. Sociology of Gender. (3 cr. ; A-F or Audit; Periodic Spring)
Gender is something so fundamental to our lives, to our identities, and how we interact with others that we often take it for granted. However, understandings of gender vary across time and place, and even within cultures, making it clear that our understandings of gender are not universal or timeless. In this class, we will examine how gender intersects with race and sexuality, as well as how it impacts areas of our lives such as child socialization, family structure, the media, intimate relationships, and the workplace.

SOC 5315. Never Again! Memory & Politics after Genocide. (GP; 3 cr. ; A-F or Audit; Spring Odd Year)
Course focuses on the social repercussions and political consequences of large-scale political violence, such as genocide, war crimes, and crimes against humanity. Students learn how communities and states balance the demands for justice and memory with the need for peace and reconciliation and addresses cases from around the globe and different historical settings. prereq: SOC 1001 or 1011V recommended, A-F required for Majors/Minors.

SOC 5411. Terrorist Networks & Counterterror Organizations. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
Theories/evidence about origins, development, and consequences of terrorist networks. Efforts to prevent, investigate, and punish terrorists by use of law enforcement, security, and military forces. Terror involves using violent actions to achieve political, religious, or social goals. This course examines theories and evidence about the origins, development, and consequences of terrorist networks. It analyzes efforts to prevent, investigate, and punish terrorists by counterterror organizations, including law enforcement, security, and military forces. Graduate and honors students are expected to demonstrate greater depth of discussion, depth and to a degree length of writing assignments, presentations, and leadership of the students. Prereq: Sociology Major/Minors must register A-F

SOC 5446. Comparing Healthcare Systems. (GP; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Examination of national health systems from an international comparative perspective, emphasizing social, organizational, political, economic, cultural, and ethical dimensions of healthcare policies and programs to deliver services and their impacts on the health of population groups. The comparative approach will enable students to acquire a better understanding of the problems and potential for reforming and improving U.S. health care delivery. Students enrolled in Soc 5446 (graduate level) are expected to demonstrate greater depth of discussion, depth and to a degree length of writing assignments, presentations, and leadership of the students. prereq: Soc majors/minors must register A-F

SOC 5455. Sociology of Education. (; 3 cr. ; Student Option; Every Fall)
Structures and processes within educational institutions. Links between educational organizations and their social contexts, particularly as these relate to educational change. prereq: 1001 or equiv or instr consent; soc majors/minors must register A-F

SOC 5811. Social Statistics for Graduate Students. (3 cr. ; Student Option; Every Fall)
In this course, students will learn core statistical and computations principles that will allow them to perform quantitative analyses using social data. The course is designed for social science students at the beginning of their graduate school careers. However, advanced undergraduates can take the course, which will involve a few modifications to the assignment schedule. Sociology 5811 will review basic probability, and then move on to univariate inference, the linear regression model, and introductory lessons of causal inference. In doing so, students will explore statistical concepts and methods that provide the foundation sociologists use to most commonly collect and analyze numerical evidence. Sociology 5811 will also provide the foundation for data management and statistical

inference using Stata, a statistical computing environment that is popular in the social sciences. prereq: Undergraduate students are expected to have familiarity with the materials taught in the equivalent of 3811. Students who are unsure of the course requirements should contact the instructor. Undergraduates with a strong math background are encouraged to register for 5811 in lieu of 3811. Soc majors must register A-F. 5811 is a good social statistics foundation course for MA students from other programs. 5811 will not count for credits towards the Soc PhD program requirements.

SOC 8001. Sociology as a Profession. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Fall & Spring)
This 1 credit class fosters adaptation to the Graduate Program in Sociology and preparation for a sociological career. In the Fall, we explore professional careers in this field. We discuss the wide range of opportunities in sociology and help students further explore the next steps to becoming a scholar, educator, and member of various professional, intellectual, and social communities. We share practical information about being a student in sociology and about sociological careers, discuss presentations in department workshop seminars, and provide a safe place to discuss issues of student concerns. Students are encouraged to bring to the class their thoughts and reactions to experiences during their first semester in the PhD program. The Spring 8001 class is oriented to particular milestones in the Sociology Graduate Program and important student activities (for example, preparing reading lists for the preliminary exam and then writing the preliminary exam, preparing a dissertation prospectus, writing grant proposals, preparing an article for publication, etc.). Pre-req: Soc PhD students

SOC 8011. Teaching Sociology: Theory & Practice. (3 cr. ; Student Option; Every Spring)
Social/political context of teaching. Ethical issues, multiculturalism, academic freedom. Teaching skills (e.g., lecturing, leading discussions). Active learning. Evaluating effectiveness of teaching. Opportunity to develop syllabus or teaching plan. prereq: Soc grad student or instr consent

SOC 8090. Topics in Sociology. (; 1.5-3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Topics specified in Class Schedule. prereq: instr consent

SOC 8093. Directed Study. (; 1-4 cr. [max 20 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed study in sociology. prereq: Grad soc major or instr consent

SOC 8094. Directed Research. (; 1-4 cr. [max 20 cr.] ; Student Option; Every Fall, Spring & Summer)
May be used to fulfill sociology graduate requirement for advanced methodological training.

SOC 8101. Sociology of Law. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Sociological analysis of law and society. In-depth review of research on why people obey the law, of social forces involved in creation of law (both civil and criminal), procedures of enforcement, and impact of law on social change.

SOC 8111. Criminology. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Overview of theoretical developments and empirical research. Underlying assumptions, empirical generalizations, and current controversies in criminological research.

SOC 8171. Cross-Disciplinary Perspectives in Human Rights. (3 cr. ; Student Option; Periodic Spring)
This seminar will approach human rights issues from a variety of "disciplinary" perspectives, including history, the arts, law, the social sciences, and praxis. Empirical work in the social sciences will receive somewhat greater emphasis. One key focus will be the unique advantages (and disadvantages) of the different perspectives and fruitful ways to combine them to strengthen action that improves human rights situations in countries around the world, including the United States. prereq: Grad student or instr consent

SOC 8190. Topics in Law, Crime, and Deviance. (; 3 cr. [max 9 cr.] ; A-F or Audit; Every Fall)
Advanced topics in law, crime, and deviance. Social underpinnings of legal/illegal behavior and of legal systems.

SOC 8211. The Sociology of Race & Racialization. (3 cr. ; Student Option; Periodic Fall & Spring)
Major theoretical debates. Classic and contemporary theoretical approaches to studying U.S. race relations; contemporary and historical experiences of specific racial and ethnic groups.

SOC 8221. Sociology of Gender. (; 3 cr. ; Student Option; Periodic Fall)
Organization, culture, and dynamics of gender relations and gendered social structures. Sample topics: gender, race, and class inequalities in the workplace; women.s movement; social welfare and politics of gender inequality; theoretical and methodological debates in gender studies; sexuality; science; sociology of emotions.

SOC 8290. Topics in Race, Class, Gender and other forms of Durable Inequality. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall)
Comparative perspectives on racial inequality; race, class, and gender; quantitative research on gender stratification; stratification in post-communist societies; institutional change and stratification systems; industrialization and stratification. Topics specified in Class Schedule.

SOC 8311. Political Sociology. (; 3 cr. ; Student Option; Every Fall)
Social dimensions of political behavior and social origins of different forms of the state. How various theoretical traditions--Marxist, Weberian, and feminist--address key issues in political sociology, including citizenship, revolution, state formation, origins of democracy, welfare state, and fascism.

SOC 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

SOC 8390. Topics in Political Sociology. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Topics with common focus on social underpinnings of political behavior/change. Topics specified in Class Schedule. Sample topics: democracy and development, international legal and political systems, power and protest in advanced capitalist states, xenophobia and international migration, and civil society and democracy.

SOC 8412. Social Network Analysis: Theory and Methods. (3 cr. ; Student Option; Periodic Fall)
Introduction to theoretical/methodological foundations of social network analysis. Concepts/principles, measurements, computer techniques. Applications to friendships, communities, workteams, intra-/inter-organizational relations, international systems. Focuses on network visualizations.

SOC 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

SOC 8490. Advanced Topics in Social Organization. (; 3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Content varies with instructor. Sample topics: gender and organizations, interorganizational relations, comparative study of organizations, nonprofit organizations, consumer behavior, industry and technology, social networks, conflict, coercion, and social exchange. Topics specified in [Class Schedule]. prereq: instr consent

SOC 8501. Sociology of the Family. (; 3 cr. ; Student Option; Every Fall)
Theoretical and empirical works from contemporary family sociology. Content varies with instructor. Sample topics: definitions of the family, family roles, family interactions, marriage and divorce, childbearing, parenthood, and cultural variations in families.

SOC 8540. Topics in Family Sociology. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Families and mental health; families, work, and the labor market; historical/comparative research on the family. Topics specified in [Class Schedule].

SOC 8551. Life Course Inequality & Health. (; 3 cr. ; Student Option; Periodic Fall)
Seminar examines the changing life course in its social and historical context, including theoretical principles, methodologies, and policy implications. Focus on key societal institutions that offer unequal opportunities and constraints, depending on social class, race/ethnicity, and gender. Unequal access

to age-graded social roles and resources shape the course of development, and in doing so, they have profound impacts on health. We will consider how inequality in the family, education, work, the military, and in the health care & criminal justice systems influence health behaviors and outcomes at different ages and life stages. prereq: grad student or instr consent

SOC 8590. Topics in Life Course Sociology. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall)
Sociology of aging, sociology of youth, and mental health and adjustment in early life course. Topics specified in [Class Schedule].

SOC 8607. Migration & Migrants in Demographic Perspective. (3 cr. ; A-F or Audit; Every Spring)
With fertility and mortality, migration is one of three core population processes. This course provides a graduate-level treatment of major theoretical and empirical debates in demographic/population research on migration and migrants. It examines topics like why and how people migrate, who migrates and who does not, and the effects of migration in migrant-receiving and migrant-sending areas. Along the way, it links to a number of related topics, including the impacts of migration on migrants themselves, the role of the state and policies governing migration and incorporation, and transnationalism. A common thread throughout is connecting these topics to issues of population size, composition, and change. While this course contains ?demographic? in the title and fulfills requirements for graduate trainees and the population studies minor in the Minnesota Population Center, it is necessarily interdisciplinary in scope and draws from research in economics, demography/population studies, human geography, history, political science, population health, public policy, and sociology. Credit will not be granted if the student has already completed a Soc 8090 topics course with the same title.

SOC 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

SOC 8701. Sociological Theory. (; 4 cr. ; A-F or Audit; Every Fall)
Traditions of social theory basic to sociological knowledge, their reflection and expansion in contemporary theory, their applications in selected areas of empirical research. Sample topics: social inequality, social organization and politics, family organization and social reproduction, social order and change, sociology of knowledge and religion.

SOC 8721. Social Psychology: Micro-Sociological Approaches to Inequalities and Identities. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Social psychology is basic to an understanding of contemporary social life. This subfield of sociology focuses on social phenomena at the micro-level. Small group dynamics, social interactions, and individual experiences are importantly structured by the macro-structural context, e.g., by socioeconomic status, race, gender, sexuality, and other dimensions of social inequality. At the same time, these and other micro-sociological processes reflect individual-level identities, perceptions, motivations and cognitions. This seminar examines a wide range of social psychological phenomena linked to inequality (e.g., the effects of class, minority status, and gender on disparities in identity, self-concept, and health; the development of status hierarchies in small group interaction; intergroup relations, prejudice, and discrimination). We begin with a consideration of ?personal structure,? emphasizing the cultural and structural variability of self-conceptions and identities, cognitive processes, and motivation, as well as the biosocial bases of action. These may be considered individual-level ?building blocks? of social psychological theories (along with emotions, attitudes, values, and ideologies). We then address prominent theoretical perspectives in social psychology that illuminate the linkages between micro-social contexts of inequality and identity, including symbolic interactionism, exchange theory, structural social psychology (?social structure and personality?) and the social psychology of the life course. Social psychological theory and research are foundational to many specialty fields in sociology, including the sociology of the family, education, health, deviance, work, social mobility, social movements, emotions, and the sociology of childhood, youth, and aging. Social psychology is also central to prominent theoretical debates in sociology surrounding the relationship between social structure and agency; individual-level identities, perceptions, motivations, goals, and strategies are both structured by the social context and affect the capacity of individuals to act agentically and to achieve their goals.

SOC 8731. Sociology of Knowledge. (; 3 cr. ; Student Option; Periodic Fall)
Knowledge and related terms (ideology, stereotype, prejudice, belief, truth). Variation of knowledge across social groups/categories (e.g., gender, race, class, generation, nationality); institutions (e.g., politics, law, science); and societies across time and space. Power, rituals, institution, networks, and knowledge. Genealogy of theories.

SOC 8735. Sociology of Culture. (; 3 cr. ; Student Option; Periodic Spring)
Definition/importance of culture as dimension of social life. Structural/Durkheimian approaches, cultural Marxism, practice theory. Cultural creation/reception. Identities as cultural formations. Culture/social inequality. Culture and race. Cultural construction of social problems. Culture and globalization.

SOC 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

SOC 8790. Advanced Topics in Sociological Theory. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Spring)
Sample topics: theories of conflict, theories of purposive action, Marxist theory, and structure-agency debate.

SOC 8801. Sociological Research Methods. (; 4 cr. ; A-F or Audit; Periodic Fall & Spring)
Multiple objectives of social research and how they inform research design. Conceptualization and measurement of complex concepts. Broad issues in research design and quantitative and qualitative approaches to data collection and management. prereq: Grad soc major or instr consent

SOC 8811. Advanced Social Statistics. (; 4 cr. ; A-F or Audit; Every Fall & Spring)
Statistical methods for analyzing social data. Sample topics: advanced multiple regression, logistic regression, limited dependent variable analysis, analysis of variance and covariance, log-linear models, structural equations, and event history analysis. Applications to datasets using computers. prereq: recommend 5811 or equiv; graduate student or instr consent

SOC 8851. Advanced Qualitative Research Methods: In-Depth Interviewing. (3 cr. ; A-F only; Spring Odd Year)
Interviewers have opened up other worlds to the sociological imagination and taught us much about the way people think, feel, and make sense of the world as well as of their own identities. We will conduct interviews; transcribe, code, and analyze interview data; and write up interview- based research. We will also consider a range of epistemological, practical, and ethical issues related to interviewing as a research method, reading materials drawn from a broad range of substantive sociological subfields as well as from geography. This course is best suited to graduate students who have an interview-based project in mind and want to acquire the skills for carrying out their research, and students who are considering using interviews in their dissertation research and want to try their hand at interviewing before making a decision. Because this is a hands-on, fieldwork-based course, no auditors are permitted.

SOC 8852. Advanced Qualitative Research Methods: Ethnographic Practicum. (3 cr. ; A-F or Audit; Fall Odd Year)
Ethnographic practice involves two core activities: engaging people in their own space and time, and separating yourself enough from the fieldwork site to write about observations and experiences with some degree of analytical distance and theoretical sophistication. Ethnographers are always both participant and observer, although some of them -- often those who start off as insiders at a site from the beginning -- will be more practically or emotionally enmeshed in a fieldwork site than others. This seminar emphasizes both these core activities: students develop the practice of shuttling constantly

between fieldwork site and writing field notes and analysis. Complementing the field work will be reading and discussion of classic and contemporary ethnographies. Each student will undertake his or her own fieldwork project, learning how to generate field notes that include rich description and coherent, flexible analysis. These projects should generate a useful body of qualitative data, as well as an intensive, hands-on experience of the design, research process, and analysis of ethnography. Prerequisites: graduate student, and completion of SOC 8801, or instructor consent.

SOC 8853. Advanced Qualitative Research Methods: Historical & Comparative Sociology. (3 cr. ; A-F or Audit; Periodic Fall & Spring)
This course is designed to teach graduate students to design and carry out theoretically informed and methodologically sophisticated historical research projects. In the first section of the course, we will explore the meaning of historical sociology, the disciplinary reflexes of sociologists and historians, conceptions of time in historical sociology, the uses of narrative in explanation, the use of case studies and comparisons in historical analysis, and varieties of explanation. The following section will examine the problems and potentials involved in different types of sources used by historically-oriented social scientists and the politics of historical memory. The final section will survey research by sociologists, historians, and political scientists that attempts to develop historically informed theories of various phenomena, such as race relations, nation and state formation, colonialism and imperialism, democratization and citizenship, gender and sexuality, and contentious politics. This course fulfills an advanced qualitative methods requirement for Sociology graduate students.

SOC 8888. Thesis Credits: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: [Completion of four semesters and all required credits completed], 24 cr required

SOC 8890. Advanced Topics in Research Methods. (; 2-3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Advanced Research Methods (e.g., multilevel models), historical/comparative, field, survey research. Topics specified in Class Schedule. prereq: 8801, 8811, or instr consent. Cr will not be granted if cr has been received for the same topics title

Software Engineering (SENG)

SENG 5115. Graphical User Interface Design, Evaluation, and Implementation. (; 2 cr. [max 3 cr.] ; A-F or Audit; Every Fall & Spring)
Design and evaluation of interactive application interfaces, user- and task-centered approaches to design, guidelines for graphical design, interface evaluation techniques, current interface trends, including web interfaces and information visualization. Group projects that include designing, prototyping, and implementing an application interface. prereq: Grad SEng major

SENG 5116. Graphical User Interface Toolkits. (; 2-3 cr. ; A-F or Audit; Periodic Fall)
Toolkit-centered introduction to GUI implementation technology. Students learn to use a GUI toolkit to implement a graphical application. Introduction to advanced techniques, including constraint-based data management, 3D visualization tools, and toolkit structure and design. prereq: Grad SEng major

SENG 5130. Introduction to Internet of Things: Systems-Level Design and Experimentation. (3 cr. ; A-F or Audit; Every Spring)
Project-based examples from modern "Internet of Things" (IoT) systems. Hands-on experiments with core wireless hardware, sensors, and software elements. Students will gain the practical system-level skills and understandings able to be applied to any IoT system, and walk away with an IoT project created themselves. There will be discussions and team-centric activities focused on market trends, ground-breaking tech and products, security, communication protocols, and exciting emerging technologies related to IoT including machine learning, artificial intelligence, and augmented reality.

SENG 5131. Distributed Application Design and Development. (; 3 cr. ; A-F or Audit; Every Spring)
Java programming, concurrent programming, workflow, distributed database, security, collaborative computing, object-oriented architecture/design, network publishing, messaging architecture, distributed object computing, and intranet. prereq: Grad SEng major

SENG 5132. Web Application Development. (3 cr. ; A-F or Audit; Every Spring)
This course is an in-depth discussion of the challenges and complexities involved in designing and implementing modern web applications. Students will gain experience designing and implementing a project during in the course of the semester.

SENG 5133. Cloud Computing - Leading Technical Change. (3 cr. ; A-F only; Periodic Spring)
Today most organizations make use of the "Cloud" in some way and it is, understandably, changing the way we architect our systems. But there is confusion around cloud native, 12 factors, modular monoliths, serverless, etc. How does a busy technologist make sense of it all? In this course, using cloud computing as a lens, we will explore the broader impact of technology change. We discuss how a technology radar can help a technologist stay marketable as well as to help an organization stay informed of important changes in the technology landscape. Expected topics: Docker; Kubernetes; Google Kubernetes Engine, Amazon EKS, Amazon Fargate; Cloud Foundry; Functions as a service; Amazon Lambda, Google Cloud Functions, Azure. This course will consist of discussion, hands on assignments, papers, presentations, and use of sample applications.

SENG 5199. Topics in Software Engineering. (; 2-3 cr. [max 6 cr.] ; A-F or Audit; Every Spring)
Topics specified in Class Schedule. prereq: SEng grad student

SENG 5271. Cybersecurity. (3 cr. ; A-F or Audit; Every Spring)
This course introduces the major topics of cyber security. Class time will focus on demonstrations, exercises, mini-projects, and discussions. Topics include authentication, access control, file system forensics, symmetric and asymmetric cryptography, network monitoring and controls, dynamic web site attacks, and network cryptography.

SENG 5511. Artificial Intelligence. (; 2-3 cr. ; A-F or Audit; Periodic Spring)
Introduces ideas and theories of AI. Problem solving, search, inference techniques. Logic and theorem proving. Knowledge representation, rules, frames, semantic networks. Planning and scheduling. Introduces Lisp programming language. prereq: Grad SEng major

SENG 5551. Introduction to Intelligent Robotic Systems. (; 3 cr. ; A-F or Audit; Periodic Fall)
Transformations, kinematics and inverse kinematics, dynamics, and control. Sensing (robot vision, force control, tactile sensing), applications of sensor-based robot control, robot programming, mobile robotics, and micro-robotics. prereq: Grad SEng major

SENG 5707. The Principles of Database Systems. (; 3 cr. ; A-F or Audit; Every Fall)
Fundamental concepts; representing instances; prototypic model shapes; model evolution; interviewing user skills, reverse engineering; mapping to DBMS schema; database querying. prereq: Grad SEng major

SENG 5708. Data Analytics. (; 2-3 cr. ; A-F or Audit; Every Spring)
Applications/motivation. Extended relational, object-relational, and object-oriented data models. Object identifier, types/constructors. Versions, schema evolution. Query language (e.g., recursion, path expressions). Object indices, buffer management, and other implementation issues. Triggers, rules, complex objects, and case studies. prereq: Grad SEng major

SENG 5709. Big Data Engineering and Analytics. (3 cr. ; A-F or Audit; Every Spring)
This course aims to teach students how to evaluate and engineer solutions that traditional data systems cannot handle, as well as various real-world use cases related to big data problems. This course will integrate theory and hands-on learning of various big data systems like NoSQL, streaming architectures, along with popular industry tools for scalable analytics. The focus of the course is largely around big data engineering, with some coverage of data science and analytics.

SENG 5801. Software Engineering I: Overview, Requirements, and Modeling. (; 3 cr. ; A-F or Audit; Every Fall)

Software engineering as a discipline. Preview of topics to be covered in subsequent courses in master of science in software engineering program; in-depth study of requirements engineering; modeling techniques applicable to requirements and specification, including UML and formal modeling. prereq: Grad SEng major

SENG 5802. Software Engineering II: Software Design. (; 3 cr. ; A-F or Audit; Every Spring)
Software design quality, processes that produce quality design, graphical and textual representations, including UML, common problems and patterns that solve them, refactoring. Students develop fluency in object-oriented design, and ability to read, critique, and advocate design ideas. Students work in teams to complete a multiphase project. prereq: Grad SEng major

SENG 5811. Software Testing and Verification. (; 3 cr. ; A-F or Audit; Every Spring)
Theoretical/practical aspects of testing software. Analyzing a requirements document for test conditions. Writing a test plan. Designing, creating, and executing test cases. Recording defects. Writing a test report. prereq: 5801, grad SEng major

SENG 5831. Software Development for Real-Time Systems. (; 2-3 cr. ; A-F or Audit; Periodic Fall)
Analysis, design, verification, and validation of real-time systems. Periodic, aperiodic, and sporadic processes, scheduling theory. Pragmatic issues. prereq: Grad SEng major

SENG 5841. Model-based Development. (; 3 cr. ; A-F or Audit; Every Spring)
Formal specification of software artifacts. Applicability of formal specifications. Methods such as Z, SCR, and Satecharts. Formal analysis. Theorem proving. Reachability analysis. Model checking. Tools such as PVS, Statemate, SPIN, and SMV. prereq: Grad SEng major

SENG 5851. Software Project Management. (; 3 cr. ; A-F or Audit; Every Fall & Spring)
Concepts used to manage software projects. Project management cycle: initiation, planning/control, status reporting, review, post-project analysis. Leadership and motivation strategies. Lecture, discussion, individual/team presentations/projects. prereq: Grad SEng major

SENG 5852. Quality Assurance and Process Improvement. (; 2 cr. [max 3 cr.] ; A-F or Audit; Every Fall & Spring)
Theory and application of capability maturity model: process assessment, modeling, and improvement techniques. Life cycle issues related to development and maintenance; quality, safety, and security assurance; project management; and automated support environments. Group projects and case studies. prereq: Grad SEng major

SENG 5861. Introduction to Software Architecture. (; 3 cr. ; A-F or Audit; Periodic Fall)
Software/systems architecture. Representation/design, how they fit into software engineering process. Description of architectures, including representation and quality attributes. prereq: 2nd year, MSSE grad student

SENG 5899. Software Engineering Seminar. (; 1 cr. [max 2 cr.] ; Student Option; Every Fall)
Software engineering trends. Talks by invited speakers, selected readings. prereq: Grad SEng major, instr consent

SENG 5900. Directed Study. (; 1-3 cr. ; Student Option; Every Fall & Spring)
Directed study/research in software engineering. Topics/scope decided in collaboration with instructor.

SENG 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

SENG 8494. Capstone Project (Plan B Project). (; 3 cr. ; S-N or Audit; Every Spring)
Students work in teams on software project using tools, techniques, and skills acquired during previous coursework. Each team works with a client to establish requirements, agree upon design, and achieve a successful acceptance test of resulting software system. prereq: SEng major

SENG 8891. Independent Project. (; 2-6 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Independent project arranged with faculty.

Soil, Water, and Climate (SOIL)

SOIL 5125. Soil Science for Teachers and Professionals. (; 4 cr. ; Student Option; Every Fall & Spring)
Basic physical, chemical, and biological properties of soil. Soil genesis classification, principles of soil fertility. Use of soil survey information to make a land-use plan. WWW used for lab preparation information.

SOIL 5232. Vadose Zone Hydrology. (; 3 cr. ; Student Option; Every Fall)
Basic soil physical properties/processes governing transport of mass/energy in soils. Emphasizes water/solute transport through unsaturated root/vadose zones, their impact on subsurface hydrology and on water quality. Lectures, hands-on laboratory exercises, discussion of real world problems, problem solving. prereq: [Math 1271 or equiv], [Phys 1042 or equiv]

SOIL 5555. Wetland Soils. (; 3 cr. ; A-F or Audit; Every Fall)
Morphology, chemistry, hydrology, formation of mineral/organic soils in wet environments. Soil morphological indicators of wet conditions, field techniques of identifying hydric soils for wetland delineations. Peatlands. Wetland benefits, preservation, regulation, mitigation. Field trips, lab, field hydric soil delineation project. prereq: SOIL 1125 or 2125 or equiv or instr consent; concurrent registration is required (or allowed) in SOIL 4511 recommended

SOIL 5611. Soil Biology and Fertility. (; 4 cr. ; Student Option; Every Fall)
Properties of microorganisms that impact soil fertility, structure, and quality. Nutrient requirements of microbes and plants, and mineral transformations in biogeochemical cycling. Symbiotic plant/microbe associations and their role in sustainable agricultural production. Biodegradation of pollutants and bioremediation approaches. prereq: Biol 1009 or equiv, Chem 1021 or equiv; Soil 2125 recommended

SOIL 5993. Directed Study. (1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
A course in which a student designs and carries out a directed study on selected topics or problems under the direction of a faculty member; eg, literature review. Directed study courses may be taken for variable credit and special permission is needed for enrollment. Students enrolling in a directed study will be required to use the University-wide on-line directed study contract process in order to enroll. Prereq: department consent, instructor consent, no more than 6 credits of directed study counts towards CFANS major requirements.

SOIL 5994. Directed Research. (1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
An opportunity in which a student designs and carries out a directed research project under the direction of a faculty member. Directed research may be taken for variable credit and special permission is needed for enrollment.Students enrolling in a directed research will be required to use the University-wide on-line directed research contract process in order to enroll. Prereq: department consent, instructor consent, no more than 6 credits of directed research counts towards CFANS major requirements.

SOIL 8005. Supervised Classroom or Extension Teaching Experience. (; 2 cr. ; S-N or Audit; Every Fall & Spring)
Teaching experience in one of five departments: Biosystems and Agricultural Engineering; Agronomy and Plant Genetics; Horticultural Science; Soil, Water, and Climate; or Plant Pathology. Participation in discussions about effective teaching to strengthen skills and develop a personal teaching philosophy. prereq: instr consent

SOIL 8110. Colloquium in Soil Science. (; 1-3 cr. [max 6 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Research or intellectual areas in soil science or climatology not covered in regular courses. Topics vary; contact department for current offerings.

SOIL 8123. Research Ethics in the Plant and Environmental Sciences. (; 0.5 cr. ; S-N or Audit; Every Spring)
History/values relating to research and scholarship. Social responsibility, reporting misconduct. Authorship. Plagiarism. Peer review. Copyright, intellectual property. Conflicts of interest. Research data management. Fiscal responsibility, management. Environmental health/safety.

Research involving humans/animals. Mentorship. Presentations by faculty and invited speakers. Meets during first seven weeks of spring semester. prereq: Enrolled in a plant/environmental sci grad research prog

SOIL 8252. Advanced Soil Physics. (; 2 cr. ; Student Option; Spring Even Year)
Advances in measurements/modeling of soil physical properties/processes as they relate to water, solute, heat movement in soils. Measuring/estimating hydraulic/thermal properties. Scaling, media concepts. Applying fractals. Analytical/numerical solutions of non-steady state heat/water flow equations. Analytical solutions of diffusion-dispersive equation for solute movement. Spatial variability in soil physical properties/processes. prereq: [5232, differential equations] or instr consent

SOIL 8510. Advanced Topics in Pedology. (; 2-4 cr. [max 12 cr.] ; A-F or Audit; Fall Odd Year)
Sample topics: soil-landscape relations, soil genesis, landscape evolution, land use and management, precision agriculture, digital terrain modeling, forest soils. prereq: 5515

Spanish (SPAN)

SPAN 5150. Contemporary Spanish Literature. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Major literary works/movements in Spain from 1915 to 2000. Neomodernism, surrealism, social realism, literatures of dictatorship/exile. Postmodernism. Poetry, novel, drama, essays, film, video/TV. Problems of literary history. prereq: Grad student or instr consent

SPAN 5160. Medieval Iberian Literatures and Cultures. (; 3 cr. ; Student Option; Periodic Fall & Spring)
The major literary genres developed in Spain from the Reconquest to 1502, with reference to the crucial transformations of the Middle Ages, including primitive lyric, epic, clerical narrative, storytelling, debates, collections, chronicles, "exempla," and the Celestina (1499-1502).

SPAN 5170. The Literature of the Spanish Empire and Its Decline. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Major Renaissance/Baroque works of Spanish Golden Age (16th-17th-century poetry, nonfiction prose, novel, drama) examined against historical background of internal economic decline, national crisis, ideological apparatus developed by modern state. prereq: Grad student or instr consent

SPAN 5180. Don Quixote. (; 3 cr. ; Student Option; Periodic Spring)
Analysis of Cervantes' [Don Quixote] in its sociohistorical context; focus on the novel's reception from the romantic period to postmodern times. prereq: Grad student or instr consent

SPAN 5190. The Crisis of the Old Regime: Spanish Literature of the Enlightenment and Romanticism. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Major literary works/intellectual movements/ conflicts represented in written culture, of 18th/ early 19th centuries (1680-1845), examined as expressions of long crisis of Spain's Old Regime and rise of bourgeois liberalism. prereq: Grad student or instr consent

SPAN 5550. Caribbean Literature: An Integral Approach. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Literature of Spanish-speaking Caribbean. Emphasizes historical legacy of slavery, African culture, independence struggles. prereq: Grad student or instr consent

SPAN 5560. Global Colonial Studies in the Hispanic World. (; 3 cr. ; Student Option; Periodic Fall & Summer)
Discourse production in Spanish America between 1492 and 1700. Conquest/colonial writing/counter writing. Historical origin, evolution, impact of cultural, political, socioeconomic factors. prereq: Grad student or instr consent

SPAN 5570. Nineteenth Century Latin America: Enlightened Thought, Nation Building, Literacy, Cultural Discourse. (; 3 cr. ; Student Option; Periodic Spring)
Political/economic contexts. Capitalism, liberalism, conservatism, their discursive media. Essay, journalism, literature, expression of everyday life. Wheels of commerce, progress, industrialization. Romanticism, realism, positivistic faith.

SPAN 5580. Latin American Cultural Integration in the Neocolonial Order. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Modernismo, historical vanguard, impact of populist politics in patterns of culture/literature. 1900-50. prereq: Grad student or instr consent

SPAN 5590. The Impact of Globalization in Latin American Discourses. (; 3 cr. ; Student Option; Every Fall & Spring)
Second half of 20th century critical culture. Neo-indigenism, new novel, poetry/antipoetry, theater/drama. Pragmatic search for past/ identity. Globalization, its impact in literature.

SPAN 5701. History of Ibero-Romance. (; 3 cr. ; Student Option; Periodic Spring)
Origins and developments of Ibero-Romance languages; evolution of Spanish, Portuguese, and Catalan. prereq: Grad student or instr consent

SPAN 5714. Theoretical Foundations of Spanish Syntax. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Linguistic types/processes that appear across languages. Grammatical relations, word order, transitivity, subordination, information structure, grammaticalization. How these are present in syntax of Spanish. prereq: Grad student or instr consent

SPAN 5716. Structure of Modern Spanish: Pragmatics. (3 cr. ; Student Option; Periodic Fall)
Concepts in current literature in Spanish pragmatics. Deixis, presupposition, conversational implicature, speech act theory, conversational structure. prereq: Grad student or instr consent

SPAN 5717. Spanish Sociolinguistics. (; 3 cr. ; Student Option; Periodic Spring)
Sociolinguistic variation, cross-dialectal diversity in different varieties of Spanish in Latin America and Spain. Impact of recent cultural, political, and socioeconomic transformations on language. prereq: Grad student or instr consent

SPAN 5718. Spanish Language Contact. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Analysis of different types/results of Spanish language contact globally, taking into account varying social conditions under which contact occurs. prereq: Grad student or instr consent

SPAN 5721. Spanish Laboratory Phonology. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Core literature on Spanish laboratory phonology. Phonology from a laboratory perspective. Students evaluate laboratory research methodologies, perform basic acoustic analyses, and design laboratory phonology studies. prereq: Grad student or instr consent

SPAN 5920. Topics in Spanish-American Studies. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Spanish-American literature analyzed according to important groups, movements, trends, methods, and genres. Specific approaches depend on topic and instructor. Topics specified in Class Schedule. prereq: Grad student or instr consent

SPAN 5930. Topics in Ibero-Romance Linguistics. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Spring & Summer)
Problems in Hispanic linguistics; a variety of approaches and methods.

SPAN 5985. Sociolinguistic Perspectives on Spanish in the United States. (; 3 cr. ; Student Option; Periodic Spring)
Sociolinguistic analysis of issues such as language maintenance/shift in U.S. Latino communities, code switching, attitudes of Spanish speakers toward varieties of Spanish and English, language change in bilingual communities, and language policy issues. prereq: Grad student or instr consent

SPAN 5991. The Acquisition of Spanish as a First and Second Language. (; 3 cr. ; Student Option; Periodic Spring)
Analysis of issues such as the acquisition of Spanish and English by bilingual children; Spanish in immersion settings; developmental sequences in Spanish; classroom language learners' attitudes, beliefs, and motivation; development of pragmatic competence. prereq: Grad student or instr consent

SPAN 5993. Directed Studies. (1-4 cr. [max 9 cr.] ; Student Option; Every Fall, Spring & Summer)
Students must submit reading plans for particular topics, figures, periods, or issues. Readings in Spanish and/or Spanish-American subjects. Students enrolling in this directed study/research course will complete the University's common Directed Study/Research contract with the faculty mentor/evaluator. The Faculty member will ensure academic

standards are upheld, including: - the work proposed is at the appropriate level for the course, academic in nature, and the student will be involved intellectually in the project. - the project scope is reasonable for one semester and the number of credits specified (42 hours of work per credit) - the faculty mentor is qualified to serve in this role - assessment of student learning and grading criteria are clear and appropriate - the student will be working in a respectful, inclusive environment prereq Grad student or instr consent.

SPAN 5994. Directed Research. (1-4 cr. [max 9 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed research. Students enrolling in this directed study/research course will complete the University's common Directed Study/ Research contract with the faculty mentor/ evaluator. The Faculty member will ensure academic standards are upheld, including: - the work proposed is at the appropriate level for the course, academic in nature, and the student will be involved intellectually in the project - the project scope is reasonable for one semester and the number of credits specified (42 hours of work per credit) - the faculty mentor is qualified to serve in this role - assessment of student learning and grading criteria are clear and appropriate - the student will be working in a respectful, inclusive environment prereq: Grad student or instr consent

SPAN 8100. Research in Sociohistorical Approaches to Spanish Literature. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall)
Sociohistorical functions of Spanish literary works and major theories concerning literary production of texts. Testing modern theories in terms of representative fictional discourses from specific historical periods. prereq: 5xxx courses in Span literature and culture

SPAN 8200. Spanish Literary Texts: Theories of Formal Structures. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall)
Advanced research in methods of literary analysis of discourse. Emphasizes theoretical and practical frameworks within which representative texts are analyzed and interpreted from differing perspectives. prereq: 5xxx courses in Span literature and culture

SPAN 8212. Spanish Theater of the 16th Century: Drama up to Lope. (; 3 cr. ; Student Option; Periodic Fall)
Medieval origins of drama to [La Celestina] (1499-1502), pastoral dialogues, crossover plays of Spanish and Portuguese dramatists, popular theater up to emerging public and private theaters under Italian influence. Rojas, Encina, Vicente, Naharro, Cervantes, and new tragedians. prereq: 5xxx courses in Span literature and culture

SPAN 8223. The Poetry of the Spanish Golden Age. (; 3 cr. ; Student Option; Periodic Fall)
New Spanish poetic forms, from Garcilaso de Le[?]n, mystics, and San Juan to Baroque trends by G[?]ngora, Lope, and Quevedo. Classic traditions and modern adaptations. Ideological foundations of lyric genres--eclogue, lira, mystics, satire, conceptismo/ culteranismo, and sonnet. prereq: 5xxx courses in Span literature and culture

SPAN 8300. The Construction of Spanish Literary History. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall)
Origins and development of Hispanic literary canon: sociocultural theories of Spanish literary histories as academic and historiographic disciplines. Critiques of modern literary theories through analysis of literary works by major writers. prereq: Two 5xxx courses in Span literature and culture

SPAN 8312. Two Spanish Masterpieces: [Libro de Buen Amor] and [La Celestina]. (; 3 cr. ; Student Option; Periodic Fall)
Cultural reappraisal of the late Middle Ages by reference to two Spanish masterpieces: the Archpriest's [Book of True Love] and Rojas' [La Celestina] (1499-1502). Emphasizes historical function of varied genres, motifs, and sources adapted by the authors. prereq: 5106, 5107 or 5xxx course in Portuguese

SPAN 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

SPAN 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

SPAN 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

SPAN 8710. Seminar in Hispanic Linguistics. (; 3 cr. [max 9 cr.] ; Student Option; Fall Even Year)
Critical examination of readings/research on specific topic. prereq: 5711, [Ling 5302 or instr consent]

SPAN 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

SPAN 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

SPAN 8900. Spanish Seminar. (; 3 cr. [max 9 cr.] ; Student Option; Every Fall, Spring & Summer)
Projects relying heavily on advanced research in Spanish problems. Investigation of assigned fields, analysis of problems, appraisal of principles. Limited to small group of students. For list of sample seminars, consult department and director of graduate studies. prereq: Span 5xxx series required for MA or instr consent

SPAN 8940. Advanced Research in Spanish-American Literary Historiography. (; 3 cr. [max 9 cr.] ; Student Option;)
Sources and procedures that have given rise to institutionalizations of Spanish-American literary history. Evaluation and review of epistemological principles and assumptions in theory of literary criticism and histories of literature.

SPAN 8960. Workshop: Research in Hispanic Cultural Issues. (; 3 cr. [max 9 cr.] ; A-F or Audit; Every Fall, Spring & Summer)
Individualized support and advice in framing, theorizing, problematizing, and interpreting areas of cultural research. Taught in Spanish, Portuguese, and English. prereq: Reading knowledge of Spanish and Portuguese

SPAN 8990. Advanced Comparative Research of Caribbean Genres. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall)
Major literary works and genres of Caribbean literature studied against the background of sociohistorical vicissitudes of the process leading to the formation and consolidation of the national states. prereq: 5525 or instr consent

Spanish and Portuguese (SPPT)

SPPT 5930. Selected Topics in Hispanic and Lusophone Cultural Discourse. (; 1-3 cr. [max 9 cr.] ; A-F or Audit; Periodic Fall & Spring)
Cultural discourses in Spanish- and Portuguese-speaking areas. Historical intersections/divergences. Taught in Spanish or Portuguese, and in English when cross-listed. Topics specified in Class Schedule. prereq: Reading knowledge of Spanish and Portuguese

SPPT 5995. Directed Teaching. (1 cr. ; S-N only; Every Fall)
Taken in conjunction with SPPT 5999. Language acquisition theory as applied to foreign language instruction at college level. How current theory translates into practice through hands-on practical application particular to communicative language instruction practiced in Department of Spanish/ Portuguese Studies. prereq: Grad student with concurrent enrollment in 5999

SPPT 5999. The Teaching of College-Level Spanish: Theory and Practice. (; 3 cr. ; Student Option; Every Fall)
Theoretical grounding in the general principles of second language acquisition and guidance with their practical applications to the teaching of first- and second-year Spanish at the college-level. prereq: Grad or instr consent

SPPT 8400. Topics in Modern Hispanic and Lusophone Culture. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Advanced research in methods of analysis of cultural products, including but not limited to

literature. Emphasizes historical, ideological, and theoretical frameworks within which representative texts/events may be interpreted. prereq: Three 5xxx SPAN or PORT courses

SPPT 8920. Introduction to Hispanic and Lusophone Literatures, Cultures, and Languages. (; 2 cr. [max 9 cr.] ; S-N only; Every Spring)
This two-credit seminar will familiarize beginning doctoral students in the areas of Hispanic/Lusophone literary and cultural studies and Hispanic linguistics. Course must be taken during spring semester of the first year. Topics to be covered include: expected milestones and progress prior to reaching ABD status; methods for writing conference abstracts and presentations; the basics of academic writing in cultural studies and linguistics; how to transform a seminar paper into a publishable piece of scholarship; best practices for determining appropriate conference and publication venues; how to start formulating a dissertation project in the early stages of the graduate career; tactics for requesting funding and completing scholarship/grant applications; collegiality and professionalism in the discipline prereq: Graduate Student

SPPT 8930. Dissertation & Professionalization Workshop. (; 1 cr. [max 6 cr.] ; S-N only; Every Spring)
Critical/supportive forum for issues related to dissertation research/writing. Conceptualizing the dissertation. Shaping one's topic. Audience. Uses of language. Feedback. Producing the dissertation prospectus. prereq: Grad student, instr consent

Speech-Language-Hearing Sci (SLHS)

SLHS 5401. Counseling and Professional Issues. (; 3 cr. ; Student Option; Every Fall)
Basic counseling principles and current professional issues related to practice in a dynamic multicultural environment. Application of counseling theory to clinical practice. Analysis of regulation, practice, and future direction of communication disorders. prereq: [[concurrent registration is required (or allowed) in 8720 or concurrent registration is required (or allowed) in 8820], grad student] recommended

SLHS 5502. Voice and Cleft Palate. (3 cr. ; Student Option; Every Spring)
Disordered voice and resonance. Presentation and discussion of the nature of etiologies, assessment and management of organic/functional voice disorders and cleft palate to meet clinical competencies for speech-language pathology. prereq: [3305, 4301] or [CDis 3305, CDis 4301] or instr consent

SLHS 5503. Stuttering Motor Speech Disorders. (; 3 cr. ; Student Option; Every Fall)
SLHS 5503 is designed for graduate students who wish to increase their understanding of stuttering and motor speech disorders. Its goal is to provide students with a strong foundation on the basics of the physiology, diagnosis, assessment, and treatment of these communication disorders and to provide working knowledge of current trends in related fields. prereq: graduate SLHS student or department permission, [3305, 4301] or instr consent

SLHS 5504. Evaluation and Management of Dysphagia. (3 cr. ; Student Option; Every Fall)
Normal/disordered aspects of swallowing. Nature, etiologies, evaluation, management of swallowing disorders.

SLHS 5602. Speech Sound Disorders: Assessment and Treatment across Languages. (3 cr. ; Student Option; Every Fall)
Nature, assessment, and treatment of speech sound disorders in children. Assessment and treatment of phonological awareness and pre-literacy skills. This course covers cross-linguistic issues in speech sound disorders, including characteristics of speech sound disorders in a variety of languages, and the differential diagnosis of speech sound disorder from the effects of normal second-language acquisition. Emphasis on functional speech sound disorders, with some coverage given to disorders of a clear organic origin, like cerebral palsy, hearing impairment, and cleft palate. prereq: [3303, 3304, 4601] or instr consent

SLHS 5603. Assessment and Intervention of Language Disorders in Children. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Assessment and intervention techniques approaches for treating language impairment in children with disabilities, such as specific language impairment, developmental delays, and autism spectrum disorder. prereq: 3303 or CDis 3303 or equiv or grad student or instr consent

SLHS 5605. Language and Cognitive Disorders in Adults. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Acquired cognitive and communicative disorders in the adult population specifically including: stroke/aphasia, right hemisphere dysfunction, traumatic brain injury, and dementia. Consideration of neurological substrates, disorder symptomology, assessment, clinical intervention, and functional impact across the lifespan and amongst diverse populations. prereq: [3302, 4301] or [CDis 3302, CDis 4301] or instr consent

SLHS 5606. Introduction to Augmentative and Alternative Communication. (; 3 cr. ; Student Option; Every Fall & Spring)
Description of the range of augmentative and alternative communication applications for persons with developmental and acquired disabilities. Topics include assessment, intervention strategies, progress monitoring, generalization, and maintenance; collateral behavior resulting from AAC applications.

SLHS 5609. Child Language Disorders in Diverse Populations. (3 cr. [max 6 cr.] ; Student Option; Every Spring)
This course covers topics across three broad areas of child language: cultural and linguistic diversity, early intervention, and social communication. The first section will address multicultural issues and bilingualism. The second section will focus on assessment and treatment of language disorders from birth through preschool. Finally, we will address the assessment and treatment of social communication and pragmatic language deficits across disorders and developmental levels, including early prelinguistic communication The course will include both theoretically and clinically motivated content.

SLHS 5801. Advanced Audiologic Assessment. (; 3 cr. ; Student Option; Every Fall)
Basic audiometric battery, including pure tone thresholds, measures of speech understanding, masking and immittance in adults. Topics include video ostoscopy, ototoxicity, functional hearing loss, and identification of middle-ear fluid. Students enrolled in this course concurrently enroll in SLHS 5810. prereq: 4801 or CDis 4801 or instr consent

SLHS 5802. Hearing Aids I. (; 3 cr. ; Student Option; Every Fall)
Survey of modern hearing aids including history of development, electroacoustic functions, clinic and laboratory measurement techniques, sound field acoustics, techniques for selection. prereq: [[3305, 4801] or [CDIS 3305, CDIS 4801], SLHS grad] or instr consent

SLHS 5803. Pediatric Audiology. (; 3 cr. ; Student Option; Fall Odd Year)
Behavioral, physiological approaches to assessment and identification, development of the auditory mechanism, etiologies of hearing losses in infants, children, principles of case management with children and families. prereq: [[4801 or CDIS 4801], SLHS grad] or instr consent

SLHS 5804. Cochlear Implants. (; 3 cr. ; A-F or Audit; Spring Odd Year)
Implantable auditory prostheses. History of device development, including cochlear implants and auditory brainstem implants. Signal processing. Techniques for selection, fitting, and rehabilitation. Behavioral/physiological changes across life span. prereq: [[4802, 5801, 5802] or [CDIS 4802, CDIS 5801, CDIS 5802], SLHS grad] or instr consent

SLHS 5805. Advanced Rehabilitative Audiology. (; 3 cr. ; A-F only; Spring Even Year)
Analysis of speech perception/production. Communication skills/strategies. Sensory modalities. Rehabilitative techniques in adults, children, and infants with hearing losses. Tinnitus management. Audiology telepractice.

SLHS 5806. Auditory Disorders in Children. (3 cr. ; A-F or Audit; Every Fall)
In this course students learn about assessing hearing and listening difficulties in children ? beyond the audiogram?, as well as the pediatric-specific considerations for intervention and management of identified hearing difficulties. This course covers the anatomy and physiology of the central auditory pathway,

assessments to evaluate auditory disorders and processing skills, and techniques to address auditory processing weaknesses and disorders in children. Additional topics include normal and disordered auditory processing abilities, current and historical theories and controversies surrounding auditory assessment beyond the audiogram, and advances in the assessment and management of childhood hearing disorders. prereq: [4802 or CDIS 4802, SLHS grad] or instr consent

SLHS 5807. Noise and Hearing Conservation. (; 3 cr. ; A-F or Audit; Every Fall)
Students in this course will learn to: Describe the auditory and nonauditory effects of noise on humans, Design a successful hearing conservation program, Measure noise levels in a variety of settings, Monitor hearing, Measure hearing protection devices, Develop educational materials, and Describe federal and state regulations as they relate to hearing conservation. prereq: [8801, 8802] or [CDis 8801, CDis 8802]

SLHS 5808. Pathophysiology of Hearing Disorders. (; 3 cr. ; A-F or Audit; Fall Odd Year)
Disorders of auditory system, including anatomical, physiological, perceptual, and audiological manifestations of pathologies affecting hearing. Focus will be on understanding current data on physiology, pharmacology, and novel treatment alternatives prereq: [[8801, 8802] or [CDIS 8801, CDIS 8802], SLHS grad] or instr consent

SLHS 5810. Laboratory Module in Audiology. (; 1-2 cr. [max 10 cr.] ; A-F only; Every Fall & Spring)
Intensive study of clinical methods in audiology. Supplements didactic courses in audiology curriculum. Laboratory study, individually or in small groups. Students enroll in this course concurrently with SLHS 5801, 5802, 8801, 8802. prereq: [4801 or CDIS 4801, SLHS grad] or instr consent

SLHS 5820. Clinical Research and Practice: Grand Rounds. (; 1-6 cr. ; S-N or Audit; Every Fall & Spring)
Group discussions of current professional issues in audiology. Case presentations, guest presentations on current technology, clinical/research ethics. Group meets for an hour weekly with faculty coordinator who leads discussion. Integrates academic/clinical education. prereq: [[4801 or CDIS 4801 or equiv], SLHS grad] or instr consent

SLHS 5830. Clinical Foundations in Audiology. (; 1-8 cr. [max 24 cr.] ; S-N or Audit; Every Fall & Spring)
Clinical foundations in audiology for first year AuD graduate students. prereq: Grad SLHS major

SLHS 5900. Trends in Telepractice in Communication Sciences and Disorders. (; 2 cr. [max 4 cr.] ; Student Option; Periodic Fall & Spring)
Topics listed in Speech-Language-Hearing Sciences office. prereq: SLHS grad student or instr consent

SLHS 5993. Directed Study. (; 1-12 cr. [max 18 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed readings and preparation of reports on selected topics. prereq: SLHS grad or instr consent Students enrolling in this directed study/research course will complete the University's common Directed Study/Research contract with the faculty mentor/evaluator. The Faculty member will ensure academic standards are upheld, including: *the work proposed is at the appropriate level for the course, academic in nature, and the student will be involved intellectually in the project. *the project scope is reasonable for one semester and the number of credits specified (42 hours of work per credit) *the faculty mentor is qualified to serve in this role *assessment of student learning and grading criteria are clear and appropriate *the student will be working in a respectful, inclusive environment

SLHS 8111. Directed Readings in Speech-Language-Hearing Sciences. (1-3 cr. [max 18 cr.] ; Student Option; Every Fall, Spring & Summer)
Readings appropriate to an individual student's program or objectives that are not available in regular courses.

SLHS 8112. Supervised Laboratory Experience. (1-2 cr. [max 12 cr.] ; S-N only; Every Fall, Spring & Summer)
Training/experience conducting lab activities in Speech-Language-Hearing Sciences. Students select a faculty member to serve as their sponsor and prepare/conduct lab research/ presentations.

SLHS 8113. Supervised Teaching Experience. (1-2 cr. [max 12 cr.] ; S-N only; Every Fall, Spring & Summer)
Training/experience conducting educational activities in Speech-Language-Hearing Sciences. Students select a faculty member to serve as their sponsor and prepare/execute educational presentations.

SLHS 8333. FTE: Masters. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

SLHS 8410. Seminar: Research. (3 cr. ; Student Option; Periodic Fall & Spring)
Advanced study exploring application of experimental and quasi-experimental research designs used in single-subject and group research.

SLHS 8420. Seminar: Teaching. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Advanced study to prepare doctoral students for careers in undergraduate and graduate teaching. prereq: Grad com dis major

SLHS 8430. Proseminar in Speech-Language-Hearing Sciences. (; 1-6 cr. [max 60 cr.] ; S-N only; Every Fall & Spring)
Presentations/discussions led by faculty and PhD students in the department, based on research or issues in the discipline.

SLHS 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

SLHS 8501. Interdisciplinary Management in Cleft Palate and Craniofacial Disorders. (; 3 cr. ; Student Option; Every Fall)
Communication problems associated with cleft palate and craniofacial disorders within interdisciplinary context; structural bases for speech problems, and physical and behavioral approaches to speech treatment; interdisciplinary medical and dental concerns and management. prereq: 3305 or CDis 3305 or instr consent

SLHS 8530. Seminar: Speech. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Advanced study and analysis of research in speech science and speech pathology.

SLHS 8602. Traumatic Brain Injury. (; 3 cr. ; Student Option; Periodic Fall)
Survey of communicative and cognitive disorders in adults who have traumatic brain injuries. Demographics, neuropathologic substrates, assessment and diagnosis, clinical applications. prereq: [3302, 4301] or [CDis 3302, CDis 4301] or instr consent

SLHS 8630. Seminar: Language. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Research in language acquisition, language science, and language disorders.

SLHS 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

SLHS 8720. Clinical Education in Speech-Language Pathology. (1-8 cr. [max 24 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Clinical experience. Prereq Grad CDis major, adviser, DGS consent.

SLHS 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

SLHS 8801. Electrophysiologic Assessment of Auditory Function. (; 3 cr. ; Student Option; Every Spring)
Basic terminology and theoretical aspects of the auditory evoked potentials, electrocochleography, acoustic reflectance, and otoacoustic emissions. Topics include case studies with clinical application of short-latency responses such as the auditory brainstem response and otoacoustic emissions in adults. Students enrolled in this course concurrently enroll in SLHS 5810. prereq: 5801 or CDis 5801 or instr consent

SLHS 8802. Hearing Aids II. (; 3 cr. ; Student Option; Every Spring)
Instrumentation and methods for fitting and evaluating personal hearing aids; ear

impression techniques and materials; repair and modification of hearing aids. prereq: 5802 or Cdis 5802 or instr consent

SLHS 8803. Signals and Systems in Audiology. (; 3 cr. ; Student Option; Fall Even Year)
This mostly laboratory class includes familiarization and application of test equipment and methods for calibrating audiometric equipment. Sessions will include topics such as sound-field calibration, earphone calibration, filters, spectra of transient signals, and use of an artificial mastoid. prereq: [3305, 3306, 4801] or [CDis 3305, CDis 3306, CDis 4801] or instr consent

SLHS 8805. Hearing Science Foundations of Audiology. (; 3 cr. ; Student Option; Fall Odd Year)
Physiological/psychological acoustics. Emphasizes hearing loss. Acoustics of the middle and external ear, cochlear mechanics, neural codes for perception, frequency selectivity, loudness, temporal resolution, clear speech, attention, prediction of speech understanding ability using stimulus measures, and binaural hearing. prereq: Knowledge of acoustics, basic anatomy/physiology of ear, intro coursework in hearing/speech science

SLHS 8806. Audiology Capstone. (; 1-6 cr. ; S-N or Audit; Periodic Fall)
Students research a case history of patient with an auditory disorder, write paper that summarizes the literature on the disorder, and recommend assessment tools and treatment plans. prereq: 8802, 8807

SLHS 8807. Balance Assessment. (3 cr. ; Student Option; Every Spring)
Anatomy/physiology of vestibular mechanism. Assessment techniques to evaluate balance function. Treatment options available for persons with balance disorders. prereq: 5801, 8801

SLHS 8820. Clinical Education in Audiology. (; 1-8 cr. [max 24 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Clinical experience. prereq: Grad CDis major

SLHS 8830. Seminar: Hearing. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall, Spring & Summer)
Advanced study/analysis of research in hearing science and audiology.

SLHS 8840. Audiology Externship. (; 1-8 cr. [max 24 cr.] ; S-N or Audit; Periodic Fall & Spring)
Students intern at external clinical setting under supervision of certified audiologist. Entry-level knowledge and skills required for professional practice as clinical audiologist. External internship settings may include hospitals, schools, private otolaryngology practices, hearing aid dispensing practices, industrial settings, or community clinics. prereq: [8802, 8807] or [CDIS 8802, CDIS 8807]

SLHS 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required.

SLHS 8994. Directed Research. (; 1-12 cr. [max 18 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed research prereq: instr consent

Statistics (STAT)

STAT 5021. Statistical Analysis. (; 4 cr. ; Student Option; Every Fall & Spring)
Intensive introduction to statistical methods for graduate students needing statistics as a research technique. prereq: college algebra or instr consent; credit will not be granted if credit has been received for STAT 3011

STAT 5052. Statistical and Machine Learning. (3 cr. [max 4 cr.] ; A-F only; Every Fall)
The material covered will be the foundations of modern machine learning methods including regularization methods, discriminant analysis, neural nets, random forest, bagging, boosting, support vector machine, and clustering. Model comparison using cross-validation and bootstrap methods will be emphasized.

STAT 5101. Theory of Statistics I. (; 4 cr. ; Student Option; Every Fall)
Logical development of probability, basic issues in statistics. Probability spaces. Random variables, their distributions and expected values. Law of large numbers, central limit theorem, generating functions, multivariate normal distribution. prereq: (MATH 2263 or MATH 2374 or MATH 2573H), (CSCI 2033 or MATH 2373 or MATH 2243)

STAT 5102. Theory of Statistics II. (; 4 cr. ; Student Option; Every Fall & Spring)
Sampling, sufficiency, estimation, test of hypotheses, size/power. Categorical data. Contingency tables. Linear models. Decision theory. prereq: 5101 or Math 5651

STAT 5201. Sampling Methodology in Finite Populations. (; 3 cr. ; Student Option; Every Spring)
Simple random, systematic, stratified, unequal probability sampling. Ratio, model based estimation. Single stage, multistage, adaptive cluster sampling. Spatial sampling. prereq: 3022 or 3032 or 3301 or 4102 or 5021 or 5102 or instr consent

STAT 5302. Applied Regression Analysis. (; 4 cr. ; Student Option; Every Fall, Spring & Summer)
Simple, multiple, and polynomial regression. Estimation, testing, prediction. Use of graphics in regression. Stepwise and other numerical methods. Weighted least squares, nonlinear models, response surfaces. Experimental research/applications. prereq: 3032 or 3022 or 4102 or 5021 or 5102 or instr consent Please note this course generally does not count in the Statistical Practice BA or Statistical Science BS degrees. Please consult with a department advisor with questions.

STAT 5303. Designing Experiments. (; 4 cr. ; Student Option; Every Fall, Spring & Summer)
Analysis of variance. Multiple comparisons. Variance-stabilizing transformations. Contrasts. Construction/analysis of complete/incomplete block designs. Fractional factorial designs. Confounding split plots. Response surface design. prereq: 3022 or 3032 or 3301 or 4102 or 5021 or 5102 or instr consent

STAT 5401. Applied Multivariate Methods. (; 3 cr. ; Student Option; Periodic Fall)
Bivariate and multivariate distributions. Multivariate normal distributions. Analysis of multivariate linear models. Repeated measures, growth curve, and profile analysis. Canonical correlation analysis. Principal components and factor analysis. Discrimination, classification, and clustering. pre-req: STAT 3032 or 3301 or 3022 or 4102 or 5021 or 5102 or instr consent Although not a formal prerequisite of this course, students are encouraged to have familiarity with linear algebra prior to enrolling. Please consult with a department advisor with questions.

STAT 5421. Analysis of Categorical Data. (; 3 cr. ; Student Option; Every Fall & Spring)
Varieties of categorical data, cross-classifications, contingency tables. Tests for independence. Combining 2x2 tables. Multidimensional tables/loglinear models. Maximum-likelihood estimation. Tests for goodness of fit. Logistic regression. Generalized linear/multinomial-response models. prereq: STAT 3022 or 3032 or 3301 or 5302 or 4051 or 8051 or 5102 or 4102

STAT 5511. Time Series Analysis. (; 3 cr. ; Student Option; Every Fall)
Characteristics of time series. Stationarity. Second-order descriptions, time-domain representation, ARIMA/GARCH models. Frequency domain representation. Univariate/multivariate time series analysis. Periodograms, non parametric spectral estimation. State-space models. prereq: STAT 4102 or STAT 5102

STAT 5601. Nonparametric Methods. (; 3 cr. ; Student Option; Every Fall & Spring)
Order statistics. Classical rank-based procedures (e.g., Wilcoxon, Kruskal-Wallis). Goodness of fit. Topics may include smoothing, bootstrap, and generalized linear models. prereq: Stat classes 3032 or 3022 or 4102 or 5021 or 5102 or instr consent

STAT 5701. Statistical Computing. (3 cr. ; A-F or Audit; Every Fall)
Statistical programming, function writing, graphics using high-level statistical computing languages. Data management, parallel computing, version control, simulation studies, power calculations. Using optimization to fit statistical models. Monte Carlo methods, reproducible research. prereq: (Stat 5102 or Stat 8102) and (Stat 5302 or STAT 8051) or consent

STAT 5731. Bayesian Astrostatistics. (4 cr. ; A-F only; Every Fall)
This course will introduce Bayesian methods for interpreting and analyzing large data sets from astrophysical experiments. These methods will be demonstrated using astrophysics real-world data sets and a focus on modern statistical software, such as R and python. Prerequisites: MATH 2263 and MATH 2243, or equivalent; or instructor consent Suggested: statistical course at the level of

AST 4031, AST 5031, STAT 3021, or STAT 5021

STAT 5931. Topics in Statistics. (; 3 cr. ; Student Option; Periodic Fall)
Topics vary according to student needs and available staff.

STAT 5993. Tutorial. (; 1-6 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed study in areas not covered by regular offerings. prereq: instr consent

STAT 8051. Advanced Regression Techniques: linear, nonlinear and nonparametric methods. (3 cr. ; A-F or Audit; Every Fall)
Linear/generalized linear models, modern regression methods including nonparametric regression, generalized additive models, splines/basis function methods, regularization, bootstrap/other resampling-based inference. prereq: Statistics grad or instr consent prereq: Statistics grad or instr consent

STAT 8052. Applied Statistical Methods 2: Design of Experiments and Mixed -Effects Modeling. (3 cr. ; A-F or Audit; Every Spring)
Design experiments/analyze data with fixed effects, random/mixed effects models. ANOVA for factorial designs. Contrasts, multiple comparisons, power/sample size, confounding, fractional factorials. Computer-generated designs. Response surfaces. Multi-level models. Generalized estimating equations (GEE) for longitudinal data with non-normal errors. prereq: 8051 or instr consent

STAT 8053. Applied Statistical Methods 3: Multivariate Analysis and Advanced Regression. (3 cr. ; A-F or Audit; Every Fall)
Standard multivariate analysis. Multivariate linear model, classification, clustering, principal components, factor analysis, canonical correlation. Topics in advanced regression. prereq: PhD student in stat or DGS permission and 8052

STAT 8054. Statistical Methods 4: Advanced Statistical Computing. (3 cr. ; A-F or Audit; Every Spring)
Optimization, numerical integration, Markov chain Monte Carlo, related topics. prereq: STAT 8053 or instr consent

STAT 8055. Applied Project. (; 2 cr. ; S-N only; Every Fall)
Collaborative applied statistical practice with a member of University community, including consulting, problem solving, presentation/ documentation of results. prereq: [8054, 8801] or instr consent

STAT 8056. Statistical Learning and Data Mining. (3 cr. ; Student Option No Audit; Periodic Spring)
STAT8056 covers a range of emerging topics in machine learning and data science, including high-dimensional analysis, recommender systems, undirected and directed graphical models, feed-forward networks, and unstructured data analysis. This course will introduce various statistical and computational techniques for prediction and inference. These techniques are directly applicable to many fields, such as business, engineering, and bioinformatics. This course requires the basic knowledge of machine learning and data mining (e.g., STAT8053).

STAT 8101. Theory of Statistics 1. (3 cr. ; Student Option; Every Fall)
Review of linear algebra. Introduction to probability theory. Random variables, their transformations/expectations. Standard distributions, including multivariate Normal distribution. Probability inequalities. Convergence concepts, including laws of large numbers, Central Limit Theorem. delta method. Sampling distributions. prereq: Statistics grad major or instr consent

STAT 8102. Theory of Statistics 2. (3 cr. ; Student Option; Every Spring)
Statistical inference. Sufficiency. Likelihood-based methods. Point estimation. Confidence intervals. Neyman Pearson hypothesis testing theory. Introduction to theory of linear models. prereq: 8101, Statistics graduate major or instr consent

STAT 8111. Mathematical Statistics I. (; 3 cr. ; Student Option; Every Fall)
Probability theory, basic inequalities, characteristic functions, and exchangeability. Multivariate normal distribution. Exponential family. Decision theory, admissibility, and Bayes rules. prereq: [5102 or 8102 or instr consent], [[Math 5615, Math 5616] or real analysis], matrix algebra

STAT 8112. Mathematical Statistics II. (; 3 cr. ; Student Option; Every Spring)
Statistical inference, estimation, and hypothesis testing. Convergence and relationship between convergence modes. Asymptotics of maximum likelihood estimators, distribution functions, quantiles. Delta method. prereq: 8111

STAT 8141. Probability Assessment. (; 3 cr. ; Student Option; Periodic Spring)
Probability as a language of uncertainty for quantifying and communicating expert opinion and for use as Bayesian prior distributions. Methods for elicitation and construction of subjective probabilities. De Finetti coherence, predictive elicitation, fitting subjective-probability models, computer-aided elicitation, and use of experts. prereq: 5102

STAT 8171. Sequential Analysis. (; 3 cr. ; Student Option; Periodic Fall)
Walds's sequential probability ratio test and modifications. Sequential decision theory. Martingales. Sequential estimation, design, and hypothesis testing. Recent developments. prereq: 8112

STAT 8311. Linear Models. (; 3 cr. [max 4 cr.] ; Student Option; Every Fall)
General linear model theory from a coordinate-free geometric approach. Distribution theory, ANOVA tables, testing, confidence statements, mixed models, covariance structures, variance components estimation. prereq: Linear algebra, 5102 or 8102 or instr consent

STAT 8312. Linear and Nonlinear Regression. (; 3 cr. ; Student Option; Periodic Fall)
Nonlinear regression: asymptotic theory, Bates-Watts curvatures, super leverage, parameter plots, projected residuals, transform-both-sides methodology, Wald versus likelihood inference. Topics in linear and generalized linear models as they relate to nonlinearity issues, including diagnostics, semi-parametric models, and model assessment. prereq: 8311

STAT 8321. Regression Graphics. (; 3 cr. ; Student Option; Periodic Fall)
Foundations: dimension-reduction subspaces, Li-Duan Lemma, structural dimension. Inferring about central dimension-reduction subspaces by using 3D plots, graphical regression, inverse regression graphics, net-effect plots, principal Hessian directions, sliced inverse regression and predictor transformations. Graphics for model assessment. prereq: 8311

STAT 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

STAT 8401. Topics in Multivariate Methods. (; 3 cr. ; Student Option; Every Fall)
Bivariate and multivariate distributions. Multivariate normal distributions. Hotellings's T-squared, MANOVA, MANCOVA, and regression with multivariate dependent variable. Repeated measures, growth curve, and profile analysis. Canonical correlation analysis. Principle components and factor analysis. Discrimination, classification, clustering. prereq: 8311

STAT 8411. Multivariate Analysis. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Multivariate normal distribution. Inference on the mean, covariance, and correlation and regression coefficients; related sampling distributions such as Hotelling's T-squared and Wishart distributions. Multivariate analysis of variance. Principal components and canonical correlation. Discriminant analysis. prereq: 8152

STAT 8421. Theory of Categorical Data Analysis. (; 3 cr. ; Student Option; Periodic Fall)
Categorical data, multidimensional cross-classified arrays, mixed categorical and continuous data. Loglinear, logit, and multinomial response models. Ordinal responses. Current research topics. prereq: 8062 or instr consent

STAT 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

STAT 8501. Introduction to Stochastic Processes with Applications. (; 3 cr. ; Student Option; Periodic Fall)
Markov chains in discrete and continuous time, renewal processes, Poisson process, Brownian motion, and other stochastic models encountered in applications. prereq: 5101 or 8101

STAT 8511. Time Series Analysis. (; 3 cr. ; Student Option; Periodic Fall)
Characteristics of time series. Stationarity. Second-order descriptions. Time-domain representation, ARIMA/GARCH models. Frequency domain representation, univariate/ multivariate analysis. Periodograms, non-parametric spectral estimation, state space models. prereq: 5102 or 8111 or instr consent

STAT 8666. Doct Pre-Thesis Cr. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

STAT 8701. Computational Statistical Methods. (; 3 cr. ; Student Option; Every Spring)
Random variate generation, variance reduction techniques. Robust location estimation and regression, smoothing additive models, regression trees. Programming projects; basic programming ability and familiarity with standard high-level language (preferably FORTRAN or C) are essential. prereq: 8311, programming exper

STAT 8721. Programming Paradigms and Dynamic Graphics in Statistics. (; 3 cr. ; Student Option; Periodic Fall)
Alternative programming paradigms to traditional procedural programming, including object-oriented programming and functional programming. Applications to development of dynamic statistical graphs and representation and use of functional data, such as mean function in nonlinear regression log likelihoods and prior densities in Bayesian analysis. prereq: 8062, 8102

STAT 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

STAT 8801. Statistical Consulting. (3 cr. ; S-N or Audit; Every Spring)
Principles of effective consulting/problem-solving, meeting skills, reporting. Aspects of professional practice/behavior, ethics, continuing education. prereq: STAT 8051 and STAT Grad Student or Instructor Consent

STAT 8811. Statistical Consulting Practicum. (; 3 cr. [max 12 cr.] ; S-N or Audit; Every Fall & Spring)
Providing (under faculty supervision) statistical support to clients, primarily University researchers. Exercises in problem solving, ethics, listening/communication skills. prereq: Statistics grad student or instr consent

STAT 8821. Curricular Practical Training. (1 cr. [max 3 cr.] ; S-N only; Every Fall, Spring & Summer)
Industrial work assignment using advanced statistical techniques. Grade based on final report and presentation covering work assignment. prereq: Statistics grad student, dept consent

STAT 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

STAT 8900. Student Seminar. (; 1 cr. [max 2 cr.] ; S-N or Audit; Every Fall & Spring)
Preparation or presentation of seminar on statistical topics. prereq: Statistics graduate student

STAT 8913. Literature Seminar. (; 1 cr. [max 4 cr.] ; S-N only; Every Fall & Spring)
Students will read, present, discuss, and critique current literature/research. prereq: Statistics grad major or instr consent

STAT 8931. Advanced Topics in Statistics. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Topics vary according to student needs/ available staff.

STAT 8932. Advanced Topics in Statistics. (; 3 cr. [max 12 cr.] ; Student Option; Periodic Fall & Spring)
Topics vary according to student needs/ available staff.

STAT 8933. Advanced Topics in Statistics. (; 3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Topics vary according to student needs and available staff.

STAT 8992. Directed Readings and Research. (; 1-6 cr. [max 12 cr.] ; Student Option; Every Fall, Spring & Summer)
Directed study in areas not covered by regular offerings. prereq: instr consent

Stem Cell Biology (SCB)

SCB 5051. Stem Cell Biology Practical Training Module. (1 cr. ; A-F only; Every Fall)
Intensive two-week course. Hands-on instruction in techniques of tissue culture. Conventional, fluorescence, and confocal microscopy. Flow cytometry for both analysis of cell populations and sorting of cells. prereq: Acceptance into stem cell biology master's program

SCB 5054. Stem Cell Institute Research Seminar and Journal Club. (; 2 cr. [max 6 cr.] ; A-F or Audit; Every Fall & Spring)
Students attend weekly Stem Cell Institute research seminars and journal clubs, write brief summaries, participate in journal club, and present original research paper. prereq: Acceptance into stem cell biology [master's prog or PhD minor prog] or instr consent

SCB 5900. Master's Plan B Research Paper and Presentation. (; 2 cr. ; A-F only; Every Fall, Spring & Summer)
Students write research paper based on primary literature on stem cell biology topic of interest, mentored by faculty member. prereq: Admission to stem cell biology master's plan B program

SCB 8181. Stem Cell Biology. (3 cr. ; Student Option; Every Fall)
Stem cell research and its applications. Critical analysis, written summaries/critiques, oral presentations. prereq: [[GCD 4034], [GCD 4161]] or equiv or instr consent

SCB 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
FTE: master's prereq: Master's student, adviser consent, DGS consent

SCB 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Thesis credits: master's

Studies in Cinema Media Cultur (SCMC)

SCMC 5001. Critical Debates in the Study of Cinema and Media Culture. (; 4 cr. ; Student Option; Every Fall)
This course serves as a capstone within the Studies in Cinema and Media Culture program as well as an advanced seminar in cinema and media theory. It covers such topics as contemporary cinema, transnational television, video games, digital networks, and surveillance technologies. It builds on the knowledge of cinema and media studies that students have developed over their undergraduate education. Students are given the resources and encouragement to construct larger reading and viewing lists that will further develop their knowledge of media and cinema. The final grade is based on participation, critical essays, weekly viewing assignments, and an individualized project that can include creative and professional interests.

SCMC 5002. Advanced Film Analysis. (; 4 cr. ; A-F only; Every Spring)
Application of textual analysis to the reading of a film. Students work collaboratively to discern and interpret all component aural/visual elements of what the film says and how it says it.

SCMC 5303. Sound Studies. (3 cr. ; A-F or Audit; Fall Odd Year)
What is sound? Among the various ways of absorbing the world through the senses (looking, reading, watching, touching, tasting), what is unique to the actions of listening and hearing? And over the course of human history, how has sound been variously deployed, framed, and constructed? This course covers a diverse range of topics in the fast-developing interdisciplinary field of Sound Studies from the philosophy of sound to psychoanalytic theories of the voice, the gendered histories of telephones, accounts of radio and decolonization, film sound, sonic expressions of race, the politics of global popular music, mobile media technologies, and cutting-edge approaches to sound art.

SCMC 5993. Directed Study. (1-3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Guided individual reading or study.

Studies of Science and Tech (SST)

SST 8000. Colloquium. (; 1.5 cr. [max 3 cr.] ; S-N or Audit; Every Fall & Spring)
Series of weekly lectures by nationally and internationally known scholars with diverse disciplinary and methodological backgrounds speaking on a variety of issues. prereq: Grad SST minor

SST 8100. Seminar: Models, Theories, and Reality. (; 3 cr. ; Student Option; Every Fall & Spring)

Students participate in ongoing research on the role of models and theories in science, and prepare and present research papers. prereq: HSci 8111 or [Phil 8601 or Phil 8602 or Phil 8605] or instr consent

SST 8200. Seminar: Philosophy of the Physical Sciences. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Fall)
Students participate in ongoing research in history, philosophy, and social study of physical sciences and prepare and present research papers. prereq: instr consent

SST 8300. Seminar: The Biological and Biomedical Sciences. (; 3 cr. ; Student Option; Every Fall & Spring)
Students participate in ongoing research in history, philosophy, and social study of biological and biomedical sciences, and prepare and present research papers. prereq: HSci 8111 or [Phil 8601 or Phil 8602 or Phil 8605] or instr consent

SST 8400. Seminar: Science, Technology, and Society. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Students participate in ongoing research on interactions involving science, technology, and society from perspectives of history, philosophy, and social study of science, and prepare and present research papers. prereq: HSci 8111 or [Phil 8601 or Phil 8602 or Phil 8605] or instr consent

SST 8420. Seminar: Social and Cultural Studies of Science. (; 3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)
Recent work; theoretical and methodological differences among practitioners; selected responses from historians and philosophers of science.

Supply Chain and Operations (SCO)

SCO 6041. Project Management. (; 2 cr. ; A-F only; Every Fall & Spring)
Companies in a wide-range of industries (such as agri-business, aerospace, construction, manufacturing, and medical technology) use Project Management for New Product Development, implementing strategic initiatives, and other business objectives. In the course of your career, those in business, government, and even non-profit organizations will spend a significant amount of their professional career either participating in, or leading projects. While every project is by definition unique in scope, some concepts and tools are considered industry best practices and are internationally recognized via the certification programs of the Project Management Institute. The course will focus on scheduling and critical path analysis, time management, cost estimating, resource utilization, and risk management. Specific tools will include Earned Value Management and the quantitative techniques for estimating schedule risk. The latter will include estimating task durations and the probabilities for project completion by specific time periods. The course will conclude an introduction of Agile Methodologies and Scrum.

SCO 6045. Strategic Sourcing. (2 cr. ; A-F only; Every Spring)
Procurement and supply management has become increasingly visible in a world where supply is a major determinant of organizational success. Supply chain performance influences not only operational and financial risks but also reputational risk. Although this course explores cost containment and supply process improvement methods, it also pushes into revenue enhancement. The job of the supply manager today goes way beyond the scope of value and efficiency to the search for competitive advantage through the supply network. In addition to organizing the supply function for strategic advantage, the course explores strategic sourcing, supplier selection and evaluation techniques, supplier development methods, global sourcing techniques, as well as legal and ethical challenges. High-performance supply managers live for the challenges associated with building and maintaining a high-performance supply chain.

SCO 6048. Logistics and Transportation. (; 2 cr. ; A-F only; Every Fall)
Manufactured products often travel across multiple countries and multiple states, using multiple modes of transportation, and channels of distribution before reaching final customers. Along the way, these products are processed at a variety of inventory transfer points, and reconfigured and combined with other products with the goal of arriving intact without damage in the right quantity, at the right place and right time. This course provides the knowledge, skills, and tools for understanding these core elements of logistics and transportation systems. Students will gain an understanding of the dynamics of key logistics and transportation decisions, including the design of distribution networks, choice of transportation modes and routes, location and configuration of distribution centers, and management of last mile logistics. Students will explore how these decisions are made by leading companies and what influence these decisions have on the performance dimensions of flexibility, speed, reliability, accessibility, and cost. Operations research techniques will be used to analyze, compare, and optimize these decisions. Throughout the course, students will be exposed to best practices and gain an appreciation for the challenges that typical companies face in managing their logistics and transportation network, including how to innovate in light of competitive pressures and external shocks.

SCO 6051. Service Management. (; 2 cr. ; A-F only; Every Fall)
Both business customers and consumers seek fulfillment of their wants and solutions to their needs ? resolving customer problems via one-stop complete service models. This course addresses creating and delivering customer solutions via multi-faceted product-service bundles. The approach uses a structured framework of defining tangible goods and services, intangible service activities, and psychological benefits that customers are seeking. Most course time is spent developing a service delivery system to create and deliver the offering: designing and mapping process flows, applying operations research techniques for analyzing queueing models, determining appropriate applications of automation, and using operations analysis to balance capacity and demand. The course also covers developing systems for managing variability, service quality, queues, and customer psychology in real time during service delivery. prereq: [MBA 6220 or equiv], MBA student

SCO 6056. Managing Supply Chain Operations. (; 4 cr. ; A-F only; Every Fall & Spring)
Decisions/trade-offs managers face when directing operations of supply chain. How supply chain operations are coordinated within manufacturing, distribution, and retail organizations. prereq: [MBA 6220 or equiv], MBA student

SCO 6059. Quality Management and Lean Six Sigma. (; 4 cr. ; A-F only; Every Fall)
Management/technical aspects of process improvement. Organizational performance and financial measures as they relate to process improvement. Strategy, improvement tools/ methods. prereq: [MBA 6220 or equiv], MBA student

SCO 6061. New Product Design and Business Development. (; 3 cr. ; A-F or Audit; Periodic Fall & Spring)
Nine-month intensive course. Engineering and business students work in teams on actual product development projects sponsored by business organizations to design prototype products and develop business plans for commercialization. Lectures, workshops, guest speakers, team meetings, company visits.

SCO 6072. Managing Technologies in the Supply Chain. (; 2 cr. ; A-F only; Every Spring)
Course prepares students to develop capabilities for (i) making well-informed technology choice decisions; (ii) effectively managing the development and implementation of technologies; and (iii) collaboratively engaging in crisis management and problem solving during technology development and implementation. The central question around which the course is organized is: How can existing and emerging technologies (e.g., IoT, automation, artificial intelligence, 3D printing, block chains) and the related process and people issues be managed to design and sustain reliable, responsive, resilient, and responsible supply chains? Analytic methods covered in the course to inform decisions related to the development and implementation of technologies include statistical methods (e.g., multivariate regression, time-series analysis, hazard models), risk analysis methods (e.g., decision trees) and predictive analytic methods (e.g., random forest). Through a combination of operations analysis case studies and hands-on exercises, students learn to evaluate the potential upside and downside risks of existing and emerging technologies. The final course project involves designing and testing of prototype systems for evaluating the development and

implementation in supply chain and operations settings of companies.

SCO 6081. Global Operations Strategy. (; 4 cr. ; A-F only; Every Spring)
An essential element of every business model is the delivery of services or goods. Some companies astonish customers by a constant stream of new and innovative products. Other companies can deliver their goods or services rapidly or have the absolute cost leadership in their industry. Such world-class capabilities are usually the result of a well formulated and executed operations strategy. Therefore, understanding operations strategy is crucial for business model innovation in a global environment. Topics covered in the course include the operational implications of strategic decisions, such as global facility location, market strategy, methods of market entry, outsourcing, process standardization, global product expansion, social responsibility, sustainability, and ethics. Students conduct an in-depth country analysis from a global perspective to fulfill their international experience as well as a comprehensive assessment of the current trends and impacts affecting global industries and organizations. The course uses supply chain and operations management academic theories and applicable case studies to illustrate and explore the concept of global operations strategy. Students will develop their abilities to: 1. Think strategically, analytically, and creatively from a global perspective. 2. Develop an understanding of formulating and executing global operations strategy 3. Develop a better understanding of the processes underlying various international business models. 4. Understand how people, process and technology are integral to executing an effective global strategy. 5. Maximize the benefit of key partnerships (i.e., HR; Finance; IT) in executing the agreed-upon strategy 6. Practice effective team strategies to maximize results prereq: [MBA 6221 or equiv], MBA student

SCO 6082. International Operations Management. (; 2 cr. ; A-F only; Every Fall)
Managing operations in global economy. Coordinating product design, technology transfer, sourcing, supply chains, quality standards, product assignment, facility location, and multicultural workforce management across national boundaries. Cross-functional decision making. prereq: [MBA 6220 or equiv], MBA student

SCO 6085. Sales, Inventory, and Operations Planning. (; 2 cr. ; A-F only; Every Spring & Summer)
Sales, Inventory, and Operations Planning (SI&OP) is an important business process for any firm and can provide significant payoffs through achieving a balance between supply and demand. Using analytical tools and field data, SI&OP links a company?s strategic goals at the high level with its production at the tactical level while coordinating different business elements including manufacturing, finance, operations, sales, marketing, HR, etc. The output of an SI&OP process serves as guidance for various production functions such as the master production schedule (MPS) as well as material requirements planning. SI&OP focuses on getting the big picture right via balancing demand and supply at the product family level. This 2-credit course is designed (1) to provide an overview of the entire SI&OP process, (2) to introduce the crucial inputs (i.e., forecasting and inventory management) to SI&OP, (3) to explain how the output of SI&OP (i.e., aggregate plan) is used as a guidance for planning production and material procurement, and (4) to expose students to several analytical tools used for the SI&OP process. To achieve these goals, the course covers a range of topics including forecasting, inventory management, aggregate planning, master production scheduling, and material requirements planning.

SCO 6091. Process Improvement Methods. (; 2 cr. ; A-F only; Periodic Spring)
This course introduces the tools and problem solving techniques for process improvement. While organized around the DMAIC (Define, Measure, Analyze, Improve, and Control) terms used in Six Sigma, the class will also include concepts from Root Cause Analysis and Lean Thinking. While our focus is on implementing process improvements from a manager? s perspective, numerous technical tools to identify and implement process improvements, plus the quantitative methods used to identify capacity capabilities, utilization rates, and bottlenecks will be presented through a series of problems and practical exercises. In addition, the course will consider broader aspects of process improvement that includes an understanding organizational change, the importance of Change Management, and aligning process improvements with strategy.

SCO 6092. Supply Chain Risk and Security. (2 cr. ; A-F only; Periodic Spring)
This course covers the organizational and behavioral aspects of managing quality, risk, and security within and across organizations. It covers various frameworks such as ISO 28000 (security) as a starting point. It covers various organizational issues such as managing organizational culture and navigating across national boundaries to address quality, risk, and security issues. It draws on various management theories to understand how to manage quality, risk, security, and disruptions across the supply chain. The course draws on examples from a variety of industries and government.

SCO 6093. Negotiations in Supply Chain. (2 cr. ; A-F only; Periodic Spring)
Negotiation is the art and science of securing agreements between two or more interdependent parties. Managing supply chains often requires extensive negotiations related to pricing, joint problem solving and collaboration. This course (i) helps students understand the theory and processes of negotiation as it is practiced in supply chains, (ii) highlight the components of an effective negotiation, and (iii) help students analyze their own behavior in negotiations. The course is largely experiential, providing an opportunity to develop skills by participating in supply chain negotiation exercises and integrating experiences with the principles presented in the assigned readings and class discussions.

SCO 6094. Responsible Supply Chain Management. (2 cr. ; A-F only; Every Spring)
Companies around the world are facing increasing pressure to perform well on the triple bottom line?People, Planet, and Profit?and responsible supply chain management is often a cornerstone of the CSR strategy for many companies. This course looks at how and why responsible supply chain management could be a powerful strategy to enhance a company? s triple bottom line. The course focuses on the social and environmental aspects of managing supply chain operations. Particular emphasis is placed on human rights, health and safety, and environmental issues faced by supply chain managers and the linkage to the firm?s supply chain strategy.

SCO 6095. Supply Chain Management in the Food and Agribusiness Sector. (2 cr. ; A-F only; Periodic Spring)
The food and agribusiness supply chain is complex. It spans input companies, farmers, traders, food companies, and retailers. The goal of this supply chain is to provide access to affordable food, feed, fiber, and fuel in a sustainable manner. The course covers topics relevant to achieving this goal such as supply management, production management, and demand management to consumers. Issues such as diversity of production and demand, bulkiness of produce, perishability, seasonality, and complexity of supply chains of food and agricultural products will be addressed.

SCO 6096. Supply Chain Management in the Health Care and Medical Devices Sector. (; 2 cr. ; A-F only; Periodic Spring)
The motivation for developing this course is the widespread and growing recognition of the need to design and sustain reliable, responsive, resilient, and responsible supply chains to enable the delivery of high quality, high volume, and affordable physical and mental health care equitably in both developed and developing countries. The course advances an end-to-end, supply chain?centric view of the health care and medical devices sector ? i.e., linking the development of care to the delivery of care: ?from bench to bed.? The course highlights the interdependencies between organizations on the upstream (e.g., medical devices, pharma, and biotech firms) and downstream (e.g., hospitals and clinics) of the healthcare supply chain. Topics addressed include: managing supply chain risks with rapid growth in adverse events and recalls related to medical devices and drugs; and reducing the disparities in health care delivery in underserved communities around the world. Implications of scientific and technological advancements ? specifically, precision medicine, surgical robots, mobile & wearable devices, telemedicine and IoT (Internet of Technology) ? for designing and sustaining health care supply chains will be a theme that will run through the entire course. We will closely follow the developments

related to COVID-19 pandemic throughout the duration of the course. In every class session, we will make a concerted effort to explore the topic of the session and its relevance to understanding and addressing COVID-19 related issues at the local, state, national and global levels -- e.g., understanding the roles of the Minnesota Department of Health (MDH), Center for Disease Control (CDC), Food and Drug Administration (FDA), Federal Emergency Management Agency (FEMA) and the World Health Organization (WHO).

SCO 6097. Supply Chain Management in the Retail Sector. (2 cr. ; A-F only; Periodic Spring)
This course reviews how the retail sector has evolved over the years and the significance of supply chain management in the retail sector. The course examines the various functional components of retail supply chain management, and focuses on analysis and metrics required to effectively manage a retail supply chain. The students learn the ?language" of retailing and acquire the fundamental skills needed to effectively analyze the performance of retail supply chains. Cases are discussed to illustrate how customers are becoming more exacting and demanding ever-increasing levels of service; and how retailers are responding by increasing product variety, becoming more price competitive, striving towards higher service levels, and utilizing advances in computing capabilities, information technologies, and retail analytics to improve their supply chain efficiency.

SCO 6098. Operations Excellence via Lean Thinking. (2 cr. ; A-F only; Every Fall)
This course introduces the concepts and theory of quality control, philosophical foundations of lean thinking, and technical concepts related to flow and pull, and tools such as value stream mapping, A3, and 5S. Students learn to identify, measure, and eliminate non-value added activities; process capability analysis; statistical process control; and acceptance sampling from extended value chains in manufacturing and service settings through hands-on exercises.

SCO 6185. Statistics. (2 cr. ; A-F only; Every Fall)
This course introduces quantitative and business statistics concepts for managerial decision making and problem solving.
The course first focuses on the nature of statistical studies and the differences between observational and experimental studies. Methods for producing data, including sampling techniques, process monitoring, and designed experiments will be discussed. Students learn graphical and numerical methods for descriptive statistics. Foundations for statistical inference are covered, including basic probability, discrete and continuous probability distributions, and sampling distributions of statistics. Students then learn how to apply the two basic inferential methods of statistics, statistical estimation, and tests of statistical hypotheses. These methods are used to make inferences about population parameters including means, proportions, and standard deviations. The students also learn to identify sample size requirements.

SCO 6191. Big Data Analytics in Supply Chains. (; 2 cr. ; A-F only; Every Fall)
With the advancement of digital technologies and networking capabilities, firms are actively engaged in capturing ?big? data related to their supply chains. Firms recognize the immense potential in mining big data for improving the quality and timeliness of decisions, and becoming proactive in sensing and responding to external and internal signals of threats and opportunities. The course develops the capability to analyze and interpret structured and unstructured data that is fundamental to managing supply. The data analytics methods covered in the course include statistical methods (e.g., multivariate regression, logistics regression, GLMM, LASSO), machine learning methods (e.g., support vector machine, ensemble methods ? random forest, gradient boosting model) and optimization methods (e.g., deterministic and stochastic methods). Through a combination of operations analysis case studies and hands-on exercises, students learn (i) various facets of data analytics: data access, data aggregation, data analysis and data visualization; (ii) appropriateness and inappropriateness of big data analytic methods; and (iii) big data based predictive analytics. The final course project involves designing and testing of prototype systems in supply chain and operations settings of companies.

SCO 6192. Supply Chain Finance. (2 cr. ; A-F only; Every Spring)
Managing the financial flows and capital is just as important as managing the physical flow of goods and services. This course focuses on the underlying link between supply chain performance and the financial systems within an organization. Students learn concepts and tools related to supply chain costing, valuation, and projecting cash flow and capital requirements. The course looks at issues including tax and trade credits, and students develop an understanding of how financial considerations influence and inform a firm?s supply chain strategy.

SCO 6285. Managing Supply Chain Operations. (4 cr. ; A-F only; Every Fall)
This course serves as an introduction to the program, providing an overview of the fundamental concepts of supply chain and operations management. The course is taught as a cohort experience with opportunities to interact outside the classroom. Supply chain professionals from a variety of industries are featured throughout to highlight how the concepts apply in different contexts. Students learn methods and models for evaluating and improving end-to-end processes and gain an understanding of the operational challenges inherent in managing global supply chains. The course takes a strategic and cross-functional view of supply chains in both product and service based industries.

SCO 6291. Leadership Development. (0-2 cr. ; A-F only; Every Fall, Spring & Summer)
Carefully designed lectures, exercises and assignments are positioned through the year to assess and develop leadership skills personalized to each student at three levels: (i) how to lead self: leveraging current strengths, (ii) how to lead others: teamwork, collaboration, motivation, and feedback, and (iii) how to lead organizations: operating in complex global work environments. Substantively, the course is committed to creating an intellectual context that is now viewed as central to developing supply chain leaders. Specifically, the course provides opportunities for raising environmental, social and political awareness; learning about social media and related communications technologies and channels; and interacting with non-commercial organizations such as government and NGOs.

SCO 6292. Global Operations Capstone. (4 cr. ; A-F only; Every Summer)
This course will examine, compare and contrast business models that work globally, and require a careful design of processes and supply chains to deliver the capabilities necessary to create a competitive advantage. This course helps students understand the strategic nature of decision making in operations, and allows them to apply such thinking to the design and improvement of global supply chain networks that span both developed and developing economies. The course contains an essential experiential component. Students will work with companies, either locally in Minnesota or across the world, on real world supply chain applications.

SCO 6850. Topics in Operations and Management Science. (; 2-4 cr. [max 12 cr.] ; A-F only; Every Fall & Spring)
Topics seminar. Provides forum for topics in operations/management science.

SCO 8800. Research Topics in Supply Chain and Operations. (; 1-2 cr. [max 8 cr.] ; A-F or Audit; Periodic Fall, Spring & Summer)
Topics selected from contemporary areas of research and/or methods in supply chain and operations. prereq: Business admin Ph.D. student or instr consent

SCO 8811. Operations Strategy. (4 cr. ; A-F or Audit; Periodic Fall & Spring)
The course goal is to expose students to the operations strategy area holistically, starting with its origins and historical evolution over time. Students will understand the breadth, develop a sense of the pertinent research questions that have been examined and those that remain unanswered, and begin to develop an informed sense of the emerging/ existing research paradigms. The seminar approach is both topical and methodological, using published and working papers as the context and starting point for discussions. Although the focus of the class is not to teach new methods, a significant amount of time will be spent on the theoretical, empirical, and econometric research paradigms used in the papers. Each session is built around a specific theme. The objective is to develop a deep, collective understanding of the various research streams, different empirical methods, and the opportunities for contributions in the areas discussed. Prereq: Business admin PhD student or instr consent; offered alt yrs

SCO 8821. Management of Technological Operations. (4 cr. ; A-F or Audit; Periodic Fall & Spring)
The learning objectives of the seminar are to develop an understanding of the problems in managing technological operations (i) within firms (intra-firm), and (ii) across firms (inter-firm) ? i.e., designing and sustaining reliable, responsive, resilient and responsible supply chains. Theories and methodologies that either have been, or can be, applied to address these problems will be reviewed. Emerging and impactful problem areas relevant to managing technological operations within and across firms, and their supply chains, and their potential to serve as topics for new lines of research inquiries will be explored. Prereq: Business admin PhD student or instr consent; offered alt yrs

SCO 8822. Innovative Operations. (2 cr. ; A-F or Audit; Periodic Fall & Spring)
The course will focus on emerging research topics in supply chain and operations with a particular focus on topics that relate to: (i) technology and supply chains in the context of developing economies and the public sector, and (ii) the increased digitization of supply chains through the use of sharing economy platforms. While these topics build upon and extend the core focus areas of supply chain operations (e.g., technology management, operations strategy, and inventory management), they also cross disciplinary boundaries (e.g., information systems, strategy, and public policy) and represent areas of much interest to scholars across disciplines. Prereq: Business admin PhD student or instr consent; offered alt yrs

SCO 8831. Supply Chain Management. (2 cr. ; A-F or Audit; Periodic Fall & Spring)
This course is designed to provide students with some foundational tools and techniques to model and analyze business problems in the context of supply chain management. Basic theoretical models as well as related quantitative methods and techniques will be discussed. In addition, each session will involve detailed discussions of classic and recent research articles that demonstrate how various supply chain topics of interest can be modeled and analyzed using different conceptual and methodological approaches. Prereq: Business admin PhD student or instr consent; offered alt yrs

SCO 8832. Analytical Models for Operations Management. (2 cr. ; A-F or Audit; Periodic Fall & Spring)
This is a foundational course that introduces PhD students to analytical models widely used in operations management including optimization, game theory, and queueing theory. This course pays particular attention to emerging applications in supply chain, sustainable operations, retail, service, online platforms, and machine learning. Prereq: Business admin PhD student or instr consent; offered alt yrs

SCO 8841. Behavioral Research in Operations Management. (4 cr. ; A-F or Audit; Periodic Fall & Spring)
This course aims to prepare students to conduct rigorous research in the field of behavioral operations. It focuses on developing skills in three areas (1) knowledge of classic behavioral theories in economics, sociology, psychology, and other social sciences as they apply to an operations context; (2) ability to ascertain and discover novel behavioral issues that arise within operations contexts, particularly those with the potential for major impact on operational outcomes such as profit, demand, operational efficiency, service level, employee retention, and customer satisfaction; and (3) judgement of what research methodologies are most appropriate for studying a given behavioral issue and practice using these methodologies. Special emphasis is given to experimental and analytical methodologies, with applications spanning operational decisions in service systems, new product development, supply chain management, and responsible operations. Prereq: Business admin PhD student or instr consent; offered alt yrs

SCO 8842. Retail Operations. (2 cr. ; A-F or Audit; Periodic Fall & Spring)
This course is designed to provide an overview of research in the field of retail operations and to help students develop necessary skills to conduct research in retail operations. To achieve these goals, the course covers a range of topics including forecasting and inventory management, assortment planning, store labor, store execution, consumer returns, omnichannel retailing, and innovative retail practices. Prereq: Business admin PhD student or instr consent; offered alt yrs

SCO 8843. Sustainable and Socially-Responsible Operations. (2 cr. ; A-F or Audit; Periodic Fall & Spring)
With the fast expanding public awareness and aggravating environmental issues witnessed in recent years, the sustainability of business is receiving keen interest from both firms and policy-makers across the globe. Operations play a central role, as the objective of environmentally- and socially-responsible business needs to be realized through implementation and operationalization on the ground. Over the past decades, operations research has made significant contributions to advance our understanding and approaches on the sustainable aspects, examples include studies on the design and management of closed-loop supply chains (to deal with the resell, reuse, recycling or remanufacturing of used items), the development and implementation of evaluation systems to assess the environmental performance of firms (such as incorporation of the industrial ecology tool of Life-Cycle Assessment into the analysis), the formulation of environmental regulations (ranging from waste management, energy, to emissions and pollutions), the innovative business models (such as different new product development strategies, servicing and sharing economy), and those on the broader social and humanitarian issues. In this course, we will dive into the related literature, to have in-depth discussions on papers that use different conceptual and methodological approaches. Prereq: Business admin PhD student or instr consent; offered alt yrs

SCO 8892. Readings in Supply Chain and Operations. (; 1-8 cr. [max 16 cr.] ; Student Option; Every Fall, Spring & Summer)
Readings useful to student's individual program and objectives that are not available in regular courses. prereq: Business admin PhD student or instr consent

SCO 8894. Research in Supply Chain and Operations. (; 1-8 cr. [max 16 cr.] ; Student Option; Every Fall, Spring & Summer)
Individual research on an approved topic appropriate to student's program and objectives. prereq: Business admin PhD student or instr consent

Surgery (SURG)

SURG 7502. Externship in the Surgical Intensive Care Unit. (; 2-6 cr. ; H-N or Audit; Every Fall, Spring & Summer)
This service provides the student with direct bedside experience and opportunities to apply the principles of physiology, biochemistry, and metabolism to critically ill and injured patients. Required reading: Abrams and Cerra, Essentials of Surgical Critical Care, Quality Medical Publishers, 1993. prereq: 7500

SURG 7503. Surgery Research. (; 4 cr. [max 8 cr.] ; H-N only; Every Fall, Spring & Summer)
The student will participate in a research experience designed around a specific topic, arranged on an individual basis by the Course Instructor with staff members in the Department of Surgery.

SURG 7504. Externship in Hospital-based Nutrition. (; 3-6 cr. ; H-N or Audit; Every Fall, Spring & Summer)
This multidisciplinary patient care service is designed to provide one student with direct experience in hospital-based parenteral and enteral nutrition.

SURG 7505. Acting Intern Solid Organ Transplant Surgery. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
Deceased and live donor kidney, liver, and pancreas transplantation. Pre-operative evaluation and management and post operative care (including immune monitoring). Intra-operative management (donor and recipient) of transplant patients and back-table work. Clinical rounds/teaching conferences/ seminars. Complete abstract in area of interest. Scrub in organ donor operations as well as kidney, liver, and pancreas transplant.

SURG 7509. Acting Intern Burn Surgery. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
The student is exposed to all aspects of burn care including small outpatient burns as well as massive life-threatening burns.

SURG 7510. Acting Intern Surgery. (; 4 cr. [max 8 cr.] ; H-N only; Every Fall, Spring & Summer)
Instruction and advanced experience in surgery and its components. Students participate in patient care at level similar to first-year intern. Students work with a team in general/vascular

surgery, surgical oncology/colorectal, or MIS/ thoracic/foregut under faculty supervision and participate in the care of patients, in the operating room, and in clinics. Students take call on assigned service.

SURG 7511. Advanced Surgery Externship (Subinternship) at VA Medical Center. (; 3-6 cr. [max 12 cr.] ; H-N or Audit; Every Fall, Spring & Summer)
Instruction/experience in surgery and its components. Students participate directly in patient care at a level of responsibility exceeding that given to beginning students. Students work under direct supervision of faculty and participate fully with surgical team on assigned service in care of hospitalized patients, in operating room, and in clinics. prereq: 7500, dept consent

SURG 7515. Acting Internship Vascular Surgery. (4 cr. ; H-N only; Every Fall, Spring & Summer)
This course will provide instruction and advanced experience in vascular surgery for the student who has completed a basic internship or clerkship in surgery. Students taking this course can expect to participate directly in patient care at a level of responsibility that is similar to a first year intern. The student will work with their assigned team under the supervision of the faculty and will participate fully in the care of patients on the hospital wards and in the ICUs, operating room and clinics.

SURG 7522. Acting Intern Plastic & Reconstructive Surgery. (; 4 cr. [max 8 cr.] ; H-N only; Every Fall, Spring & Summer)
The student is exposed to the full spectrum of plastic and reconstructive problems while on the rotation.

SURG 7523. Acting Intern Colon and Rectal Surgery. (4 cr. ; H-N only; Every Fall, Spring & Summer)
Each student has the opportunity to become adept in the use of the sigmoidoscope as well as performing various outpatient anorectal procedures.

SURG 7524. Externship in Outpatient and Ambulatory Surgery. (; 3 cr. ; H-N or Audit; Every Fall, Spring & Summer)
Surgery clinic. Operating room experience. Surgical pathology review. prereq: instr consent

SURG 7525. Acting Intern Cardiovascular and Thoracic Surgery. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
Students will have the opportunity to become involved in the evaluation and management of patients with cardiac and thoracic surgical diseases. They will be incorporated at the level of a sub-intern on very busy clinical services. They will attend teaching conferences in addition to clinical duties. They may first or second-assist on routine thoracic cases and second assist on some cardiac surgeries.

SURG 7526. Acting Intern Pediatric Surgery. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
Students participate in all aspects of patient care. Initial evaluation, detailed history, physical exams, initiation/evaluation of diagnostic laboratory/radiologic testing. Formulating plans of resuscitation and patient care. Students also participate in outpatient clinics.

SURG 7550. Essentials of Surgery Clerkship. (4 cr. ; P-N only; Every Fall, Spring & Summer)
Required 4- week clinical Clerkship. Designed to provide the learner with a multidisciplinary experience in approaching surgical disease and surgical decision making.

SURG 7551. General Surgery Subspecialty Elective. (4 cr. ; H-N only; Every Fall, Spring & Summer)
Students interested in general surgery subspecialties will have the opportunity to care for patients with surgical disease processes and aid in both discernment and preparation for surgical acting internships

SURG 7552. Surgical Subspecialty Elective. (4 cr. ; P-N only; Every Fall, Spring & Summer)
Students will spend 4 weeks on surgical subspecialty services. This may be a 4 week experience on 1 subspecialty or two 2 week experiences, depending on the site. Clinic, consultation service and OR experiences will be available.

SURG 7560. Introduction to Cardiovascular Surgery. (2-4 cr. ; P-N only; Every Fall, Spring & Summer)
Students will spend 4 weeks on cardiovascular surgery services. Clinic, consultation service, and OR experiences will be available.

SURG 7561. Introduction to Plastic Surgery. (2-4 cr. ; P-N only; Every Fall, Spring & Summer)
By the completion of the rotation, students will be able to evaluate plastic surgery patients, participate in the operative procedure, and recognize post operative complications.

SURG 7562. Introduction to Vascular Surgery. (2-4 cr. ; P-N only; Every Fall, Spring & Summer)
Students will spend 4 weeks on vascular surgery services. Clinic, consultation service, and OR experiences will be available.

SURG 7910. Surgery Medical Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Surgery medical residency.

SURG 7930. Surgery Medical Fellowship. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Surgery medical fellowship.

SURG 8200. Clinical Surgical Problems in Management. (; 3 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Diagnostic and management instruction in all phases of clinical surgery, inpatient and outpatient. prereq: Grad surg major

SURG 8201. Surgery Roentgenological Pathology Conference. (; 1 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Weekly review of surgical patients presenting interesting roentgen and pathological findings. Staff from the Departments of Surgery, Radiology, and Laboratory Medicine and Pathology. Basic science and management principles of the surgical patient. prereq: Grad surg major

SURG 8202. Surgical Research. (; 3 cr. ; S-N only; Every Fall, Spring & Summer)
Graduate students undertake original investigation of problems in either experimental or clinical surgery. prereq: Grad surg major

SURG 8203. Surgery Complications and Research Conference. (; 1 cr. ; S-N only; Every Fall, Spring & Summer)
Evaluation of surgical patients, including postoperative course. Discussion and critical evaluation of current research problems. prereq: Grad surg major

SURG 8207. Transplantation Conference. (; 1 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Interdepartmental discussion and evaluation of current clinical and research problems. prereq: Grad surg major

SURG 8293. Applied Statistics. (; 1 cr. ; S-N or Audit; Every Fall & Spring)
Interactive computer course. Concepts of applied statistics. Examples, problem sets based on surgical research. How to independently set up appropriate experiments and perform basic descriptive/inferential analysis. prereq: Grad student in [surgery or experimental surgery or health sciences] or

SURG 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

SURG 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

SURG 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

SURG 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

SURG 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

SURG 8990. Topics in Pancreatology. (1-4 cr. ; A-F only; Every Fall)
Presentations and discussion of translation of bench to bedside research in Pancreatology.

SURG 8992. Directed Research. (2-4 cr. [max 8 cr.] ; A-F only; Every Fall & Summer)

Students will conduct basic or clinical research under the guidance of a faculty member in the Department of Surgery.

SURG 8994. Directed Readings. (; 1-4 cr. ; A-F only; Every Fall & Spring)
Students will read and discuss publications related to their research projects and in their specialty areas.

Sustainability Studies (SUST)

SUST 5480. SUST 5480 Topics in Sustainability. (; 1-4 cr. [max 24 cr.] ; A-F only; Every Fall, Spring & Summer)
Topics in sustainability encompass special courses related to issues such as renewable energy, food and waste systems, sustainable planning, water and climate change.

Sustainable Agricultural Syst (SAGR)

SAGR 8010. Colloquium in Sustainable Agriculture. (; 2 cr. ; A-F or Audit; Every Fall)
Forum for University faculty and students, and representatives of the farming community, including farmers, grassroots organizations, agricultural businesses, and representatives of state agencies, to engage in discussions on topics related to sustainability of food production. prereq: Coursework in biological or social sciences that provides intro to ag practices or issues

SAGR 8020. Field Experience in Sustainable Agriculture. (; 1-4 cr. ; S-N or Audit; Every Fall, Spring & Summer)
3- to 14-week internship with growers or organizations working with sustainable agriculture issues. Students analyze issues in final written project, oral seminar. prereq: Coursework in biological or social sciences that provides intro to ag practices or issues

Sustainable Systems Management (SSM)

SSM 5093. Directed Study. (1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
A course in which a student designs and carries out a directed study on selected topics or problems under the direction of a faculty member; eg, literature review. Directed study courses may be taken for variable credit and special permission is needed for enrollment. Students enrolling in a directed study will be required to use the University-wide on-line directed study contract process in order to enroll. Prereq: department consent, instructor consent, no more than 6 credits of directed study counts towards CFANS major requirements.

SSM 5094. Directed Research. (1-4 cr. [max 6 cr.] ; Student Option; Every Fall, Spring & Summer)
An opportunity in which a student designs and carries out a directed research project under the direction of a faculty member. Directed research may be taken for variable credit and special permission is needed for enrollment.Students enrolling in a directed research will be required to use the University-wide on-line directed research contract process in order to enroll. Prereq: department consent, instructor consent, no more than 6 credits of directed research counts towards CFANS major requirements.

SSM 5407. Sustainable Manufacturing Principles and Practices. (3 cr. ; A-F only; Every Fall)
In this course, students will learn about ways in which companies are embracing sustainability in their strategy and operations to increase growth and global competitiveness, including manufacturing processes for major sustainable products and biobased products. This includes processes and approaches for environmental mitigation and "green" manufacturing, reduce industrial waste and emissions, environmental footprint, and associated costs through more efficient manufacturing practices and incorporate bio-based product formulation. Students will acquire a working knowledge of management policies, tools and techniques to improve operational and environmental performance.

SSM 5503. Marketing of Bio-based Products. (; 4 cr. ; A-F or Audit; Every Fall)
Introduction to marketing function as it relates to current/emerging bio-based products industries (building materials, paper, fuels, etc.). Product positioning, pricing, promotion, and channel management within strategic planning and environmental marketing management.

SSM 5504. Sustainable Products Systems Management. (3 cr. ; A-F only; Every Spring)
Concepts of new product development and product management and their application to bio-based products.

SSM 5612. Systems Approach to Building Science and Construction. (; 4 cr. ; Student Option; Every Fall)
Dynamic/interrelated issues of energy, moisture control, indoor air quality in residential bldgs. Emphasizes design, construction, and operational aspects to provide an energy efficient, durable structure, and healthy living environment. Interaction between moisture and wood products within building system. prereq: Graduate Student

SSM 5614. Building Systems Performance: Testing & Diagnostics. (; 2 cr. ; Student Option; Spring Even Year)
Theoretical basis for performance testing. Diagnostics applications for residential structures. Focuses on existing structures and retrofit/remedial applications. Digital differential pressure gauges, blower doors, airflow hoods/grids, duct pressure testing, infrared thermography. Hands-on sessions for equipment use, problem solving. prereq: Grad student or instr consent

SSM 5616. Building Science I: Fundamentals. (; 4 cr. ; Student Option; Fall Even Year)
Building science theory, advanced applications for residential buildings. Focuses on heat/mass transfer. prereq: Grad student or instr consent

SSM 5618. Building Science II: Applications. (3 cr. ; A-F or Audit; Spring Odd Year)
This course is intended to be a capstone applications course, where students will learn how to apply key building science principles (from SSM 4616/5616 Building Science I: Fundamentals) to common building enclosure and mechanical system problems. Students will be guided to develop both qualitative and quantitative solutions for many common energy, moisture, and indoor air quality problems facing contemporary buildings. prereq: Graduate Student

TMD & Orofacial Pain (TMDP)

TMDP 8440. Advanced Theory and Principles of TMD and Orofacial Pain. (0-3 cr. ; A-F or Audit; Every Fall & Spring)
Nature and pathophysiology of disorders causing chronic pain in TMJ and craniofacial regions; advanced principles and theory on assessment, diagnosis, and interdisciplinary management.

TMDP 8441. Seminar in Temporomandibular Disorders & Orofacial Pain. (1 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Advanced topics on theories and application of recently developed techniques of data collection, diagnostic strategies, and management.

TMDP 8442. Advanced Clinical Temporomandibular Disorders and Orofacial Pain. (1-4 cr. ; A-F or Audit; Every Fall, Spring & Summer)
Interdisciplinary study of patients with TMD and orofacial pain using techniques of assessment currently being researched; background and clinical knowledge of patient synthesized with respect to current literature on management; management program is developed, discussed with faculty, and implemented. prereq: Participation in TMJ and orofacial pain advanced education program

Theatre Arts (TH)

TH 5100. Theatre Practicum. (; 1-4 cr. [max 20 cr.] ; Student Option; Every Fall & Spring)
Individual creative projects in production of approved plays as an actor, director, dramaturg, or playwright. (See 5500 for design practicums.) prereq: instr consent, dept consent; 4 cr of 3100 for undergrads

TH 5103. The Theatre Dramaturg. (; 3 cr. ; Student Option; Periodic Spring)
Theoretical/practical aspects of dramaturgy in American theater. Historical perspectives. Research/production history of classics. Development of new scripts. Dramaturgical structure and interpretive choices. Dramaturgy as it relates to playwrights/directors. Preparing/editing the rehearsal script. Production dramaturgy.

TH 5117. Performance and Social Change. (; 3 cr. ; A-F or Audit; Periodic Fall)
Reading, writing, research, presentations and workshops explore activist performance projects. Theories of social formation and ideology provide framework to discuss/animate

theater's potential for social change. prereq: Jr or sr or grad student

TH 5179W. Text and Performance. (WI; 3 cr. ; A-F or Audit; Every Fall)
How to read texts toward performance in various dramatic/nondramatic material. Method of unlocking metaphoric energy of texts. Vocabulary/techniques of analysis that transform text from page to stage. prereq: [1322, [3171 or 3172]] or grad student

TH 5181W. Blacks in American Theatre. (WI; 3 cr. ; Student Option; Periodic Spring)
Historical survey of significant events in the development of American black theatre traditions. Essays, plays, playwrights, and theatres from early colonial references to the Black Arts Movement.

TH 5182W. Contemporary Black Drama and Dramaturgies. (WI; 3 cr. ; Student Option; Every Spring)
This course is an exploration of the impact and evolution of Black Theatre in America, covering the period rising from the Black Arts Movement to the present. The exploration will entail an understanding of cultural and socio-political issues as they are reflected in key and significant plays written and produced from the late 1950?s to the present. The plays and essays will be read against the background of significant cultural, social and literary movements - the Civil Rights Movement, Cold War politics, the Women?s Movement, Gay Liberation, the Culture Wars, post-modernism, deconstruction, multiculturalism, afro-futurism, etc. as well as the evolution of identity nomenclature and racial classification from Colored to Negro to Black to African American. In addition to play analysis and criticism, students will garner a knowledge of significant Black cultural institutions and their impact on the ever-changing American theatre landscape.

TH 5183. Critical Literacy, Storytelling, and Creative Drama. (; 3 cr. ; Student Option; Every Summer)
This course examines and embodies how storytelling and creative drama can be used as tools to help develop students? critical literacy and to assist them in becoming more fluent readers and writers. Critical literacy is the focus; theater and storytelling are the vehicles. Key topics to be covered include: 1) A historical background on fairy and folk tales, legends, fables, myths, and the different oral traditions; 2) Tools for developing a critical view of diverse tales; 3) Practical instruction on how to use storytelling and story genres in the classroom to develop critical literacy; 4) Assessing storytelling work in the classroom. Students will meet in the first week at the University to learn tools of the Neighborhood Bridges program and in the second week will practice and observe each other?s teaching with local school classrooms. In the past we have worked with 4th graders and 6th graders, though we will also discuss how course content applies to high school students. The class meets for two intensive weeks in person, however, we additionally assign pre-readings and post-class reflections and papers.

TH 5330. Comedy: Advanced Physical Performance Studio. (; 3 cr. [max 9 cr.] ; A-F only; Every Spring)
Mechanics of creating physical comedy. Focuses on process using clown, Comedia dell'arte, Bouffons, or improvisational comedy. Exercises on how comedy is born from tragedy and state of conflict within one's self. prereq: 3330, audition

TH 5340. Tragedy/Poetry: Advanced Physical Performance Studio. (; 3 cr. [max 6 cr.] ; A-F only; Every Fall)
Specific tragic/poetic training paradigms in physical theater employed by Stanislavski, Grotowski, Brecht, Lecoq, etc. Psychological, emotional, technical, and physical work. Tragic action in Greek tragedy, Shakespeare, Melodrama, operatic characterization, Brecht. Original tragic/poetical work. prereq: [3322, 3331, grad student] or instr consent

TH 5355. Puppetry: Techniques and Practice in Contemporary Theater. (; 3 cr. ; Student Option; Every Fall & Spring)
Fundamentals of puppet and object theater/performance are introduced through traditional/contemporary puppetry forms. Focuses on object theater, toy theater, hand puppets, and shadow/Bunraku-style puppets. Readings, in-class screenings of videos/slides. Students build/create series of short works for in-class performance. prereq: [[3513 or concurrent registration is required (or allowed) in 3513], instr consent] or grad student

TH 5370. Hand, Mind, and Gesture: An Independent Study in the Creation of Image Driven Performance. (3 cr. ; Student Option; Every Spring)
Create single or collaborative performance/event that lives in time/space. Work will draw from personal investigation, amplify personal signature, explore modalities of image driven forms. Propose, develop, construct, rehearse, present finished public performance. prereq: 5355, instr consent

TH 5500. Theatre Design Practicum. (1-3 cr. [max 20 cr.] ; Student Option; Every Fall, Spring & Summer)
Individual projects in production of approved plays as a designer of scenery/properties, costumes, lighting, or sound. (See 5100 for other creative practicums.) prereq: Th 3521, 3531, or 3541

TH 5510. Drawing, Rendering, and Painting for the Theatre Designer I. (3 cr. ; Student Option; Periodic Fall & Spring)
Development of skills necessary for presentation of theatre scene/costume designs. Materials, layout, and techniques in scene painting. Basic drawing/graphic skills. prereq: 1501 or grad

TH 5520. Scene Design. (3 cr. [max 9 cr.] ; Student Option; Every Fall & Spring)
Conceiving/communicating design ideas in both two-dimensional sketches and three-dimensional models for theatre and allied venues. Drafting. prereq: 3521

TH 5530. Costume Design. (3 cr. [max 9 cr.] ; Student Option; Every Fall)
Theory and process of costume design for theatrical productions (e.g., dance, opera, film) through hypothetical productions. prereq: 3531

TH 5540. Lighting Design for the Theatre. (3 cr. [max 9 cr.] ; Student Option; Every Spring)
Design aesthetics and exploration of design for various stage forms and venues. Development of the lighting plot and paperwork; use of the computer in lighting design. prereq: 3541

TH 5545. Stage Lighting Technology. (; 3 cr. ; Student Option; Periodic Fall)
The lighting technician's skills and crafts: equipment, techniques, control operation, wiring, and maintenance. prereq: 3515 or grad or instr consent

TH 5554. Multimedia Production for Live Performance. (; 3 cr. ; Student Option; Periodic Fall)
Use of multimedia production technologies in actual production. Students apply knowledge/skill in conjunction with an artistic team on a production and are an integral part of the development/realization of that production. prereq: 5553 or instr consent

TH 5556. Audio Engineering. (; 3 cr. ; Student Option; Periodic Spring)
Miking/recording techniques specific to music/dramatic dialogue. Recording different styles of music. Hands-on recording of bands, doing final mixes to demo CD. Field trips to professional studios and club/concert recordings. prereq: 4555, instr consent

TH 5559. Sound Design for Performance. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Audio technology/psychology, their impact on audience in a performance. Communication, design process, psychoacoustics, script analysis. prereq: 4555 or instr consent

TH 5560. Drawing, Rendering, and Painting for the Theatre Designer II. (; 3 cr. ; Student Option; Periodic Spring)
Development of skills necessary for presentation of theatre scene/costume designs. Materials, layout, and techniques in scene painting. Rendering and scene painting skills. prereq: 5510

TH 5570. Properties/Scenery Technology. (; 1-3 cr. [max 15 cr.] ; Student Option; Every Fall & Spring)
Management, structures, upholstery, mask-making, furniture construction, stage mechanics, soft properties, faux finishes. Topics specified in Class Schedule. prereq: 3515 or grad or instr consent

TH 5580. Costume Technology. (; 3 cr. [max 15 cr.] ; Student Option; Every Fall & Spring)
Fabric enhancement techniques, masks, wig-making, millinery, makeup prosthetics, pattern drafting, and draping. Topics specified in Class Schedule. prereq: 3571 or grad or instr consent

TH 5590. Theatre Technology Practicum. (; 1-3 cr. [max 15 cr.] ; Student Option; Every Fall, Spring & Summer)
Individual creative project in technology/craft area of theatre. Practical work in costume, lighting, makeup, props, scenery, sound, or theatre management. prereq: 3515, instr consent, dept consent; 4 cr max for undergrads

TH 5711. Advanced Stage Direction. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Realistic/non-realistic dramatic forms. Theory/technique of rehearsal. Production problems. Includes directing of three one-act plays. prereq: [4711, instr consent] or grad student

TH 5716. Stage Management for the Theatre. (; 4 cr. ; Student Option; Every Fall)
Theories, practicalities, and techniques for rehearsal/performance. Organizing/managing various types of performance venues. prereq: [1101, 1321, soph] or grad

TH 5718. Principles of Arts Management. (3 cr. ; Student Option; Periodic Spring)
This course will introduce students to the practical skills required for the successful management of arts organizations. Areas covered will include marketing/publicity, fundraising, audience development, board governance, and issues associated with the founding of a nonprofit arts organization. Each class we will engage in discussion relating to articles shared by the instructor. You will participate in group and solo projects aimed to hone your skills in various areas of management. Additionally, students will engage in discussions with a number of professionals in the field of arts administration, and discover advanced concepts applied by arts administrators.

TH 5760. Advanced Stage Management. (; 2 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
TH 5760 is practical experience in stage management for specific productions of the University Theatre with emphasis on rehearsal and performance. In addition to rehearsals, design meetings, and performances, the students will meet with the Production Stage Manager weekly. The purpose of this weekly meeting (class) is to mentor a lead Stage Manager of a TAD Mainstage. The Mainstage Stage Manager and PSM will meet weekly for 90 minutes. Each weekly meeting time will be determined based on the individual students? schedule. Weekly meetings will begin two weeks prior to their first rehearsal and end one week after the final project performance. Attendance of individual weekly meetings are required and expected. Please be on time. Always bring your promptbook and laptop. Be prepared for weekly discussion. PSM will visit rehearsals weekly.

TH 5950. Topics in Theatre. (; 1-4 cr. [max 80 cr.] ; Student Option; Every Fall, Spring & Summer)
Topics specified in Class Schedule.

TH 5993. Directed Study. (1-5 cr. [max 20 cr.] ; Student Option; Every Fall, Spring & Summer)
Guided individual reading or study. Prereq 6 Th cr, instr consent, dept consent, college consent.

TH 8100. Theatre Practicum. (; 1-4 cr. [max 20 cr.] ; Student Option; Every Fall, Spring & Summer)
Individual creative projects in production of approved plays as an actor, director, dramaturg, or playwright (see 8500 for design practicums). prereq: instr consent, dept consent

TH 8102. Theatre Historiography. (; 3 cr. ; Student Option; Periodic Fall)
Current trends in historiography; research strategies and methods.

TH 8111. History and Theory of Western Theatre: Ancient World and Early Medieval. (; 3 cr. ; Student Option; Periodic Fall)
History, theories, arts, and crafts of western theatre from the ancient world to the present.

TH 8112. History and Theory of Western Theatre: Medieval Through Renaissance. (; 3 cr. ; Student Option; Periodic Fall)
History, theories, arts, and crafts of western theatre from the ancient world to the present.

TH 8113. History and Theory of Western Theatre: National Theatres to the French Revolution. (; 3 cr. ; Student Option; Periodic Fall & Spring)
History, theories, arts, and crafts of western theatre from the ancient world to the present.

TH 8114. Theatre: Performance and Political Modernity. (; 3 cr. ; Student Option; Periodic Fall & Spring)
History, theories, arts, and crafts of western theatre from the ancient world to the present.

TH 8115. History and Theory of Western Theatre: 20th Century Through World War II. (; 3 cr. ; Student Option; Periodic Fall)
History, theories, arts, and crafts of western theatre from the ancient world to the present.

TH 8116. History and Theory of Western Theatre: 20th Century From 1945 to the Present. (; 3 cr. ; Student Option; Periodic Fall)
History, theories, arts, and crafts of western theatre from the ancient world to the present.

TH 8120. Seminar. (3 cr. [max 12 cr.] ; Student Option; Every Fall & Spring)
Selected research topics from various theatre fields and periods. Sample topics: Border Crossings--Theatre History and Representation; The Theatre and Drama of the Third Reich, 1927-1944.

TH 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

TH 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

TH 8500. Theatre Design Practicum. (; 1-3 cr. [max 20 cr.] ; Student Option; Every Fall, Spring & Summer)
Individual creative projects in production of approved plays as a designer for scenery/properties, costumes, lighting, or sound (see 8100 for other creative practicums). prereq: instr consent, dept consent

TH 8510. Professional Design Workshop. (1-3 cr. [max 18 cr.] ; A-F only; Every Fall & Spring)
Development of graduate student as individual artist working collaboratively in performing arts industry. Further mastery of designer collaboration, self-promotion, management, displaying of job materials. Attend both professional/university productions throughout semester. prereq: MFA candidate

TH 8590. Theatre Technology Practicum. (; 1-3 cr. [max 20 cr.] ; Student Option; Every Fall & Spring)
Individual creative projects in the technology or craft of costume, lighting, makeup, props, scenery, sound, or theatre management. prereq: instr consent, dept consent

TH 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

TH 8711. Theory and Practice of the Modern Stage Director. (; 3 cr. ; Student Option; Periodic Fall)
Survey of principal stage directors (e.g., Saxe-Meiningen, Meyerhold, Brecht, Strehler, Mnouchkine, Brook) and their theories and practices from 1871 to today using books, journals, firsthand accounts, and videos.

TH 8750. MFA Directing Practicum. (; 2-3 cr. [max 10 cr.] ; A-F or Audit; Every Fall & Spring)
Rehearsed and performed production of published or original one-act (2 cr) or full-length play (3 cr) with budgeted design and technical support. prereq: MFA directing specialization

TH 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

TH 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

TH 8950. Topics in Theatre. (; 1-4 cr. [max 8 cr.] ; Student Option; Every Spring)
Topics specified in Class Schedule.

TH 8980. Internship. (; 1-5 cr. [max 10 cr.] ; Student Option; Every Fall & Spring)
tbd prereq: instr consent, dept consent

TH 8990. MFA Creative Thesis. (; 3-4 cr. ; Student Option; Every Fall & Spring)
tbd prereq: instr consent, dept consent

TH 8994. Directed Research. (; 1-5 cr. ; Student Option; Every Fall & Spring)
tbd prereq: instr consent, dept consent

Therapeutic Radiology (TRAD)

TRAD 7170. Basic Radiological Physics. (; 3 cr. ; H-N or Audit; Every Fall & Spring)

TRAD 7171. Physics of Nuclear Medicine. (; 2 cr. ; H-N or Audit; Periodic Fall)
N/A prereq: 7170 or instr consent

TRAD 7174. Physics of Diagnostic Radiology. (; 2 cr. ; H-N or Audit;)

TRAD 7177. Radiation Therapy Physics Laboratory: Radiation Physics Basics. (; 3 cr. ; A-F only; Every Spring)
Hands-on experience with hardware/software used in radiation therapy clinic for physics measurements. prereq: 7170 or concurrent registration is required (or allowed) in 7173 or instr consent

TRAD 7505. Introduction to Radiation Oncology. (; 2 cr. ; H-N only; Every Fall, Spring & Summer)
This course is designed not only for the student who plans to go into radiation therapy, but for those who plan to go into a field such as family practice, internal medicine, pediatrics, or surgery, where oncologic patients may be part of their practice. It provides training in clinical oncology, especially the diagnosis, disposition, and care of patients with cancer. The student attends all departmental and interdepartmental functions including follow-up clinics, new patient oncology conference, etc. radiation physics will provide supplemental teaching. There is no night call.

TRAD 7507. Advanced Radiation Oncology. (; 4 cr. ; H-N only; Every Fall, Spring & Summer)
Here the student will gain more familiarity with the role of radiation therapy in the treatment of cancer patients. The student will be able to work-up new patients and present to the staff, assist in the treatment planning and follow patients through therapy. The student will see follow-up patients and new patient in the clinic. Student will observe or assist in brachytherapy source implantation for gynecology cancer.

TRAD 7510. Radiation Oncology Research. (; 4-8 cr. ; H-N only; Every Fall, Spring & Summer)
This elective provides an opportunity for each interested student to participate in a clinical research project designed around a specific topic related to radiation oncology. The student may choose to participate in an ongoing research project within the radiation oncology division or in an original investigative project of the student's design arranged on an individual basis by the course director with staff members in the Department of Therapeutic Radiology-Radiation Oncology.

TRAD 7910. Therapeutic Radiology Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Therapeutic radiology residency.

TRAD 8149. Advanced Topics in Radiation Therapy Physics. (; 2 cr. ; A-F only; Every Fall)
Special procedures, including total body irradiation, intensity-modulated radiation therapy, stereotactic radiosurgery/radiotherapy, image-guided radiation therapy. Treatment planning algorithms and techniques. Advanced techniques in brachytherapy. prereq: [7170, 7173] or [BPHY 5170, BPHY 5173]

Toxicology (TXCL)

TXCL 5000. Directed Research in Toxicology. (; 1-5 cr. [max 80 cr.] ; A-F or Audit; Every Fall & Spring)
Special project that addresses specific issue in toxicology. Under guidance of faculty member. prereq: instr consent

TXCL 5011. Principles of Toxicology. (; 2 cr. ; A-F or Audit; Periodic Fall)
Introduction to fundamentals of poisoning in individuals and the environment, assessment of potential health hazards, and application of toxicology in various professional careers. prereq: Grad txcl major or instr consent

TXCL 5012. Principles of Toxicology. (; 3 cr. ; A-F or Audit; Every Spring)
Science of toxicology. Biomedical principles. Regulatory practices governing protection of human health and environmental quality. prereq: At least one semester [biochemistry, calculus, cell biology]; at least one semester of [human or animal] physiology recommended

TXCL 5013. Chemical Toxicology. (; 3 cr. ; A-F or Audit; Every Fall)
Signs, symptoms, and mechanism of toxicity of different classes of chemicals spanning several organ systems, including chemical carcinogenesis. prereq: 5012, instr consent

TXCL 5101. Molecular and Cellular Basis of Nanoparticle Toxicology. (; 3 cr. [max 6 cr.] ; A-F or Audit; Fall Odd Year)
Introduction to science of nanotoxicology. Nanotechnology in scientific research. Assessment of impact on biological systems. prereq: Introductory toxicology course

TXCL 5195. Veterinary Toxicology. (; 3 cr. ; A-F or Audit; Every Fall)
Toxicology of minerals, pesticides, venoms, and various toxins. Identification of poisonous plants. Recognition, diagnosis, and treatment of animal poisons. prereq: Grad student or instr consent

TXCL 5545. Introduction to Regulatory Medicine. (; 2 cr. ; A-F or Audit; Periodic Spring)
Explanation of products requiring pre-market approval and those that may be marketed without approval. Post-market surveillance. Adverse reactions, removal of product from market. prereq: Grad student or instr consent

TXCL 8012. Advanced Toxicology I. (; 3 cr. ; A-F or Audit; Every Spring)
Absorption, distribution, metabolism, and excretion of xenobiotics; toxicokinetics; mechanisms of toxicity or specific classes of chemical agents. prereq: 5011 or BioC 4331, PubH 5104 or instr consent

TXCL 8013. Advanced Toxicology II. (; 3 cr. ; A-F or Audit; Every Fall)
Kinetic and dynamic determinants of target organ toxicity; pathological alterations in structure/function relationships for major target organ systems; mechanisms of mutagenesis, carcinogenesis, and teratogenesis. prereq: 8012, BioC 4332, Phsl 5062 or Phsl 6101 or instr consent

TXCL 8100. Investigative Toxicology. (; 1 cr. [max 2 cr.] ; A-F or Audit; Every Fall & Spring)
Evaluating toxicology research issues and literature. prereq: 8013 or instr consent

TXCL 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

TXCL 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

TXCL 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
tbd prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

TXCL 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

TXCL 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall & Spring)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

University College (UC)

UC 5075. Directed Study. (; 1-8 cr. ; Student Option; Every Fall, Spring & Summer)
Directed study.

Urdu (URDU)

URDU 5040. Readings in Urdu Texts. (; 3 cr. ; Student Option; Periodic Fall & Spring)
Read authentic materials of various types to improve reading/speaking ability.

URDU 5993. Directed Study. (1-5 cr. [max 10 cr.] ; Student Option; Periodic Fall & Spring)
Guided individual readings.

Urologic Surgery (UROL)

UROL 7200. Surgical Specialty: Urology. (; 2 cr. [max 4 cr.] ; P-N only; Every Fall, Spring & Summer)
Each student learns the basic principles of urology in this externship. Pediatric and adult urology are available. At the completion of the rotation, the student should be able to read an IVP, place Foley catheters, and read a urinalysis.

UROL 7252. Urological Conference. (; 3 cr. ; No Grade Associated; Every Fall, Spring & Summer)
Urological conference.

UROL 7253. Research in Urology. (; 3 cr. ; No Grade Associated; Every Fall & Spring)

UROL 7400. Surgical Specialty: Urology Elective. (; 2-4 cr. ; H-N or Audit; Periodic Fall & Spring)
Two-week urologic surgery externship. Principles of Urology students are use in a general medical practice. Urologic emergencies, infections, hematuria, stones, prostate cancer, and erectile dysfunction. How to read an IVP, place Foley catheters, and read a urinalysis. Frequent opportunities for student participation in rural consultations in primary care offices.

UROL 7500. Acting Internship Urological Surgery. (; 4 cr. [max 8 cr.] ; H-N only; Every Fall, Spring & Summer)
Advanced clinical urology rotation. Students act as sub-interns on busy clinical urology service. Students participate in weekly conferences and function as integral component of health care team.

UROL 7503. Urologic Research. (; 4-10 cr. [max 20 cr.] ; H-N only; Every Fall, Spring & Summer)
This is a full-time laboratory course in which the student learns the basic techniques of cell biology as they apply to urologic research. Basic techniques of protein purification for amino acid composition and sequencing, electrophoresis, Western blots, immunocytochemistry, and tissue culture are used in a well-defined project. The mechanics of working in a lab and research methodology are covered in this course.

UROL 7910. Urologic Surgery Medical Residency. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Urologic surgery medical residency.

UROL 7930. Urologic Surgery Medical Fellowship. (; 6 cr. [max 120 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Urologic surgery medical fellowship.

UROL 8254. Urological Seminar. (; 2 cr. ; Student Option; Every Spring & Summer)
tbd

UROL 8255. Urological Radiological Conference. (; 2 cr. ; Student Option;)

UROL 8256. Urological Pathological Conference. (; 2 cr. ; Student Option;)

UROL 8257. Selected Topics in Genitourinary System. (; 1 cr. ; Student Option;)

Veterinary Medicine (CVM)

CVM 6000. Gopher Orientation and Leadership Experience. (2 cr. [max 4 cr.] ; S-N only; Every Fall & Spring)
Introduces first-year students to the veterinary college, program, and profession. Two-day and one-night off-site orientation program and monthly meetings are experiential in design and focus on leadership development, emotional intelligence, communication, and conflict management. Third orientation day on campus and subsequent noon meetings introduce students to the college facilities and resources and address logistics necessary for participation in the program. Students work in mentor groups of 9-11 students and 2-3 faculty mentors throughout the course. prereq: Admission to veterinary program

CVM 6001. Global and Intercultural Opportunities. (; 0.5 cr. [max 1 cr.] ; S-N only; Every Fall)
Finding and applying for opportunities. Securing funding. Travel safety. Topics in cultural competence. Presentations from students who have participated in international projects.

CVM 6005. Better Together: Preparing for Collaborative Practice. (; 0.5 cr. [max 1 cr.] ; S-N only; Every Fall)
This is a two-part learning experience that introduces health professional students to foundational concepts of interprofessional education and collaboration. This experience consists of one online module and a 3-hour in-person session that offers students an opportunity to engage with health professionals and experts to learn how interprofessional collaboration can impact real world health outcomes.

CVM 6006. Global One Health: Thailand. (3 cr. ; S-N only; Periodic Spring)
Self-guided study. Monthly in person seminars prior to three week study abroad in Thailand. Journal on recommended topics. Assessment via evidence of reading provided references through active participation in discussions, presentation of learning topics, active participation.

CVM 6007. Global Perspectives and Intercultural Development. (0.5 cr. ; S-N only; Every Spring)
This course provides information on international and cultural immersion opportunities including finding and applying for opportunities, securing funding, and traveling safely. Additionally, students will explore cultural humility through the Intercultural Development inventory, case studies, and class activities. Students will also have the opportunity to view posters and ask questions from current students who have participated in international projects

CVM 6008. Integrated Physiology. (6.5 cr. [max 8 cr.] ; S-N only; Every Fall)
Fundamental principles of animal metabolism and physiology including the function of cells, skeletal muscle, heart and vascular system, gastrointestinal tract and nervous system.

CVM 6009. Introduction to Teaching Skills. (1 cr. ; S-N only; Every Fall)
This is a hybrid series of modules and face-to-face course sessions, and experiential learning guiding veterinary students through best practices to enhance efficacy as an instructor in a veterinary curriculum.?Specific topics include learning theory, building a course session, teaching presentations, and individual student assessment.

CVM 6010. Urgent Care. (2 cr. [max 8 cr.] ; S-N only; Every Fall, Spring & Summer)
This rotation is designed to expose the senior student to acute pet illness and injury cases that are typical for any small animal general practice. Emphases of the rotation include honing client communication skills taking coherent patient histories, developing concise problem lists with differential diagnoses, prioritizing diagnostic and therapeutic treatment steps, and writing readable discharge summaries for the client. Senior students will also be expected to practice skills such as physical exam, sample collection, radiograph interpretation, lab work analysis, and may perform minor surgeries.

CVM 6015. Mission Veterinary Practices Primary Care. (2 cr. [max 8 cr.] ; S-N only; Every Fall, Spring & Summer)
MVP hospitals offer a busy general practice caseload where students will participate in patient care, scrub into surgery, monitor anesthesia, assist in the management of medical cases, provide wellness care, manage exam room interactions with the patient and client, and be responsible for client communication.

CVM 6026. Small Animal ICU Practicum: Year 4. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Management of dogs/cats requiring urgent medical care, intensive medical management. Providing primary case support through patient evaluation, problem solving, health care delivery, equipment operation. Practicum in Small Animal Intensive Care Unit.

CVM 6027. Large Animal Practicum: Year 3. (1 cr. ; S-N only; Every Fall & Spring)
Experience in procedures/policies involved in after-hours care of hospitalized/emergency cases in the large-animal hospital. Prereq-3rd DVM or [instr consent, college consent]

CVM 6028. Large Animal Clerk Duty. (2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Team leadership in procedures/policies involved in after hours care of hospitalized/ emergency cases in large-animal hospital. prereq: All 4th year students and affiliate students.

CVM 6029. Small Animal Hospital Practicum: Year 3. (; 1 cr. [max 2 cr.] ; S-N only; Every Fall, Spring & Summer)
Management of dogs/cats requiring urgent medical care, intensive medical management. Providing primary case care and service support through patient evaluation, problem solving, health care delivery, equipment operation. Practicum is served in Small Animal Intensive Care Unit. prereq: DVM 3rd yr or instr consent

CVM 6131. Mixed & Food Animal Problems. (2 cr. [max 4 cr.] ; S-N only; Every Spring)
This course combines cases commonly encountered in mixed or food animal practice and allows students to select assignments based on their track and species interest. All students will complete the same core cases emphasizing common learning objectives across species, and in addition, students will complete core and elective cases for their species of interest.

CVM 6137. Small Animal Clinical Nutrition. (2 cr. [max 6 cr.] ; S-N only; Every Fall, Spring & Summer)

Students participate in clinical nutrition service of VMC, manage nutritional needs of patients, perform nutritional assessments of ICU patients, perform internal/referring nutritional consults, and see outpatient appointments. prereq: 3rd or 4th yr DVM or instr consent

CVM 6206. Introduction to Integrative Medicine. (1 cr. ; S-N only; Every Spring)
This 1 week elective rotation is primarily provided for 4th year veterinary students. The integrative medicine rotation will cover traditional eastern veterinary medicine, animal chiropractic, nutritional therapy, neutraceuticals, physical therapy, and massage therapy.

CVM 6222. Advanced Clinical Epidemiology. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall)
Apply epidemiologic principles to control of infectious diseases in animal populations. Scientific literature. Global impacts of infectious diseases. Diagnostic tests, disease outbreak investigation, economics of disease control/ surveillance.

CVM 6308. Lab Animal Medicine. (2 cr. ; S-N only; Every Spring & Summer)
This course is designed to introduce students to the field of laboratory animal medicine and provide a strong foundation in the discipline. Using a mix of didactic and hands-on training methods, students will gain proficiency in the veterinary care of lab animals, and apply their skills and knowledge gained in all previous courses in their veterinary curriculum. Discussions will be challenging and require independent thought and application of concepts to real-world situations. Students will be well-prepared for additional training in laboratory animal medicine as would occur though residency.

CVM 6312. Veterinary Dental Rotation (SDen). (; 2 cr. [max 6 cr.] ; S-N only; Every Fall, Spring & Summer)
Routine/complex dental problems. Students diagnose and formulate treatment plans. Hands-on training. Basic periodontal procedures, single/multi-rooted extractions, dental radiographic techniques, instrument/ equipment care, dental charting. prereq: DVM 3rd or 4th yr student or instr consent

CVM 6404. Small Animal Dermatology: Advanced Block. (; 1 cr. ; A-F or Audit; Every Spring)
Case-base discussion of common dermatologic conditions that affect dogs/cats. Students work on clinical cases outside classroom. Cases are discussed in classroom.

CVM 6452. Metabolic Disorders II. (; 3 cr. ; A-F or Audit; Periodic Fall)
Pathophysiology, clinical presentation, diagnostic approach, therapeutic options, and management protocols for metabolic and endocrine based disorders of domestic species. prereq: DVM 3rd yr or instr consent

CVM 6457. Practice Ready Skills Senior Rotation. (2 cr. [max 6 cr.] ; S-N only; Every Fall, Spring & Summer)
Hands on, active learning rotation, focusing on the practice of various clinical skills and surgical techniques

CVM 6482. Small Animal Theriogenology. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall)
Normal/abnormal reproduction in dogs/cats. Dystocia management. Diagnosis/treatment of reproductive tract disease. Exotics. prereq: 3rd yr DVM or instr consent

CVM 6493. Medical Terminology. (2 cr. ; S-N only; Every Fall)
This course is intended for first year DVM students. We will use a system approach to the study of Medical Terminology. Essential word parts and terms will be presented in the context of basic anatomy, physiology, and disease conditions giving students tools to immediately apply new terminology to practical clinical situations. Most of the course requirements will be completed independently, and assessment will be through online quizzes and case studies. Self-motivation will be necessary to be successful in the course. The instructors will do their best to make the material interesting, to connect the content you will learn in other courses (especially Anatomy and Physiology) and to focus on generalized patterns and ways of learning and using medical terminology.

CVM 6497. Avian and Exotic Medicine and Surgery. (; 1 cr. [max 1.5 cr.] ; S-N only; Every Spring)
Bacterial, viral, fungal, parasitic diseases of companion birds. Caged birds, psittacines, raptors, racing pigeons, waterfowl. Behavioral components of common management problems (screaming, biting, feather picking, pathological bonding). Clinical methods of capture and restraint, anesthesia, radiology. Collecting samples for lab analysis. Overview of problems managed surgically.

CVM 6500. Animal, Public, and Ecosystem Health. (; 2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Emphasize interactions with public health, policy, and regulatory partners to provide a basic understanding of the essential roles veterinarians play in public health, disease control, food safety, and ecosystem health. prereq: DVM 3rd or 4th yr or grad student or instr consent

CVM 6501. Advanced Veterinary Public Health: Current Topics. (; 1 cr. [max 2 cr.] ; S-N only; Every Fall, Spring & Summer)
Systems used to raise livestock/poultry, deliver through markets to slaughter or processing facilities, and deliver to consumers. Methods to assess/mitigate risks. Emphasizes public health/food safety issues. Field trips, problem solving, assignments. prereq: DVM or MPH or grad student or instr consent

CVM 6502. Necropsy. (2 cr. [max 40 cr.] ; S-N only; Every Fall, Spring & Summer)
Students perform necropsies, collect tissues for lab analysis, interpret clinicopathologic findings, prepare reports on animals submitted to Veterinary Diagnostic Lab, apply basic/ clinical science to diseases for animals and populations of animals. Students may participate in history taking. Case findings discussed daily. Student groups present case reports at weekly departmental seminar. prereq: DVM 3rd or 4th yr or instr consent

CVM 6503. Exotic Animal Necoropsy Rotation. (; 2 cr. ; S-N only; Every Fall, Spring & Summer)
Zoo/wildlife pathology service similar to required necropsy rotation (CVM 6502). Perform necropsies of incoming cases of "nontraditional" animals. Write report and after discussion with faculty member chose appropriate additional tests. Perform histologic evaluation of selected organs. Small projects pertaining to exotic animal pathology (and medicine). Present during lab's Thursday seminar series.

CVM 6504. Remediation course.. (; 0.5-9 cr. [max 27 cr.] ; S-N or Audit; Periodic Fall, Spring & Summer)
Remediation course.

CVM 6505. Topics course. (; 0-8 cr. [max 80 cr.] ; S-N only; Every Fall, Spring & Summer)
Topics Course

CVM 6506. Directed Studies in Large Animal Medicine (DistL). (1-2 cr. [max 40 cr.] ; S-N only; Every Fall, Spring & Summer)
Students, under guidance of a faculty member, conduct a special project addressing an issue in large animal medicine. Project proposals include hypothesis, objectives, plan of study, and product for evaluation by adviser and approval by the College of Veterinary Medicine's curriculum committee. prereq: DVM 4th yr or instr consent

CVM 6507. Directed Studies in Small Animal Medicine (DistS). (; 1-2 cr. [max 40 cr.] ; S-N only; Every Fall, Spring & Summer)
Students, under guidance of a faculty member, conduct special project addressing an issue in small animal medicine. Project proposals include hypothesis, objectives, plan of study, and product for evaluation by adviser and approval by CVM's curriculum committee. prereq: DVM 4th yr or instr consent

CVM 6508. Directed Studies: Pathobiology (DiStB). (; 1-2 cr. [max 40 cr.] ; S-N only; Every Fall, Spring & Summer)
Students, under guidance of a faculty member, conduct special project addressing an issue in veterinary pathobiology. Project proposals include hypothesis, objectives, plan of study, and product for evaluation by adviser and approval by CVM's curriculum committee. prereq: DVM 4th yr or instr consent

CVM 6509. Directed Studies: Diagnostic Medicine (DistD). (; 1-2 cr. [max 40 cr.] ; S-N only; Every Fall, Spring & Summer)
Students, under guidance of a faculty member, conduct special project addressing an issue in diagnostic medicine. Project proposals include hypothesis, objectives, plan of study, and product for evaluation by faculty adviser and approval by CVM's curriculum committee. prereq: DVM 4th yr or instr consent

CVM 6510. MPH Project: PHP. (; 1-3 cr. [max 9 cr.] ; S-N only; Every Fall, Spring & Summer)
Directed field research. Original or secondary analysis of data sets related to public health practice. prereq: DVM student or instr consent

CVM 6512. Zoo and Wildlife Rounds. (; 0.5 cr. [max 3 cr.] ; S-N or Audit; Every Fall & Spring)

Zoo, wildlife, and exotic pet conservation. Seminars involving topics of exotic animal conservation, medicine, and pathology encountered at Minnesota, Como, and Lake Superior zoos; Raptor Center; and Minnesota Veterinary Diagnostic Laboratory. Basic biology of the affected animals, clinical aspects, and pathology of encountered diseases. Apply principles of basic/clinical science to address the cause of disease for individual animals as well as populations of animals.

CVM 6513. Topics on Climate Change and Agriculture. (; 1 cr. ; A-F only; Every Spring)
Science of climate change, role of agriculture and steps that are being taken to mitigate effects. Readings/discussions on a series of topics including, evidence for climate change, policy actions, carbon credits, soil sequestration, role of livestock, anaerobic digesters, and carbon footprint.

CVM 6514. Directed Studies in Food Animal Medicine (DistFA). (1-2 cr. ; S-N only; Every Fall, Spring & Summer)
Conduct special project addressing issue in food animal medicine under guidance of faculty member. Project proposals include hypothesis, objectives, plan of study, product for evaluation by adviser/approval by CVM's curriculum committee.

CVM 6515. Externship (Extern). (; 1-2 cr. [max 24 cr.] ; S-N only; Every Fall, Spring & Summer)
Students spend two weeks/rotation in a practice or other professional setting. prereq: DVM 3rd or 4th yr or instr consent

CVM 6516. Field Experience in Public Health Practice. (; 0.5-8 cr. [max 24 cr.] ; S-N only; Every Fall, Spring & Summer)
Directed field experience or clinical rotation/ practicum in selected community or public health agencies/institutions. Integration of knowledge/skills in population science for public health. prereq: DVM student or instr consent

CVM 6519. Wildlife Rehabilitation Center Summer Internship. (; 1 cr. ; S-N only; Every Spring & Summer)
Six-week summer internship (15 hr/wk) at Wildlife Rehabilitation Center. Hands-on learning in clinical medicine; avian, waterfowl, and mammal nurseries; wildlife handling and management; and wildlife rehabilitation. Final project. prereq: DVM student

CVM 6520. Advanced Small Animal Theriogenology and Pediatrics. (; 1.5 cr. [max 3 cr.] ; S-N only; Every Spring)
On-line course consisting of individualized study and directed review of advanced topics in small animal theriogenology.

CVM 6521. Avian & Exotic Medicine. (2 cr. ; S-N only; Every Fall, Spring & Summer)
Develop the knowledge and technical skills needed to manage common medical and surgical issues of popular avian and exotic species.

CVM 6522. RaOI Large Animal Medicine. (1-2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Large Animal Medicine Rotation at another accredited veterinary college and used to met a core medicine requirement.

CVM 6523. External Shelter Medicine Rotation. (1-2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Shelter Medicine (spay and neuter) at a external site and used to meet a core requirement.

CVM 6524. Ambulatory Medicine Rotation at Other Institution. (1-2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Ambulatory Medicine at another accredited veterinary college and used to meet a core requirement.

CVM 6525. Rotation at Other Institution (RAOI). (1-2 cr. [max 40 cr.] ; S-N only; Every Fall, Spring & Summer)
Students to spend one-six weeks in an organized program at another degree-granting institution, in an area either not offered at the University or in one that complements experience in a clinical rotation at the University. prereq: DVM 4th yr or instr consent

CVM 6526. Dermatology Rotation at Other Institution. (; 1-2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Rotation through which students may take a required dermatology course at another accredited veterinary college. prereq: DVM 3rd or 4th year or instr consent

CVM 6527. Anesthesiology Rotation at Other Institution. (; 1-2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Rotation offered allowing students to fulfill their anesthesiology rotation requirement at another accredited veterinary college. prereq: DVM 3rd or 4th year or instr consent

CVM 6528. Radiology Rotation at Other Institution. (; 1-2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Radiology core rotation taken at another acredited veterinary college and used to meet core requirements. prereq: DVM 3rd or 4th year or instr consent

CVM 6529. Large Animal Surgery Rotation at Other Institution. (; 1-2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Equine Medicine Rotation at another accredited veterinary college and used to meet a core medicine requirement. prereq: DVM 3rd or 4th year or instr consent

CVM 6531. Biosecurity and Biocontainment for Food Animals. (; 2 cr. ; S-N only; Every Spring & Summer)
Rotation. Biocontainment and biosecurity measures and strategies that are being used in the food animal industry (swine, poultry and dairy) to prevent the spread of disease. Hands on experience for students interested in developing biosecurity plans for farms. Pathogen transmission within and between populations, the routes of pathogen dissemination and measures and strategies used to prevent disease dissemination. Hands on biosecurity audits/develop recommendations for system improvement.

CVM 6532. Clinical Pathology Rotation. (; 2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Two week intensive rotation in veterinary clinical lab medicine. Hematology, cytology, clinical chemistry, endocrinology, microbiology. Sample submission. Lab test methodology. Didactic teaching, small group discussion, case-based/guided self-instruction, microscopy. prereq: DVM 3rd or 4th yr or instr consent

CVM 6535. RaOI Large Animal Surgery and Lameness. (2 cr. ; A-F only; Every Fall, Spring & Summer)
Large Animal Surgery Rotation at another accredited veterinary college and used to meet a core medicine requirement.

CVM 6538. Lakefield Clinical Rotation. (2 cr. ; A-F only; Every Fall, Spring & Summer)
Managing general/clinical caseload in non-referral setting. Working with patients at Banfield, The Pet Hospital, under supervision of mentor. Managing acute/chronic cases. Client communication. Clinical skills.

CVM 6539. Wellhaven. (2 cr. [max 4 cr.] ; A-F only; Every Fall, Spring & Summer)
The intent of this rotation is to provide the student with experience, instruction and supervision managing a general,clinical caseload in a non-referral, non-academic setting. The student will use knowledge gained in didactic coursework to refine their medical knowledge base. The student will be provided the opportunity to improve their clinical skills working with patients seen at a Wellhaven hospital under the supervision of an assigned Wellhaven mentor and staff.

CVM 6540. Advanced Veterinary Toxicology. (; 2-8 cr. [max 40 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
In-depth examination of toxins. Clinical, diagnostic, mechanistic, and therapeutic aspects of biotoxins, organic, and inorganic toxins that affect livestock, poultry, wildlife, and companion animals or that threaten public health. prereq: DVM 3rd or 4th yr or instr consent

CVM 6560. Public Health Issues and Veterinary Medicine Opportunities. (; 1 cr. [max 2 cr.] ; A-F only; Every Fall & Spring)
Public health practice and veterinary medicine. Day-to-day work of public health professionals. Public health principles in context. Veterinary medicine related to public health research/ practice. Students interact with advocacy groups, media, lobbyists, legislators, regulatory officials, industry leaders, and public health professionals.

CVM 6601. Small Animal Internal Medicine: (SAM A). (; 2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Primary case responsibility for wide range of clinical diseases. History taking, physical examination, problem definition, diagnostic/ therapeutic plans on assigned cases. Cases typically relate to gastroenterology, urology/ nephrology, oncology, neurology, immunology, and cardiology. Daily rounds. Students present case discussion topics and interpret lab data, radiographic evaluations, and

biopsy information. Emphasizes effective communications with clients/referring veterinarians. prereq: DVM 3rd or 4th yr or instr consent

CVM 6602. Small Animal Internal Medicine: (SAM B). (; 2 cr. [max 52 cr.] ; S-N only; Every Fall, Spring & Summer)
Problem-solving skills, clinical skills, communication skills, record keeping, ethical issues in referral cases. Methods of knowledge acquisition, including computerized searches and diagnostic programs. Small group rounds discussions. Students assist clinicians in management of referral/emergency cases. Cases typically related to gastroenterology, nephrology, urology, oncology, nutrition, neurology, and cardiology. prereq: [6601, [DVM 3rd or 4th yr]] or instr consent

CVM 6605. Banfield Elective Clinical Rotation. (; 2 cr. [max 4 cr.] ; A-F only; Every Fall, Spring & Summer)
Managing general/clinical caseload in non-referral setting. Working with patients at Banfield, The Pet Hospital, under supervision of mentor. Managing acute/chronic cases. Client communication. Clinical skills.

CVM 6607. Introduction to MRI, CT, and PET Imaging Methods. (; 2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Two week didactic rotation where students will be introduced to magnetic resonance imaging (MRI), computed tomography (CT), and positron emission tomography (PET) imaging methods.

CVM 6609. Emergency/Critical Care (ECC). (; 2 cr. [max 8 cr.] ; S-N only; Every Fall, Spring & Summer)
Emergency/critical-care cases in small animal practice or emergency practice. History taking, physical exams. Creating problem lists, proposing diagnostic/therapeutic plans. prereq: Sr

CVM 6612. Teaching Puppy class. (1 cr. [max 2 cr.] ; S-N only; Every Fall, Spring & Summer)
Class is offered to 2nd year students in the spring who receive a "K" grade and finish the class in summer. Class is also offered in the fall for 3rd year students who receive a "K" grade and finish the class the following spring

CVM 6630. Behavior. (2 cr. [max 8 cr.] ; Student Option; Every Fall, Spring & Summer)
Students participate in behavior consultations: history taking, diagnosis, outline of treatment protocols, sample collection, demonstration of training techniques, writing of treatment plans, case follow-up. Students present one case, prepare one topic of their choice for presentation during rounds. Daily rounds include discussion of cases, review of behavior-related articles, discussion of problem complexes. prereq: DVM [3rd or 4th yr] or grad student or instr consent

CVM 6632. Dermatology (Derm). (; 2 cr. [max 20 cr.] ; S-N only; Every Fall, Spring & Summer)
Routine dermatologic problems in companion animal practice. History taking, clinical diagnosis, patient management, client education. Students participate in all phases of diagnosis/management of cases. Small-group discussions. prereq: DVM 3rd or 4th yr or instr consent

CVM 6634. Ophthalmology. (2 cr. [max 40 cr.] ; S-N only; Every Fall, Spring & Summer)
Entry-level ophthalmology. Diagnosis, treatment. Outside readings, review papers, final essay exam. prereq: DVM 3rd or 4th yr or instr consent

CVM 6636. Cardiology. (2 cr. [max 40 cr.] ; S-N only; Every Fall, Spring & Summer)
Clinical problem solving. Cases of cardiopulmonary disease, including canine/feline congenital heart disease, acquired valvular/myocardial disease, dirofilariasis, arrhythmias, pulmonary disorders. Hands-on experience in conducting physical exams, recording electrocardiograms/echocardiograms, and reading thoracic radiographs. Group discussions, rounds. prereq: DVM 4th yr or CVM grad or instr consent

CVM 6644. Primary Care A. (2 cr. [max 40 cr.] ; S-N only; Every Fall, Spring & Summer)
Students manage their own cases including developing diagnostic, treatment, and preventive health maintenance plans for each patient, performing routine medical and surgical procedures, and conducting client communication and education. Wide variety of cases.

CVM 6648. Advanced Clinical Oncology Rotation. (; 2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Case management, self-directed research. Students receive oncology referrals, work with emergency cases and special procedures, assist in treatment decisions and therapeutic options for new cases, and manage ongoing chemotherapy/radiation therapy patients. Emphasizes principles of oncology and patient care. prereq: DVM 3rd or 4th yr or grad student or instr consent

CVM 6649. Primary Care B. (2 cr. [max 8 cr.] ; S-N only; Every Fall, Spring & Summer)
Students manage their own cases including developing diagnostic, treatment, and preventive health maintenance plans for each patient, performing routine medical and surgical procedures, and conducting client communication and education. Wide variety of cases.

CVM 6661. Neurology. (2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Medical/surgical neurology. Providing complete neurological service for clients, patients, and hospital. Integration into all aspects of service, including receiving, work up, surgery, care, communications, and discharges. prereq: 3rd or 4th yr DVM or instr consent

CVM 6662. Comparative Anesthesiology (Anes). (; 2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Practical experience in sedating/anesthetizing routine clinical cases. Previously taught lab protocols/techniques are used in healthy normal clinical cases and adapted for high risk cases. Emphasizes problem solving in formulation of anesthetic plans, management of patients under anesthesia, team work, and pain management. prereq: DVM 3rd or 4th yr

CVM 6663. SA Surgery. (2 cr. [max 8 cr.] ; S-N only; Every Fall, Spring & Summer)
Diagnostic/therapeutic management of surgical patients. History taking, physical examination, communication, problem solving, and surgical techniques. Economic issues. Students work as part of a surgical service team with faculty member, resident, and intern. prereq: DVM 3rd or 4th yr or instr consent

CVM 6664. University of Minnesota: Spay and Neuter (UMSN). (2 cr. [max 10 cr.] ; S-N only; Every Fall, Spring & Summer)
Elective surgeries such as ovariohysterectomies, neuters, and declaws for small animals. Two-student teams are responsible for pre-surgical evaluation, anesthesia induction/maintenance, surgical procedure, and post-operative care of animals supplied by Humane Society for Companion Animals. prereq: DVM 3rd or 4th yr or instr consent

CVM 6665. Small Animal Physical Rehabilitation. (; 2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Students work closely with veterinary technician and physical therapist who are certified canine rehabilitation practitioners. Evaluating a patient to determine a rehabilitation problem list. Establishing treatment goals. Application of basic physical modalities, proper passive range of motion, beginning therapeutic exercises. Students develop treatment goals and plan for one orthapedic and one neurologic case.

CVM 6666. Special Procedures in Veterinary Radiology. (; 2 cr. ; Student Option; Periodic Fall & Spring)
Contrast agents and procedures used to examine various body systems or anatomical areas. prereq: DVM 3rd or 4th yr or grad or instr consent

CVM 6690. Integrative Medicine. (1 cr. ; S-N only; Every Spring)
History/principles of acupuncture, chiropractic, and other commonly used complementary approaches to care of domestic animals. Training requirements for certification. Lectures, case examples, demonstrations. prereq: 2nd yr DVM student or instr consent

CVM 6691. Veterinary Acupuncture (AcPunct). (; 2 cr. [max 6 cr.] ; S-N only; Every Fall, Spring & Summer)
Basic veterinary acupuncture theory, point combination, treatment, diagnosis of diseases, hands-on veterinary acupuncture technique. prereq: [6690, [yr 3 or 4 DVM]] or instr consent

CVM 6702. Large Animal Palpation Labs. (; 1.5 cr. [max 2 cr.] ; S-N only; Every Fall)
Hands-on clinical experiences in equine, bovine, or large animal reproductive status/disorders. Students select species. prereq: DVM or instr consent

CVM 6704. Reproductive Diseases of Cattle. (; 2 cr. [max 6 cr.] ; A-F or Audit; Every Fall)

Common diseases affecting reproductive function in cattle, swine, and small ruminants. prereq: 3rd yr DVM or instr consent

CVM 6711. Large Animal Medicine (LAM). (; 2 cr. [max 8 cr.] ; S-N only; Every Fall, Spring & Summer)
Medical diseases of horses, cattle, small ruminants, South American camelids, and pot bellied pigs. History taking, clinical diagnosis, patient management. Assessment of treatment responses. Clinic case material, opportunities to practice common procedures. Small group discussions on clinical diagnosis, treatment, and prevention of common medical disorders. prereq: DVM 3rd or 4th yr or instr consent

CVM 6712. Equine Ambulatory Rotation. (; 2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Equine ambulatory rotation meeting for two weeks performing farm calls, call backs, x-ray development, and restocking the van. Student and practitioner discuss cases as calls are being made.

CVM 6715. Large Animal Surgery and Lameness. (2 cr. [max 10 cr.] ; S-N only; Every Fall, Spring & Summer)
General surgery, lameness cases. Emphasizes horses. Some cattle, small ruminants/camelids. Diagnostic/therapeutic management in hospital setting. Cases, rounds, exercises. Students work as part of surgical management or advanced diagnostic/therapeutic techniques available in a referral setting. prereq: 3rd or 4th yr DVM student or instr consent

CVM 6720. Problem Solving in Equine Medicine. (; 2 cr. ; A-F or Audit; Every Spring)
Evidence-based medicine and clinical epidemiology concepts are integrated into discussion of cases. Assignments include reading of journal articles, working through case scenarios on Web CT, and answering case-based questions. prereq: DVM 3rd yr or instr consent

CVM 6721. Large Animal Neonatology. (1 cr. [max 2 cr.] ; S-N or Audit; Every Fall)
Instruction, emergency duty, practical application of principles in evaluating/treating sick equine neonates. Seasonal participation in clinically managing hospitalized foals/ periodically reviewing past cases.

CVM 6727. Equine Palpation. (; 0.5 cr. [max 1 cr.] ; S-N only; Every Fall)
Hands-on clinical experience in evaluation of equine reproductive status and reproductive disorders. prereq: DVM or instr consent

CVM 6728. Reproductive Diseases of the Horse. (; 1 cr. ; A-F or Audit; Every Fall)
Reproduction patterns, breeding practices, management, artificial insemination, economics of reproductive performance, and infertility in horses. prereq: DVM 3rd yr or instr consent

CVM 6729. Community-based External Elective Rotation- Mission Animal Hospital. (2 cr. [max 8 cr.] ; S-N only; Every Fall, Spring & Summer)
The major emphasis of this rotation is to provide the veterinary student with experience, instruction and supervision managing a general, clinical caseload and engaging in client education in a unique non-profit, community-based setting with a focus on client communication and spectrum of care case management.

CVM 6732. Equine Dentistry and Preventative Medicine. (; 2 cr. [max 4 cr.] ; A-F only; Every Fall, Spring & Summer)
Two-week rotation on dental health care and general preventative health care for horses. Field trips, presentations, labs, case studies, clinical cases. prereq: 3rd or 4th yr DVM or instr consent; intended for equine track or mixed track students

CVM 6733. Equine Dentistry and Nutrition. (; 2 cr. [max 4 cr.] ; S-N only; Every Fall & Spring)
Equine dentistry and practical abilities for diagnosis/treatment of dental disorders. Equine nutrition and the practical application of common nutrition related health problems. Lectures, hands on activities, group work, and case correlates.

CVM 6736. Equine Lameness and Podiatry. (; 2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Rotation introduces diagnosis/treatment of equine lameness/hoof disorders. Clinical cases, presentations, case studies, labs. prereq: Intended for equine track or mixed track students

CVM 6737. Equine Sports Medicine. (2 cr. ; S-N only; Every Fall)
Equine lameness and podiatry. Develop lameness and evaluation skills. Diagnostic principles for identifying lameness. Medical, surgical and rehabilitation therapies available to treat lameness. Didactic material, labs, and clinical cases. prereq: 6736

CVM 6739. Professional Development in Clinical Training. (2 cr. [max 8 cr.] ; S-N only; Every Fall, Spring & Summer)
Students will complete valuable work including writing manuscripts for publication, completing research work toward an advanced degree, achieving certifications (Fear Free handling, Beef Quality assurance), taking courses not available in our curriculum (aquaculture, Spanish for veterinarians), and preparing for NAVLE.?

CVM 6747. Equine Theriogenology. (; 2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Techniques in equine reproduction. Handling of stallions and mares. Testing for estrus detection. Rectal palpation, ultrasound exam of reproductive tract. Breeding management, hormone treatments, vaginal examination, uterine culture, cytology and biopsy, semen collection and evaluation, intrauterine therapy, artificial insemination.

CVM 6789. Fresh Dairy Doe and Newborn Goat Kid Management. (; 2 cr. [max 4 cr.] ; A-F only; Every Spring)
Rotation at Poplar Hill Goat Dairy during fresh doe/goat kid season. How to recognize, diagnose, and treat kid illnesses. Health strategies to control Johne's, caprine arthritis encephalitis virus, coccidiosis, neonatal diarrheas, mastitis, parasitism, and nutritional deficiencies.

CVM 6792. Small Ruminant Health and Production Rotation (SmRu). (; 2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Sheep, goat, llama, farmed-deer production, medicine, and health. Nutrition/health management, new stock, facility maintenance, husbandry, diagnosis, record keeping, zoonosis, necropsy. Reproductive management. Breeding soundness, body condition, vasectomy, ultrasound, castration, tail docking, disbudding, dehorning, vaccination, parasites, restraint/handling, venipuncture, foot trimming, tuberculin testing. Farm visits. prereq: DVM 3rd or 4th yr or instr consent

CVM 6794. Camelid Medicine, Surgery, Reproduction, and Health Management. (; 2 cr. [max 4 cr.] ; A-F only; Every Spring)
Two-week rotation. Approximately 15 farm visits are made to alpaca/llama farms. Approximately 10 alpacas/llamas are evaluated at VMC. Hands-on learning environment. Physical exam, venipuncture, ultrasound. Field surgeries such as castration, dental work, foot trimming, venipuncture, body condition score, preventive herd health management, pharmaceuticals. Common medical/reproductive problems. Interstate health certificates. Tuberculosis testing and nectropsy. prereq: 3rd or 4th yr DVM or instr consent

CVM 6796. Beef Production Systems Medicine: Feedlot. (; 2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Beef cattle feedlot production, medicine, health management. Production systems. Receiving protocols, economics. Livestock selection/evaluation, health management, facility evaluation. Pre-conditioning, pre-immunization, environmental pollution monitoring, transportation/vaccine protocols, nutrition, respiratory diseases, epidemics/ disease. Evaluation of small/large feedlot operations. Body condition scoring, castration, dehorning/parasite control. Necropsy, field pathology sampling. prereq: DVM 3rd or 4th yr student or instr consent

CVM 6797. Beef Production Systems Medicine: Cow-Calf (BPSCC). (; 2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Beef production medicine and health management. How cow-calf medicine fits within the larger North American beef production system. Cow-calf beef production system and related preventative/therapeutic health management programs, purchasing/ introducing new stock, marketing systems, facility requirements/design, husbandry, field diagnostics, reproductive management, breeding soundness evaluations, vaccine protocols, record keeping and economics, calving management, body condition scoring, and calf scour management and treatment. Farm visits to evaluate production systems with field trips to high/low health cow-calf operations with focus on problem solving and discussions of on farm disease cases and

important industry topics. prereq: DVM 3rd or 4th yr or instr consent

CVM 6798. Beef Production Systems Medicine: Feedlot A. (2 cr. [max 4 cr.] ; A-F only; Every Fall)
Beef cattle feedlot production, medicine, health management. Production systems. Receiving protocols, economics. Livestock selection/evaluation, health management, facility evaluation. Pre-conditioning, pre-immunization, environmental pollution monitoring, transportation/vaccine protocols, nutrition, respiratory diseases, epidemics/disease. Evaluation of small/large feedlot operations. Body condition scoring, castration, dehorning/parasite control. Necropsy, Field pathology sampling. Feedlot A rotation is located in Canada. Students are required to fund travel expense. prereq: DVM 3rd or 4th yr student or instr consent

CVM 6799. Beef Productions Medicine: Feedlot B. (2 cr. [max 4 cr.] ; A-F only; Every Fall & Summer)
Beef cattle feedlot production, medicine, health management. Production systems. Receiving protocols, economics. Livestock selection/evaluation, health management, facility evaluation. Pre-conditioning, pre-immunization environmental pollution monitoring, transportation/vaccine protocols, nutrition, respiratory diseases, epidemics/disease. Evaluation of small/large feedlot operations. Body condition scoring, castration, dehorning/parasite control. Necropsy, field pathology sampling. Feedlot B rotation is located in Nebraska. Students are required to fund travel expense. prereq: DVM 3rd or 4th yr student or instr consent

CVM 6800. Bovine Palpation. (; 0.5 cr. [max 1 cr.] ; S-N only; Every Spring)
Practice in diagnostic evaluation of bovine reproductive tract. prereq: DVM or instr consent

CVM 6806. Food Animal Disease and Diagnostics. (; 2 cr. [max 4 cr.] ; S-N only; Every Spring)
Two-week rotation. Food animal necropsies, diagnostic assays. prereq: 3rd or 4th yr DVM student or instr consent

CVM 6807. Food Animal Surgery & Anesthesia. (2 cr. ; S-N only; Every Fall & Spring)
This course is designed to provide intensive training in ruminant surgery to senior students. The course is unusual in format from most veterinary curriculum offerings and provides an in-depth evaluation of food animal surgery principles as well as hands-on laboratory components to solidify understanding of the material.

CVM 6811. Overview of Bovine Theriogenology and Lameness (OBTL). (2 cr. [max 20 cr.] ; S-N only; Every Fall, Spring & Summer)
This is a senior rotation that will focus on improving students' clinical skills in the examination of the bovine female. Students will participate during this rotation in routine veterinary (reproductive and lameness related) procedures provided by the instructors' dairies. Students will be taught topics related to diagnostics, treatment and management of reproductive and foot diseases of dairy cows, topics related to reproductive and lameness management of dairy herds, and on-farm data analysis related to reproductive and health performance. prereq: instr consent

CVM 6813. Miracle of Birth. (; 2 cr. [max 4 cr.] ; S-N only; Every Fall & Summer)
Delivery of calves, lambs, and piglets at the Minnesota State Fair. Assist in public education about large animal veterinary medicine processes. Birthing and veterinary assistance of the birthing process. Media relations and interviews. Students work with large animal veterinarians, FFA students, and instructors in this rotation.

CVM 6817. Bovine Theriogenology & Lameness Advanced. (2 cr. ; S-N only; Every Fall, Spring & Summer)
Rotation will build on bovine theriogenology and lameness overview and offer more advanced techniques for bovine-interested students.

CVM 6819. Advanced dentistry. (2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
The goal of this rotation is to allow fourth year students to run their own cases as if they are out in practice while still having back-up from the dentistry clinicians. This is the final step in dentistry education.

CVM 6821. Dairy on Farm Clinical. (2 cr. [max 12 cr.] ; S-N only; Every Fall, Spring & Summer)
Typical transition cow management, clinical veterinary care. Students assist in all aspects of day-to-day management of TMF. Fresh cow screening/therapies, calvings, routine animal management. Students live at TMF during rotation. prereq: 3rd or 4th yr DVM student or instr consent

CVM 6831. Overview of Bovine Production Medicine. (2 cr. ; S-N only; Every Spring)
Gives students the background necessary to promote animal welfare, prevent disease, and assist clients in making decisions that enhance their farms productivity and financial well-being.

CVM 6832. Comparative Imaging Clinical Rotation. (2 cr. [max 6 cr.] ; S-N only; Every Fall, Spring & Summer)
Clinical instruction for making diagnostic quality radiographic and sonographic images, applying radiation safety principles, practicing abdominal sonography, and interpreting radiographic and sonographic studies.

CVM 6842. Swine Disease Diagnostics, Therapeutics, and Prevention. (2 cr. [max 4 cr.] ; S-N only; Every Fall & Spring)
Major diseases and high-health technologies. Field trips of high-/low-health farms, abattoir for slaughter check. Problem solving, discussion of on-farm disease cases. In-clinic diagnostic techniques. prereq: DVM 3rd or 4th yr or instr consent

CVM 6845. Swine Production Training (SPTr). (; 2 cr. [max 8 cr.] ; Student Option; Every Fall, Spring & Summer)
Day-to-day management of modern swine farm. Students assist with all techniques, protocols, and practices encountered daily in swine unit, conduct any necessary necropsies or surgical techniques, investigate production/health problems. On final day of rotation, students lead herd visit, summarize findings with producer and course coordinator, and write a herd report. prereq: 3rd or 4th yr DVM or instr consent

CVM 6854. Introduction to Swine Health and Production. (; 2 cr. [max 12 cr.] ; S-N only; Every Summer)
Clinical problem solving based on case examples, first-hand field experiences. Students visit/assess enterprises representing all components of pork chain, from feed milling, to animal production, to slaughter/processing. Roles/responsibilities veterinarians have in food animal production. Problem definition/investigation. Formal follow up, report writing, oral presentation of recommendations.

CVM 6856. Advanced Swine Health and Production. (; 2 cr. [max 12 cr.] ; S-N only; Every Summer)
Capstone course. Complex field problems. Student teams take a field case, work it up, and propose steps for farm to resolve problem. Lectures, in-class exercises, field trips.

CVM 6860. Integrating Laboratory Diagnostics With Field Investigations of Swine Disease. (; 2 cr. [max 4 cr.] ; Student Option; Every Spring)
Students follow selected swine disease investigations, from farm through diagnostic lab and back, determine impact of specific swine diseases on productivity and cost of production, design a control program, and collect/submit quality samples to diagnostic lab. prereq: DVM 3rd or 4th yr or instr consent

CVM 6865. Introduction to Swine Production Medicine. (; 1 cr. [max 2 cr.] ; A-F only; Every Spring)
Contemporary approaches to swine practice. Swine production, disease diagnosis. Control, treatment, eradication. prereq: DVM student or instr consent

CVM 6883. Raptor. (2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)
Students participate in all aspects of raptor medicine, surgery, and rehabilitation and gain avian experience. Conservation medicine. prereq: 6497, DVM 3rd or 4th yr, instr consent

CVM 6884. Poultry Medicine Clerkship (PMC). (; 2 cr. [max 8 cr.] ; S-N only; Periodic Fall, Spring & Summer)
Broiler, layer, and turkey industries, performance analysis, disease diagnosis, management techniques for prevention/control of disease, food safety problems and diagnostic pathology in a laboratory setting. Classroom presentations, discussions, on-farm evaluations.

CVM 6900. Microscopic Anatomy I. (2 cr. ; S-N only; Every Fall)
Identification, description, and understanding of basic structure and elements of cells and basic tissues. Identify and describe structure and organization of organ systems presented.

CVM 6901. Physiology I. (5 cr. ; A-F only; Every Fall)

Principles of cell physiology, muscle physiology, neurophysiology, cardiovascular physiology. Relationships between forces/flows in biological systems. Overview of nervous system control of viscera, muscle, glands. Anatomy/physiology of central nervous system. Special senses of domestic mammals.

CVM 6902. Veterinary Biochemistry, Nutrition & Genetics. (3 cr. ; A-F only; Every Fall)
Principles of biochemistry, genetics, nutrition. Background information/how it is used to understand animal health/disease. Examples reinforced with in-class/out-of-class problems.

CVM 6903. Anatomy I. (4 cr. ; S-N only; Every Fall)
Sequential integration of normal gross/radiographic anatomy of carnivore. Knowledge gained provides solid foundation for current/subsequent courses within veterinary professional curriculum.

CVM 6904. Clinical Skills I. (1 cr. [max 2 cr.] ; S-N only; Every Fall)
Introduction to small/large animal species. Fundamental clinical skills for small/large animal species. Proper physical exam, safe handling/restraint, behavior/animal safety, frequently used clinical skill procedures. Large animal practicum. prereq: 1st year clinical skills course

CVM 6905. Professional Development I. (1 cr. ; S-N only;)
Animal use in DVM curriculum. Economic future of veterinary profession. Personal financial planning. Options available to graduate veterinarians. Preparation/training needed to pursue specific options. Professional behavior/ethics. Examine effects of addiction on veterinary professionals.

CVM 6906. Critical Scientific Reading. (1 cr. [max 2 cr.] ; S-N only; Every Fall)
Skill development in reading of scientific literature. Papers critiqued for experimental design, statistical analysis, validity of results, contributions to literature, merit of study conclusions. Major aim of the course is to prepare veterinary students to think scientifically, for multiple career pathways, and an increasingly important role for veterinarians in comparative medicine.

CVM 6907. Professional Development II. (1.5 cr. ; S-N only; Every Spring)
Develop knowledge/proficiency needed to be successful veterinarian in areas such as communication, ethics, clinical decision-making, medical record keeping. Lecture, hands-on experiences, small group/mentor group discussions. The course will provide an overview of One-Health, animal welfare, legislative/current issues, and field trips to visit animal production facilities.

CVM 6908. Anatomy II. (3 cr. [max 5 cr.] ; S-N only; Every Spring)
Sequential integration of normal gross/radiographic anatomy of ungulates. Knowledge gained will provide solid foundation for current/subsequent courses within veterinary professional curriculum.

CVM 6909. Clinical Skills II. (1 cr. ; S-N only; Every Spring)
Domestic animal behavior. Basic small animal handling/management skills. Introduction to hospital. Small-animal clerk duty is required.

CVM 6910. Physiology II. (4 cr. [max 5 cr.] ; S-N only; Every Spring)
Anatomic strategies adopted by different animal species to achieve same/similar function. Important physiologic processes used by animals to maintain homeostasis. Neural, endocrine, paracrine regulation of organ systems. Intermediary metabolism.

CVM 6911. Immunology. (2 cr. ; S-N only; Every Fall)
This course is structured as an introductory and multidisciplinary unit consisting of a series of lectures to provide a basic understanding of the cells, molecules, and mechanisms of immunology against microbial pathogens and neoplasia, as well as immune-mediated pathologies such as allergies and autoimmunity.

CVM 6912. Basic Pathology. (2 cr. ; A-F only; Every Spring)
Mechanisms in reactions of cells/tissues to injury. Retrogressive changes in cells, cell death, pigments, circulatory disturbances, inflammation, alterations of cell growth (including neoplasia). Appllications to evaluation of gross/microscopic tissue alterations.

CVM 6913. Agents of Disease I. (4 cr. ; A-F only; Every Spring)
Mechanics of agent-host interactions in important animal diseases. Become familiar using literature to understand/solve infectious disease problems, evaluate strategies for controlling diseases. Basic structure of viruses, bacteria, parasites.

CVM 6914. Preventive Medicine. (4 cr. ; A-F only; Every Fall)
Concepts of preventive medicine. Information reinforced in other coursework. Short video lectures/notes on website for access throughout training.

CVM 6915. Clinical Pathology I. (2 cr. ; A-F only; Every Fall)
Normal/abnormal function of hematopoietic system. Pathophysiologic changes underlying serum biochemical abnormalities. Principles/clinical application of cytology as diagnostic tool. How clinical laboratory data is generated/interpreted.

CVM 6916. Clinical Pathology II. (2 cr. ; A-F only; Every Spring)
Normal/abnormal function of hematopoietic system. Pathophysiologic changes underlying serum biochemical abnormalities. Principles/clinical application of cytology as diagnostic tool. How clinical laboratory data is generated/interpreted.

CVM 6917. Agents of Disease II. (5 cr. ; A-F only; Every Fall)
This course is the second part of the Agents of Disease series dealing with diseases caused by infectious agents. This course extends the foundational information obtained on viruses, bacteria and parasites in Agents of Disease I, into understanding diseases caused by these agents in species of veterinary importance. In this course we will continue to integrate concepts on pathogenesis, life cycle, host response, diagnostic tests, and transmission of agents of diseases into developing solutions for diagnosis, prevention and control of infectious diseases in animals.

CVM 6918. Pharmacology I. (2 cr. ; A-F only; Every Fall)
Principles of drug action, disposition, and clinical applications in animal patients. Provide a solid base of general knowledge of pharmacology that will be important for later coursework in veterinary medicine and future successful veterinary practice. Students completing this course should have developed an understanding of how drugs from several medicinal classes are processed by animals and how these drugs exert their beneficial and adverse effects in animals.

CVM 6919. Systemic Pathology. (5 cr. [max 10 cr.] ; A-F only; Every Fall)
Basic mechanisms of disease in various organ systems. Organ response to injury. Describe or interpret lesions in order to formulate morphological diagnoses/differential diagnoses (etiology). Correlate clinical/laboratory findings with clinical signs or lesions that might occur.

CVM 6920. Clinical Pathology I. (2.5 cr. ; A-F only; Every Fall)
Understand/explain normal/abnormal function of hematopoietic system. Principles/clinical application of cytology as diagnostic tool. How clinical laboratory data is generated/interpreted.

CVM 6921. Clinical Skills III. (2 cr. ; S-N only; Every Fall)
Builds on clinical application of first year clinical skills. Include 2-3 clinical skills labs throughout year. Hands on practical experience with live animals. Other options include VMC mini rotations, Humane Society visits, SIRVS, RAVS, Gelding Project, VIDA, VetTouch other student specific proposals.

CVM 6922. Clinical Epidemiology. (1.5 cr. [max 2 cr.] ; A-F only; Every Fall)
This course introduces the concepts, principles, and applications of veterinary epidemiology. Veterinary epidemiology is the foundation of health management of animal populations, be they companion animals, livestock or wild populations. Clinical epidemiology provides the basis for medical decision-making in clinical practice.

CVM 6923. Public Health and Community Practice. (2 cr. ; A-F only; Every Fall)
Mixture of didactic classroom lectures/in-class discussions/exercises to provide overview of common zoonotic agents/other veterinary public health issues. Emphasis on case-based public health situations.

CVM 6924. Small Animal Medicine I. (2 cr. ; A-F only; Every Fall)
Pathophysiology, clinical presentation, diagnostic approach, therapeutic options, management protocol of common/important hematologic, immunologic, infectious diseases of dogs/cats.

CVM 6925. Diagnostic Laboratory. (2 cr. ; A-F only; Every Fall)
Laboratory experiences designed to help veterinary students practice common clinical tests, understand principles of various types of tests, gain better appreciation of test selection/interpretation. Urinalysis, hematology, serology, detection of parasitic/microbial agents of disease. This course represents an effort to collect the relevant clinical laboratory information needed by the practicing veterinarian.

CVM 6926. Small Animal Medicine II. (5 cr. ; A-F only; Every Spring)
Pathophysiology, clinical presentation, diagnostic approach, therapeutic options and management protocols, and prognosis of urinary tract, gastrointestinal, dental and endocrine diseases of dogs and cats.

CVM 6927. Small Animal Surgery I. (3 cr. ; A-F only; Every Spring)
Provide students with the basic knowledge and skills needed to evaluate and treat common small animal surgical diseases. Provide students with background knowledge, problem-solving, and technical skills that will be the basis for clinical rotations and initial years in practice.

CVM 6928. Large Animal Medicine I. (2 cr. [max 4 cr.] ; A-F only; Every Fall)
This course will address the core medical problems of swine; multisystemic infectious diseases of horses and ruminants; and common medical disorders affecting the hematologic, immunologic, urinary, and gastrointestinal systems of horses, ruminants, and camelids. It will provide part of the large animal clinical content needed to pass the National Board Examination, as well as foundation knowledge for subsequent large animal elective courses.

CVM 6929. Large Animal Surgery I. (3 cr. ; Student Option; Every Spring)
This class addresses common surgical conditions in large animal species (equine, bovine, camelid and small ruminants) related to wounds,gastrointestinal disorders and musculoskeletal disorders.

CVM 6931. Diseases of Zoo Animals and Exotic Pets. (; 1 cr. ; S-N or Audit; Periodic Fall)
Diseases of and management procedures for zoo animals and exotic pets. Restraint procedures, medication, diagnosis. prereq: DVM or grad or instr consent

CVM 6932. Introduction to Non-Domestic Veterinary Medicine. (; 1 cr. ; S-N only; Every Fall)
Overview of professions, including zoo, rehabilitation, wildlife, pet exotic, aquarium, aquaculture, regulatory and conservation medicine. Faculty and guest presenters employed in areas of non-domestic practice describe their job, the path that got them there, and present some typical challenges or cases.

CVM 6933. Zoological Medicine (MNZM). (; 2 cr. [max 20 cr.] ; Student Option; Every Fall, Spring & Summer)
Introduction to all aspects of health care of zoo animals. Housing, nutrition, preventative health programs. Students assist zoo veterinarians with immobilizations, examinations, necropsies, laboratory work, records keeping. prereq: DVM 3rd or 4th yr or instr consent

CVM 6934. Selected Topics in Zoo Animal Medicine. (; 2 cr. [max 10 cr.] ; A-F only; Periodic Fall & Spring)
Year-long course. Expertise needed by a zoo veterinarian, applications to specific captive species. Manage an animal problem or animal group problem, develop diagnostic/management/therapeutic recommendations, research three topics on an assigned species, build reference materials for case care, present findings to keepers at a selected zoo, develop an item for public education. prereq: [DVM 1st or 2nd yr] or instr consent

CVM 6935. Veterinary Imaging I. (4 cr. ; A-F only; Every Spring)
Introduction to radiographic imaging, foundational principles, imaging modalities, and musculoskeletal, general abdomen and alimentary tract systems. Interpretation of radiographic studies and clinical applications germane to common animal diseases. Lectures and exercises using a body systems approach to imaging of large/small animals.

CVM 6936. Microscopic Anatomy II. (2 cr. ; S-N only; Every Spring)
Identification, description, and understanding of basic structure and elements of cells and basic tissues. Identify and describe structure and organization of organ systems presented.

CVM 6937. Pharmacology II. (2 cr. ; A-F only; Every Spring)
This course covers principles and clinical practices of veterinary toxicology. Mechanisms of action, pharmacokinetics and therapeutic uses of drugs affecting various systems and organs. Basic pharmacodynamics and pharmacokinetic aspects of anti-bacterial, anti-fungal, anthelmintic and anti-neoplastic drugs, including drug mechanism and spectrum of action, side effects and toxicity, and modes of drug resistance that diminish clinical efficacy.

CVM 6938. Professional Development III. (1 cr. [max 2 cr.] ; S-N only; Every Fall)
Integrates subjects in veterinary professional curriculum. Introduction to/practice of professional skills. Communication, ethics, teamwork, leadership. As a result of taking this course, students will be able to define medical professionalism, understand the concepts, organization, and hierarchy of problem oriented thinking by demonstrating problem definition and problem refinement. Students will identify, list and utilize resources available for answering clinical questions. Students will utilize clinical skills (history and physical exam) to assess individual or populations of animals in order to develop diagnostic and therapeutic plans. Students will effectively communicate problem oriented approach to colleagues in oral and written format. Students will effectively communicate the medical plan, treatment options, prognosis and cost of recommendations to owner.

CVM 6939. Non-Traditional Pets. (1 cr. [max 2 cr.] ; A-F only; Every Spring)
Introduction to the care and handling of a variety of small animals including reptiles, amphibians, rodents, rabbits and ferrets, seen by veterinarians in primary care practice. This course provides an overview of gross and radiographic anatomy, major infectious diseases and their management, and normal behavior in domestic environments.

CVM 6941. Clinical Skills IV. (2 cr. ; S-N only; Every Spring)
Builds on clinical application of first/2nd year fall clinical skills. Includes clinical skills labs throughout year. Hands on practical experience with live animals. Other options include VMC mini rotations, Humane Society visits, SIRVS, RAVS, Gelding Project, VIDA, VetTouch other student specific proposals.

CVM 6942. Veterinary Clinical Pathology II. (3 cr. ; A-F only; Every Spring)
Required readings, didactic classroom lectures, on-line tutorials, group discussions, homework to cover veterinary clinical pathology. Integration of all clinical pathology data available for patient with opportunity for students to distinguish diseases with similar clinical or clinic-pathologic findings.

CVM 6943. Avian Core. (2 cr. ; S-N only; Every Spring)
This course will present information on birds. Successful completion will provide a firm foundation for more advanced avian studies such as companion bird medicine, poultry health, raptor rehabilitation and avian surgery. Through a blend of didactic lectures, hands-on laboratories, and student-driven inquiry, topics of ornithology, behavior, anatomy, physiology, production management, diseases and basic clinical procedures will be presented. Fundamentals of flock management and nutrition will be covered along with principles of biosecurity and recognition of diseases will be addressed.

CVM 6944. Small Animal Surgery II & Anesthesia. (4.5 cr. ; A-F only; Every Fall)
This course will introduce the principles of small animal anesthesia, critical care, and will continue the principles of surgery from Surgery I (CVM 6927). The course will consist of lectures laboratories, and a case discussion session.

CVM 6945. Large Animal Medicine II. (3 cr. ; A-F only; Every Fall)
Course addresses common medical disorders of the large animal neurological, muscular, cardiovascular, and respiratory systems, as well as core medical problems of swine. It will provide part of the large animal clinical content needed to pass the National Board Examination, as well as foundation knowledge for subsequent large animal elective courses.

CVM 6946. Large Animal Surgery II. (2 cr. ; Student Option No Audit; Every Fall)
Course concentrates on the principles of anesthesia, identifying surgical conditions of the cardiopulmonary and urogenital systems, common urogenital surgeries and miscellaneous conditions of the head and tail.

Species discussed include horses, cattle, small ruminants, and pot-bellied pigs.

CVM 6947. Veterinary Imaging II. (2 cr. ; A-F only; Every Fall)
Imaging of the thorax, urogenital tract, and spine. Emphasis on interpretation of radiographic studies and clinical applications germane to common animal diseases. Lectures and active learning exercises using a body systems approach to imaging (primarily radiographic) of small and large animals.

CVM 6949. Comparative Theriogenology. (3 cr. ; A-F only; Every Fall)
This course develops a broad clinical knowledge of common reproductive management strategies and clinical conditions associated with reproduction in the major domestic species. It provides information and strategies for the conduct of breeding soundness examination and infertility work-ups in the male; estrous cycle characteristics, diagnostics and control in females; breeding management strategies, pregnancy diagnosis and management of gestation; investigation and control strategies for pregnancy loss; management of parturition and treatment of dystocia; normal post-partum changes and diseases of the peri-partum period and the pathophysiology and treatment of uterine infections. Material is presented in both a comparative and species specific manner.

CVM 6952. Clinical Skills V. (1 cr. ; S-N only; Every Fall)
This course aims to build on the clinical application of the first two years clinical skills course including further development of physical examination competence and frequently used clinical skill procedures. The course will incorporate a variety of opportunities to practice clinical skills including 1-2 clinical skills labs in the fall, small and large animal hospital practicum and outside veterinary hospital visits. Other experiences that can be chosen include Humane Society visits, SIRVS, RAVS, Gelding Project, VIDA, VetTouch and other student specific proposals.

CVM 6953. Professional Development IV. (2.5 cr. ; S-N only; Every Fall)
This class will prepare students for practice from both a legal and logistical perspective (Practice Management) and provide you with opportunities to hone your communication skills and thereby equip your to build your future relationships with your clients.

CVM 6954. Small Animal Medicine III. (5 cr. ; A-F only; Every Fall)
Pathophysiology, clinical presentation, diagnostic approach, therapeutic options and management protocols, and prognosis of cardiopulmonary, neurologic and neoplastic diseases of dogs and cats.

CVM 6955. Community Based Medicine at Animal Humane Society-University Ave. (2 cr. [max 8 cr.] ; S-N only; Every Fall, Spring & Summer)
Students manage their own small animal cases using a community medicine approach. History taking, physical examination, development of creative diagnostic, and treatment plans using evidence-based incremental care approaches with the specific household in mind, case management, culturally humble client communications, culturally relevant client education, +/- primary care surgery.

CVM 6956. Small Animal Selective I. (3 cr. [max 4 cr.] ; S-N only; Every Spring)
This course is intended to integrate clinical core knowledge for small animal primary care. Included in this course are the entry level competencies for small animal care in the areas of preventive care, anesthesia, emergency medicine, cardiology, surgery, nutrition, dermatology and dentistry. Students will develop the skills and knowledge to maintain health, identify and treat or manage common small animal conditions.

CVM 6957. Small Animal Selective II. (3 cr. [max 4 cr.] ; S-N only; Every Spring)
Explore advanced content related to small animal practice. Specialties covered in this course include nutrition, dentistry, cardiology, anesthesia, surgery, oncology, ultrasound, and emergency and critical care. Develop the skills and knowledge to treat a variety of small animal diseases and conditions. Practice advanced dental and surgical skills in a laboratory setting

CVM 6958. Small Animal Problems. (2 cr. ; A-F only; Every Spring)
This course uses a mixture of didactic classroom mini-lecture and group discussion and case-based homework to cover a variety of problems encountered in small animal medicine. Problems may be ones listed as presenting complaints by owners of dogs and cats, problems found on physical examination, or laboratory abnormalities encountered in case evaluation. Emphasis will be placed on selection of laboratory tests, interpretation of results, and using results to guide development of a diagnostic and treatment plan for patients. The course will emphasize integration of information introduced in core companion animal systems courses with clinical pathology.

CVM 6959. Orientation to Clinical Rotations. (2.5 cr. ; S-N only; Every Spring)
Provides students with an overview and exposure to various topics, issues, and procedures that will be encountered during their senior rotations. The goal of the Orientation to Clinical Rotations course is to facilitate student transition into clinics. The course will include didactic lectures, group exercises, and open discussions. Topics that will be covered include: CVM and VMC policies and procedures, patient flow, SOAPs, discharges, admissions, ICU/wards, patient care, UVIS, client communications, infection control, safety, pharmacy, licensure, and rotation

CVM 6960. Equine Selective I. (2.5 cr. ; A-F only; Every Spring)
The primary objective of this elective is to provide the opportunity for third year students interested in equine practice to expand their knowledge and clinical skills beyond core levels achieved in the preceding curriculum. This course includes content and skills that are considered entry level requirements for students who plan to provide clinical care for horses at any level in their practice after graduation. It is the minimum required for students with an interest in care of horses in a mixed animal practice setting and serves as a foundation for further learning and skill development provided in the Equine Selective II, as well as for the equine rotations for senior students.

CVM 6961. Equine Selective II. (3 cr. ; A-F only; Every Spring)
This elective is designed to provide further opportunity for third-year students focused on equine practice to expand their knowledge and skills beyond core levels achieved in the preceding curriculum and Equine Selective I. Content has been chosen to prepare the student for equine work on the large animal rotations and equine or mixed animal practice. Students will study equine disorders, diagnostic testing, anesthesia, and surgical techniques in greater detail through a combination of lectures and labs, and will practice working through clinical cases in a problem-based format.
By the end of the course, students will have improved their general knowledge of equine medicine and practice; recognize common medical disorders; select initial diagnostic tests; be able to perform neurologic and urinary tract examiminations; be able to perform upper airway endoscopy; be able to perform transtracheal wash and bronchoalveolar lavage procedures; and explain therapeutic options for common disorders.

CVM 6962. Equine Problems. (2 cr. ; A-F only; Every Spring)
This course is intended for third year students in the veterinary medicine curriculum. Each two-hour class period will include a review of evidence-based medicine concepts integrated into the discussion or one or more cases during the class period. This course is designed to:
1) Enhance student knowledge of diagnosis, pathophysiology and treatment equine diseases; 2) allow students to develop critical clinical thinking and problem solving skills;
3) to demonstrate the use evidence based medicine in solving clinical problems; 4) to give students the tools necessary to become life-long learners and stay current with advances in veterinary medicine after completion of veterinary school. Students will have the opportunity to create differential diagnosis lists for several common equine presenting complaints, review pertinent literature, and work through several real life cases throughout the semester. By the end of the semester students will be comfortable with the process of case work-up and will be prepared to implement this process during their clinical year.

CVM 6963. Food and Fiber Selective I: Food and Fiber Practice. (4 cr. ; S-N only; Every Spring)
Introduction to food animal practice at any level from mixed practice with backyard producers to dedicated species practitioners. Course will cover principles common to all food animal species. Students will gain exposure to common house and production systems,

approaches to treatment and management of common diseases as well as field anesthesia and surgery.

CVM 6964. Food & Fiber Selective II: Production Medicine. (4 cr. ; A-F only; Every Spring)
The course will provide a detailed understanding of general principles of swine and ruminant health and production, analytical skills applied to production records and economics, and therapeutic and preventative decision-making for prevalent clinical diseases and syndromes in US swine and ruminant herds.

CVM 6966. Applied Small Ruminant and Camelid Practice. (1.5 cr. ; A-F only; Every Spring)
This course will build upon previously taught core material focusing on diagnosing, treating, and preventing common problems seen in routine veterinary practice with sheep, goats, and camelids. This course will be a prerequisite for 4th year Small Ruminant and Doe/Kid rotations (unless instructor permission is given).

CVM 6968. Obstetrics Lab. (0.5 cr. ; S-N only; Every Spring)
This is a practical laboratory in which students will have the opportunity to practice obstetric procedures, including a full fetotomy, that were described in lecture during the fall semester Comparative Theriogenology course. Students will be grouped and each group will have two labs occurring on consecutive days; one for correction of dystocia and the second concentrating on fetotomy technique. Within each group, students will work in pairs. The lab uses late term fetuses, obtained from the slaughterhouse, that are placed in dummy cows. While late term fetuses removed from the uterus have less disease risk than dead calves, students are required to wear protective clothing at all times; including gloves (OB sleeves and latex), boots, and coveralls. Face shield will be provided if needed. Students MUST be careful with hygiene during and after the labs (e.g., avoid touching the mouth with dirty hands during the lab and WASH HANDS AFTER THE LAB).

CVM 6969. Large Animal Medicine III. (4.5 cr. ; A-F only; Every Fall)
Course addresses common medical disorders of the large animal neurological, muscular, cardiovascular, and respiratory systems, as well as core medical problems of swine. It will provide part of the large animal clinical content needed to pass the National Board Examination, as well as foundation knowledge for subsequent large animal elective courses.

CVM 6970. Professional Development V. (1 cr. ; S-N only; Every Spring)
Practice of professional skills: communication, ethics, teamwork, and leadership. Students will be able to define medical professionalism, understand the concepts, organization, and hierarchy of problem oriented thinking by demonstrating problem definition and problem refinement. Students will identify, list, and utilize resources available for answering clinical questions, and utilize clinical skills (history and physical exam) to assess individual or populations of animals in order to develop diagnostic and therapeutic plans. Students will effectively communicate a problem-oriented approach to colleagues in oral and written format, as well as a medical plan, treatment options, prognosis, and cost of recommendations to owner.

CVM 6971. Dermatology. (2 cr. ; A-F only; Every Spring)
Case-base discussion of common dermatological conditions that affect dogs and cats. Students work on clinical cases outside classroom. Cases are discussed in classroom.

CVM 6972. Ophthalmology. (1.5 cr. ; A-F only; Every Fall)
Common procedures for evaluation, diagnosis, and treatment of eye disorders in domestic species.

CVM 6973. Small Animal Behavior. (1 cr. ; A-F only; Every Spring)
Introduction to abnormal and undesired animal behavior, diagnostic procedures, and behavioral and pharmacological modifications.

CVM 6974. Veterinary Toxicology. (2 cr. ; A-F only; Every Fall)
Mechanisms by which common toxicants encountered in residential, natural, and agricultural or industrial settings exert their deleterious effects in animals. Approaches to treating common toxicoses arising from toxicant exposure

CVM 6976. Small Ruminant Practice Elective. (1 cr. [max 2 cr.] ; A-F only; Every Spring)
This course will build upon previously taught core FA material focusing on diagnosing, treating, and preventing common problems seen in routine veterinary practice with sheep and goats. This course will be a prerequisite for 4th year Small Ruminant and Doe/Kid rotations (unless instructor permission is given).

CVM 6977. Advanced Dairy Production Medicine I. (2 cr. ; S-N only; Every Spring & Summer)
This rotation will give students the background necessary to provide production medicine related services. The concepts introduced in ODPM will used as a basis to explore topics further. This will allow participants to assist clients in making decisions that enhance their farms productivity, promote animal and financial well-being.

CVM 6978. Advanced Dairy Production Medicine II. (2 cr. ; S-N only; Every Spring & Summer)
This rotation will give students the background necessary to provide production medicine related services. The concepts introduced in ODPM will used as a basis to explore topics further. This will allow participants to assist clients in making decisions that enhance their farms productivity, promote animal and financial well-being.

CVM 6979. Large Animal Emergency and Critical Care Rotation. (2 cr. ; S-N only; Every Spring)
This rotation is designed to expose senior students to the spectrum of emergency and critical care cases that may be encountered in general equine and large animal food and fiber practice, and improve their ability to manage such cases swiftly and efficiently. The student experience will involve participation in daytime and after-hours emergency patient receiving and management in the Piper Equine Hospital and Large Animal Hospital, daily patient rounds, 2 hours daily of classwork and discussion exercises addressing key topics in large animal emergency medicine and surgery; and (iv) independent completion of a written case-based assignment designed to further advance student knowledge and skills related to emergency management. The clinical learning experience will focus on history taking, triage and physical examination, identification of problems, and development and execution of diagnostic and therapeutic plans for both newly-admitted emergency patients and hospitalized critical care patients. In addition, senior students will further their experience with entry-level clinical skills and procedures needed for general equine and large animal practice.

CVM 6981. Clinical Correlations I. (1 cr. ; S-N only; Every Spring)
This course design follows principles of research in learning; prepares students for clinical work as well and what will be expected of them in senior year and, for most, in their career; and prepares students for life-long learning by requiring them to find resources.

CVM 6982. Clinical Correlations II. (1 cr. ; S-N only; Every Spring)
This course design follows principles of research in learning; prepares students for clinical work as well and what will be expected of them in senior year and, for most, in their career; and prepares students for life-long learning by requiring them to find resources.

CVM 6983. Study Strategies for Success. (1 cr. ; S-N only; Every Fall & Spring)
This elective course will provide students with information about how learning works and with training in the skills of metacognition to best permit them to develop successful study strategies. Specific skills addressed will include those for study preparation (time management, creating a study space, the role of external factors such as distractions, exercise, and sleep), reading to ensure understanding, review of writing skills, taking notes from readings and in lecture, active review to enhance retention, and test-taking strategies. The course will conclude with information about problem-solving and specific strategies for learning in a clinical environment.

CVM 6984. Introduction to Laboratory Animal Medicine. (1 cr. ; A-F only; Every Spring)
Understand varying ethical perspectives on the use of animals as research subjects and identify the role and mechanism of regulatory oversight of animal research. Learn basic concepts related to care and husbandry of laboratory animal species and understand the unique anatomic, behavioral, and physiological aspects of common laboratory animal species and identify common clinical diseases of

laboratory animals, including pathogenesis, diagnosis, and treatment.

CVM 6985. PhD Project. (2 cr. [max 12 cr.] ; S-N only; Every Fall, Spring & Summer)
Preparation and research for PhD dissertation

CVM 6986. MS Project. (2 cr. [max 12 cr.] ; S-N only; Every Fall, Spring & Summer)
Preparation and research for MS thesis

CVM 6987. Swine and Dairy Welfare. (2 cr. ; A-F only; Every Spring & Summer)
Veterinarians have unique professional responsibilities for advising clients on animal welfare issues, for the development and assessment of compliance programs with animal welfare certification programs, for assisting law enforcement in animal cruelty response, and for providing expertise for animal welfare decision-making by domestic and international policy makers, retailers, businesses and non-governmental organizations. Focusing on the role of welfare in swine and dairy production, this two-week elective will provide senior veterinary students with the skills to collect and interpret animal welfare data, aid clients with identifying and achieving welfare goals, and incorporate welfare into practice.

CVM 6988. ASPCA Spay/Neuter Alliance. (1-2 cr. [max 8 cr.] ; S-N only; Every Fall, Spring & Summer)
Practice in elective procedures such as ovariohysterectomies, castrations, hernia repairs, or dewclaw removal for small animals. Animals are supplied by local animal shelters and rescue groups. The surgeries you provide will make them more adoptable. This elective was designed to provide ?hands-on? surgery skills and offer a service to the community.

CVM 6989. MN Snap. (2 cr. ; S-N only; Every Fall, Spring & Summer)
Practice in elective procedures such as ovariohysterectomies, castrations, hernia repairs, or dewclaw removal for small animals. Animals are supplied by local animal shelters and rescue groups. The surgeries you provide will make them more adoptable. This elective was designed to provide ?hands-on? surgery skills and offer a service to the community.

CVM 6990. Twin Ports Spay/Neuter. (2 cr. ; S-N only; Every Fall, Spring & Summer)
Practice in elective procedures such as ovariohysterectomies, castrations, hernia repairs, or dewclaw removal for small animals. Animals are supplied by local animal shelters and rescue groups. The surgeries you provide will make them more adoptable. This elective was designed to provide ?hands-on? surgery skills and offer a service to the community.

CVM 6991. Small Animal Clinic Rotation. (2 cr. [max 28 cr.] ; S-N only; Every Fall, Spring & Summer)
This rotation is designed to support the students in the Longitudinal Integrated Clinics program by providing a progressive, tailored program that allows individuals to gain competency in small animal clinics through mentoring, feedback and progressive entrustment.

CVM 6992. Veterinary Genetics and Genomics. (1 cr. [max 2 cr.] ; S-N only; Every Spring)
This course integrates principles of genetics and genomics, with the goals of illustrating how an understanding of these molecular biosciences enables a better understanding of the many mechanisms at play in animal health and disease.

CVM 6993. Thrive through life. (4 cr. [max 8 cr.] ; S-N only; Every Spring)
This is a small animal course is a mixture of didactic classroom lectures, laboratory exercises and small group discussions. It will integrate key concepts of nutrition, behavior and dentistry for optimal care of small animals from birth to geriatric care.

CVM 6994. Small Animal Dermatology. (1 cr. ; A-F only; Every Spring)
Examine the processes and procedures used to identify and treat disorders within the specialty of dermatology. Develop the skills necessary to formulate a logical list of differential diagnoses based on history and clinical presentation. Acquire the skills to diagnose and manage the most common dermatological conditions that affect large and small animals.

CVM 6995. Communications in small animal practice. (2 cr. [max 40 cr.] ; S-N only; Every Fall, Spring & Summer)
Educational research on the Primary Care service and surveys of new and recent graduates identified the following common communications problems: difficulty chunking and checking information provided to clients, difficulty providing recommendations confidently, and concern about managing difficult client conversations. This is a 2-week rotation during which students will review basic and advanced communication skills and practice client communications by giving common spiels, role-playing talking to clients in difficult situations, role-playing preparing and talking to clients through common case presentations, and preparing client education materials.

CVM 6996. Journey to the DVM. (; 1 cr. ; S-N only; Every Fall & Summer)
This is an elective review course, available to all students to help them continually re-test themselves as a way to help increase retention and prepare them for boards. It is set up as a game. Students start as ? Backpackers? and work their way up through the ranks by completing ethics case write ups, completing on-line clinical decision-making cases, answering NAVLE-type questions, and writing illness scripts for common disorders in all species.

CVM 6997. Clinical Experience. (; 1 cr. [max 60 cr.] ; S-N only; Every Fall, Spring & Summer)
This is 1-week clinical experience with virtual and or hands-on training under the supervision of a veterinarian or trained professional in a related profession that fosters clinical decision-making and growth in the areas of veterinary knowledge, technical skills, and/or professionalism.

CVM 6998. Evidence Based Clinical Decision Making. (2 cr. [max 20 cr.] ; S-N only; Every Fall, Spring & Summer)
This course allows students to use evidence based medicine principles to answer clinical questions. This includes incorporating patient values, clinical experience, and the best evidence. We will start with assigned reading of specific journal articles and discussion of those articles and their evidentiary value. We will then move to clinical cases that naturally elicit a clinical question. The students will search relevant data bases to find possible sources for the answer, read the sources to determine the best evidence, write a client education handout justifying the recommendation.

CVM 6999. Directed Study for Out of Sync Student. (; 0 cr. ; No Grade Associated; Every Fall, Spring & Summer)
Directed study.

Veterinary Medicine, Graduate (VMED)

VMED 5080. Problems in Veterinary Epidemiology and Public Health. (; 1-3 cr. ; A-F or Audit; Every Fall & Spring)
Individual study on problem of interest to epidemiology or public health student.

VMED 5082. Diagnostic Epidemiology of Infectious Diseases. (; 2 cr. ; A-F only; Every Spring)
Theoretical principles, practical applications of diagnostic testing in populations. Examples related to infectious diseases in veterinary/ human health. Basis of test performance, limitations, interpretations. prereq: Statistics course or instr consent

VMED 5090. Seminar: Veterinary Epidemiology. (; 1 cr. [max 3 cr.] ; S-N or Audit; Every Fall & Spring)
Each student leads at least one seminar. Reviews of current research, literature reviews, and technique development. Students and participating faculty participate in presentation, discussion, and administration of the seminars. prereq: Veterinary Medicine grad student

VMED 5101. Molecular and Cellular Basis of Nanoparticle Toxicity. (; 3 cr. [max 6 cr.] ; A-F or Audit; Every Fall)
Use of nanotechnology in scientific research. Impact of nanomaterials on biological systems.

VMED 5165. Surveillance of Foodborne Diseases and Food Safety Hazards. (; 2 cr. ; Student Option; Every Spring)
Principles/methods for surveillance of foodborne diseases. Investigation of outbreaks. Assessment of food safety hazards. Focuses on integration of epidemiologic/lab methods. prereq: [PUBH 5330, [professional school or grad student]] or instr consent

VMED 5180. Ecology of Infectious Disease. (3 cr. ; Student Option; Every Fall)
How host, agent, environmental interactions influence transmission of infectious agents. Environmental dissemination, eradication/ control, evolution of virulence. Use of analytical/molecular tools.

VMED 5181. Spatial Analysis in Infectious Disease Epidemiology. (3 cr. ; Student Option No Audit; Every Spring)
Spatial distribution of disease events. Exposures/outcomes. Factors that determine where diseases occur. Analyzing spatial disease data in public health, geography, epidemiology. Focuses on human/animal health related examples. prereq: Intro to epidemiology, statistics,

VMED 5182. Molecular biology for the Public Health Professional. (2 cr. ; Student Option; Every Spring)
This course focuses on introducing students to molecular biology lab tools that are used to investigate infectious diseases in public health settings. The course combines laboratory sessions during which students will learn and run molecular assays with computer lab sessions during which students will analyze molecular data.

VMED 5190. Effective Science Communication. (; 2 cr. ; S-N only; Every Fall)
Skills needed to research, organize, develop, and deliver an oral scientific presentation or to assist in finding, compiling, and organizing information for presentations, theses, or papers suitable for publication. prereq: Grad student

VMED 5210. Advanced Large Animal Physiology I. (; 1-3 cr. [max 6 cr.] ; Student Option; Every Fall)
Review of large animal physiology at level needed for specialty board certification or beginning research. Students present topics in physiology and supplement reading with clinical case material or journal articles.

VMED 5211. Advanced Large Animal Physiology II. (; 1-3 cr. ; A-F or Audit; Every Spring)
Large animal physiology for specialty board certification or beginning research. Students present topics in physiology and supplement reading with clinical case material or journal articles. prereq: instr consent; 5210 recommended

VMED 5232. Comparative Clinical Veterinary Dermatologic Pathology. (; 1 cr. [max 2 cr.] ; S-N only; Every Fall & Spring)
Microscopic pathology of basic dermatologic reactions and of variable disease states. prereq: DVM degree or foreign equiv

VMED 5240. Advanced Small Animal Pathobiology I. (1 cr. ; A-F only; Fall Even Year)
Biology, physiology, pathophysiology, and medicine of disciplines relevant to companion animals. Pathogenesis/treatment of diseases. Developing hypotheses that can be translated into clinical research. Prereq CVM grad student, [DVM or foreign equiv] degree.

VMED 5241. Advanced Small Animal Pathobiology II. (1 cr. ; A-F only; Spring Even Year)
Overview of biology, physiology, pathophysiology, and medicine of disciplines. Underlying pathogenesis/treatment of diseases of companion animals. Developing hypotheses that could be translated into clinical research. Prereq CVM grad student, [DVM or foreign equiv] degree.

VMED 5242. Advanced Small Animal Pathobiology III. (1 cr. ; A-F only; Fall Odd Year)
Overview of biology, physiology, pathophysiology, and medicine. Underlying pathogenesis/treatment of diseases of companion animals. Developing hypotheses that could be translated into clinical research. Prereq CVM grad student, [DVM or foreign equivalent] degree.

VMED 5243. Advanced Small Animal Pathobiology IV. (1 cr. ; A-F only; Spring Odd Year)
Overview of biology, physiology, pathophysiology, and medicine. Underlying pathogenesis/treatment of diseases of companion animals. Developing hypotheses that could be translated into clinical research. Prereq CVM grad student, [DVM or foreign equiv] degree.

VMED 5295. Problems in Large Animal Clinical Medicine/Surgery and Theriogenology. (; 1 cr. [max 3 cr.] ; A-F or Audit; Every Fall & Spring)
Hospital cases using standardized format, audiovisual aids. Review literature pertaining to case. One or two cases presented by enrolled participants per month. prereq: VMed grad student, possess DVM

VMED 5310. Topics in Veterinary Clinical Pathology. (; 1 cr. [max 2 cr.] ; S-N only; Every Fall & Spring)
Modified rounds format. Cases from VMC used to explore cytology with associated chemistry/ hematology data. Attendees/clinicians can request lab topics for dicussion. Past topics have included lab measurement of chemical analytes, test sensitivity or specificity (e.g., ethylene glycol test, FELV test), lab testing for infectious agents. prereq: Grad student in CVM

VMED 5319. Veterinary Gross Pathology. (1 cr. [max 3 cr.] ; S-N only; Every Fall & Spring)
Diagnosing gross lesions of tissues. Evaluating images from wide variety of animals submitted to lab. Mock exams. Students prepare two in-depth reviews on topics covered during in course. Prereq Grad student in CMB or [VMED, [DVM degree or foreign equivalent], college consent]

VMED 5320. Advanced Veterinary Systemic Pathology I. (; 3 cr. ; A-F only; Fall Even Year)
Students review/summarize topics in systemic pathology using veterinary pathology textbooks and relevant updates from pathology and veterinary medical journals. Diagnostic cases in alimentary, respiratory, urinary, cardiovascular, and hematopoietic system pathology. Students give 10-15 presentations with handouts for other students. prereq: Grad student in VMED or [CMB, [DVM degree or foreign equiv]] or instr consent

VMED 5330. Veterinary Descriptive Histopathology. (; 1 cr. [max 2 cr.] ; Student Option; Every Fall & Spring)
Weekly, one-hour microscopic slide prsentations, reviews on wide variety of diseases in domestic/non-domestic animals. Students present microscopic slide cases and prepare discussions about disease entities, differential diagnoses, and ancillary tests. prereq: Grad student in VMED or [CMB, [DVM degree or foreign equiv]] or instr consent

VMED 5410. Scientific Writing and Speaking. (; 2 cr. ; A-F only; Fall Odd Year)
Techniques of writing/publishing papers/theses. Manuscript preparation. Submission/review process. Proofreading. Publishing processes. Grant Writing. Oral/poster presentations at sceintific meetings. prereq: Grad student in health sciences

VMED 5430. HIV/AIDS: Pathogenesis, Treatment, and Prevention. (; 1 cr. ; Student Option; Every Fall)
Exposure to pathogenesis, treatment, and prevention of HIV/AIDS from clinical faculty who are dealing with AIDS patients. Developing new questions and design experiments that have greatest chance of translating to clinical setting. prereq: Grad student

VMED 5440. Using Risk Analysis Tools: Estimating Food Safety Risks on the Farm to Table Continuum. (; 2 cr. [max 3 cr.] ; A-F only; Every Spring)
This applications-based course will provide the necessary risk-based tools to evaluate and mitigate the microbial and chemical risks in a food production chain-from the farm until consumption. Students will follow the risk analysis process as an integral part of science-based decision-making to estimate and manage food safety risks. Students will apply different qualitative and quantitative tools by using a computer.

VMED 5442. Quantitative Methods for Population Health. (3 cr. [max 6 cr.] ; Student Option; Every Spring)
This course reviews the principles and application of advanced methods for analysis of population health data, with a focus on animal health and infectious diseases. Analytical techniques that will be taught and applied during the course include risk assessment, spatial analysis, disease modeling, and disease economics.

VMED 5492. Seminar: One Health and Infectious Diseases of Wildlife. (2 cr. ; S-N only; Every Fall)
The course will explore the applied concept of One Health and infectious diseases of wildlife in weekly case studies. In each case study, students will gain an understanding of system dynamics, infer the interplay between humans, animals and the environment in the context of a given wildlife disease, and confront current disease management practices and challenges for successfully mediating transmission and spread.

VMED 5496. Training in Swine Production and Management. (; 4 cr. ; S-N only; Every Fall & Spring)
Production module introduces techniques/ protocols for swine production system operation. Research module covers applied research trials for viral/bacterial pathogens in pigs. prereq: VMED grad student or instr consent

VMED 5594. Research in Veterinary Medicine. (1-4 cr. [max 8 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent study as determined by instructor. Usual activity includes conducting research in instructor's lab, though research in field may also be included. prereq: Jr, instr consent

VMED 5596. Swine Diseases and Diagnostics. (; 2-3 cr. [max 2 cr.] ; Student Option; Every Fall & Spring)
Review of recent advances in swine diseases; farm visits for on-farm disease diagnostics and control programs.

VMED 5621. Principles of Veterinary Anesthesiology. (; 2 cr. ; A-F only; Every Spring)
In-depth training in principles of veterinary anesthesiology. Lectures, anesthesia labs, presentations by students. prereq: VMed grad student, [DVM degree or foreign equiv], instr consent

VMED 5670. Bovine Surgery Practicum. (; 2 cr. ; S-N only; Every Fall & Spring)
Intensive training in ruminant surgery. Evaluation of food animal surgery principles, hands-on laboratory components. prereq: [VMed grad student, [DVM or equiv foreign degree]] or instr consent

VMED 5881. Food Production, Processing, and Supply Chain. (1 cr. ; S-N only; Every Spring)
Food commodities and agricultural crops play critical roles relevant to public health, energy and economic vitality, feeding the increasing global human population, and providing multiple outputs from feed for animals, to fuel for vehicles, transportation and energy. This course focuses on agricultural commodities. For 2019 we will focus on corn and dairy production systems in Minnesota. The commodity of interest will change from year-to-year to other commodities like pork and sugar beets ? which provide critical outputs for the state of Minnesota.

VMED 5895. Veterinary Public Health Integrated Learning Experience. (1-3 cr. ; S-N only; Every Fall, Spring & Summer)
Part of the curriculum for the master's degree includes an opportunity for students to develop a written document detailing applications of public health practice. Completion of the ILE allows students to synthesize aspects of public health into a document that can be utilized by public health professionals.

VMED 5896. Application of Veterinary Public Health. (0.5-6 cr. [max 12 cr.] ; S-N only; Every Fall, Spring & Summer)
The APEx, applied practice experience provides students an opportunity to learn first-hand about the organization, operations, and special activities of selected agencies, institutions and industries concerned with public health practice. This is a means of gaining additional insight into public health programs, personnel management, governmental relations, public relations, legislative support and, particularly, knowledge of special investigations or responses conducted by these organizations. Participation in the activities of public health practice programs external to the University adds a dimension of experience to the curriculum that enriches the student's training and may be beneficial in seeking employment.

VMED 5910. Grant Writing: What Makes a Winning Proposal?. (2 cr. ; Student Option; Every Spring)
Components of a strong proposal. Grant submission process. What reviewers look for. How to locate grant announcements that match research interests.

VMED 5915. Essential Statistics for Life Sciences. (3 cr. ; A-F or Audit; Every Fall)
This course is a broad overview of the principles and methods of statistical analysis used in life sciences research, including biological, veterinary, and translational research, and provides the background a new researcher needs to understand and apply commonly used statistical methods and the preparation needed for more advanced coursework. Classes will include general instruction and background information, detailed examples of how to perform the analyses, with actual data sets, and discussion on how the topic has been applied in biological research, including reading and assessing papers in the field. Computing will be performed using the R software environment, though students may use alternate software with permission. Topics will include: ? Descriptive statistics and exploratory graphics ? Understanding statistical inference and interpreting P-values and confidence intervals. ? One and two sample inference, including t-tests, proportion tests, and non-parametric alternatives ? Linear regression, including the effects of confounders ? ANOVA methods, including pairwise comparisons and multiple comparisons

VMED 5920. Food Defense: Prepare, Respond, Recover. (; 3 cr. ; A-F only; Every Fall)
Basic principles of preparedness/emergency response. Instructor may substitute topics if timelier topic arises. prereq: Grad or professional student or instr consent

VMED 5921. Protecting your Lunch: Food Defense Awareness. (; 1 cr. ; A-F only; Every Spring)
Protecting your Lunch: Food Defense Awareness presents current issues, challenges, concerns, and activities impacting global food defense. "Food Defense" is the sum of actions and activities related to prevention, protection, mitigation, response, and recovery of the food system from intentional acts of adulteration and disruption. This includes intentional acts from both terrorism and criminal activities. This topics course incorporates case studies as well as current events that directly relate to food system disruption, cause food supply chain interruption, or may provoke intentional adulteration or food fraud.

VMED 5930. Antimicrobial Resistance (AMR) from a One Health Perspective. (; 1 cr. ; A-F or Audit; Every Spring)
Fundamentals of antimicrobial resistance (AMR) development, transmission, and risks to humans, animals, and the environment delivered by experts in the One Health concept (interconnection between people, animals, plants, and their shared environment). Review and development of research-based resources and methods for communicating scientific information to non-academic audiences. Multi-institution collaboration with online engagement during class meetings.

VMED 5989. Introduction to Applied Health Policy and Leadership. (; 1.5 cr. ; Student Option No Audit; Every Spring)
This course introduces students to policy analysis and leadership tools to navigate the complexities of policy-making and foster policy dialogue and action. We will apply a health lens to discuss contemporary policy issues, explore the different stages of the policy cycle, map the polarities of complex challenges, and apply implementation science techniques to guide policies from theory to impact. May be of particular interest to graduate students in the academic health sciences or HHH/OLPD. prereq: Graduate or professional degree in-progress or completed.

VMED 5990. Veterinary Public Practice Seminar. (; 0.5 cr. [max 2 cr.] ; S-N only; Every Fall & Spring)
Interactive review of current public practice topics in environmental health/toxicology, infectious/parasitic diseases, public health administration/education, epidemiology and biostatistics, and food safety.

VMED 5994. Advanced Clinical Epidemiology. (; 1 cr. ; A-F only; Every Fall)
An in-depth focus on infectious disease epidemiology, with opportunities to apply epidemiologic principles to control infectious diseases in animal populations.

VMED 5998. Leadership to Address Global Grand Challenges. (1.5 cr. ; Student Option No Audit; Every Spring)
In this 5-day skills-based course, participants will learn and apply integrative leadership (also known as shared or facilitative leadership) strategies for addressing global grand challenges. Using global food system challenges as a basis for exploration, we will focus on leadership practices that foster collective action across diverse groups of people.

VMED 6008. Introduction to Teaching Skills. (1 cr. ; S-N only; Every Fall)
This is a hybrid series of modules and face-to-face course sessions, and experiential learning guiding veterinary students through best practices to enhance efficacy as an instructor in a veterinary curriculum.?Specific topics include learning theory, building a course session, teaching presentations, and individual student assessment.

VMED 8090. Epidemiology of Zoonoses and Diseases Common to Animals and Humans. (3 cr. ; A-F or Audit; Every Fall & Spring)
Major human zoonotic diseases, methods of transmission, diagnosis, control, and prevention. prereq: Epidemiology and infectious disease course or instr consent

VMED 8134. Ethical Conduct of Animal Research. (; 3 cr. ; Student Option; Every Fall)
Ethical considerations in use of animal subjects in agricultural, veterinary, and biomedical research. Federal, state, and University guidelines relating to proper conduct for acquisition/use of animals for laboratory, observational, epidemiological, and clinical research. Regulatory requirements. Bases for proper conduct. Societal impact on scientific investigations utilizing animal subjects.

VMED 8192. Dairy Health Management: Critical Thinking. (1 cr. [max 2 cr.] ; S-N only; Every Fall & Spring)
Group discussions surrounding critical evaluations of scientific journal articles and dairy-related scientific presentations. Facilitated by both students and faculty.

VMED 8220. Advanced Nephrology/Urology Clinics. (; 1-3 cr. ; Student Option; Every Fall & Spring)
Clinical investigation of naturally occurring urinary diseases in patients admitted to Veterinary Medical Center. prereq: instr consent

VMED 8230. Medical Conference. (; 1 cr. [max 2 cr.] ; Student Option; Every Fall & Spring)
Participation in weekly conference about internal medical disorders. prereq: instr consent

VMED 8250. Problems in Acid-base, Electrolyte, and Fluid Metabolism. (; 2-4 cr. ; A-F or Audit; Every Fall & Spring)
Clinical problems and physiology of acid-base, electrolyte, and fluid disorders of dogs and cats. prereq: instr consent

VMED 8292. Journal Club: Large Animal Internal Medicine. (; 1 cr. [max 3 cr.] ; A-F or Audit; Periodic Fall & Spring)
Students/faculty keep abreast of current literature in large animal internal medicine. Students critically evaluate the literature. prereq: instr consent

VMED 8293. Advanced Studies in Nephrology and Urology. (; 1-3 cr. ; A-F or Audit; Every Fall & Spring)
Studies of urinary tract disease with goal of generating new knowledge. prereq: instr consent

VMED 8333. FTE: Master's. (; 1 cr. [max 2 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

VMED 8360. Evidence-based Medicine. (2 cr. ; A-F or Audit; Periodic Spring)
Concepts of evidence-based medicine with emphasis on veterinary clinical evidence will be presented. Clinical questions, development of study designs, identification of literature and assessment of the impact of the literature on clinical decisions. prereq: instr consent

VMED 8385. Directed Veterinary Clinical Skills Teaching - lecture and lab. (1 cr. ; S-N only; Every Fall)
This course involves directed work in the best practices for general veterinary clinical teaching and specific veterinary clinical skills teaching, and applying those practices in teaching laboratories for 1st, 2nd and 3rd year veterinary students. It is intended for U of MN graduate students who have a DVM or equivalent degree and will potentially be involved in clinical teaching of DVM students in their future career plans.

VMED 8386. Directed Veterinary Clinical Skills: Laboratory Teaching. (1 cr. [max 3 cr.] ; S-N only; Every Fall & Spring)
This course involves directed work in the best practices for general veterinary clinical teaching and specific veterinary clinical skills teaching, and applying those practices in teaching laboratories for 1st, 2nd, and 3rd year veterinary students. It is intended for U of MN graduate students who have a DVM or equivalent degree and will potentially be involved in clinical teaching of DVM students in their future career plans. There are 9 required laboratory teaching sessions as assigned by the laboratory instructor in the spring and for any semesters as determined in consultation with the student about their areas of knowledge and interest for teaching clinical skills.

VMED 8394. Research in Veterinary Medicine. (; 1-3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Research problems relating to any aspect of internal medicine or to the various systems in animals. prereq: instr consent

VMED 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

VMED 8492. Seminar: Infectious Diseases and Swine Medicine. (; 1 cr. [max 2 cr.] ; Student Option; Every Fall & Spring)
Students, faculty, and guest speakers present seminars on current research in diagnosis, control, and treatment of infectious diseases.

VMED 8504. Translational Animal Models. (; 2 cr. [max 4 cr.] ; S-N only; Spring Even Year)
This course will be taught by experts who have successfully developed or utilized translational animal models of human diseases. An overview of comparative and translational research will be presented and discussed including a comparison of naturally occurring vs experimental models of diseases. We will review 12 animal models and use them as examples to discuss the challenges faced during model development, relevance of the selected models to other animal species and humans, and the advantages/disadvantages of each animal model. Strategies to determine when an animal model is appropriate for a given application will be discussed. During this course each participant will develop and present their own idea of a translational animal model (naturally occurring or experimental) in their area of research interest. The class will be alternate each week between the participating institutions. It will be held in person by the hosting institution and participants from other institutions and will participate via Zoom or another online platform. The instructor will generally be located at the host institution and will participate in person at that school, but occasionally instructors will participate remotely via Zoom.

VMED 8520. Advanced Immunology. (; 2 cr. ; Student Option; Every Spring)
Lectures and case presentations.

VMED 8550. Veterinary Medicine Seminar. (; 1 cr. [max 2 cr.] ; S-N only; Every Fall & Spring)
Seminar. Exposure to research activities of CMB and VMED students and faculty. Students prepare/present a 20 minute seminar on their original research. prereq: Grad student

VMED 8560. Research and Literature Reports in Veterinary Medicine. (1 cr. [max 2 cr.] ; S-N only; Every Fall & Spring)
A combination of literature review, group discussions and analyses are utilized to improve participants' capacity to critically evaluate scientific journal articles. Scientific research presentations will be led by students or faculty.

VMED 8592. Infectious Disease Journals: Critical Thinking. (1 cr. [max 2 cr.] ; A-F only; Every Fall & Spring)
This course is intended to discuss published papers, experimental methods, approaches, diseases and animal health problems with the goal of promoting critical thinking. Students will be responsible for identifying, reviewing and sharing relevant material as well as leading discussion of their assigned class meeting.

VMED 8593. Advanced Veterinary Virology and Serology. (; 3 cr. ; Student Option; Every Fall & Spring)
Discussion and laboratory practice.

VMED 8682. Advanced Large Animal Surgery. (; 2 cr. [max 6 cr.] ; A-F or Audit; Every Fall & Spring)
Surgery of various systems in large animals, with preoperative and postoperative evaluation and management. prereq: DVM or equiv degree, instr consent

VMED 8684. Surgical Physiology. (; 1-3 cr. ; Student Option; Periodic Fall & Spring)
Discussions on pathophysiology of surgical diseases in dogs and cats.

VMED 8685. Neurosurgery. (; 2-3 cr. ; A-F or Audit; Every Fall & Spring)
Advanced neurosurgical diseases of small animals amenable to surgical treatment.

VMED 8686. Thoracic and Cardiovascular Surgery. (; 2-4 cr. ; A-F or Audit; Every Fall & Spring)
Advanced thoracic and cardiovascular diseases of small animals amenable to surgical treatment.

VMED 8693. Seminar: Large Animal Surgery. (; 1 cr. [max 6 cr.] ; A-F or Audit; Every Fall & Spring)
Discussion of current literature and surgery board preparation. prereq: DVM or equiv degree, instr consent

VMED 8696. Research in Critical Care/ Emergency Medicine. (; 1-3 cr. ; Student Option; Every Fall & Spring)
Special problems course. Controlled study; prospective and retrospective models of

evaluation are defined, critiqued, and used for experimental design and data collection to validate research methods. prereq: DVM or equiv degree

VMED 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

VMED 8780. Advanced Avian Critical Care: Principles and Procedures. (; 2 cr. ; A-F or Audit; Every Spring)
Procedures and protocols for managing avian medical emergencies such as starvation, toxicities, respiratory failure, and massive trauma. prereq: Course each in vet pathology, physiology, pharmacology, anatomy, small animal anesthesiology and critical care

VMED 8781. Seminar: Advanced Veterinary Anesthesiology. (; 1-3 cr. ; A-F or Audit; Every Fall)
Active interaction around topics of advanced anesthesiology in veterinary species. prereq: [[CVM 6321, CVM 6322] or equiv], grad student

VMED 8788. Seminar: Veterinary Critical Care/Emergency Medicine. (; 1 cr. ; A-F or Audit; Every Fall & Spring)
Current topics. prereq: DVM or equiv degree

VMED 8793. Seminar: Veterinary Anesthesiology. (; 1-2 cr. [max 4 cr.] ; A-F or Audit; Every Fall & Spring)
Discussion and presentations; for veterinary anesthesiology and surgery residents and graduate students. prereq: [CVM 6321 or equiv], DVM degree

VMED 8796. Avian Anesthesia and Orthopedic Surgery. (; 1-3 cr. ; A-F or Audit; Every Fall & Spring)
Current methods for anesthetizing raptors, psittacine birds, and waterfowl. Lecture and lab on current methods for avian fracture bone fixation. prereq: courses in vet anesthesia, vet small animal orthopedics

VMED 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

VMED 8910. Statistical Principles of Research Design. (3 cr. ; A-F or Audit; Every Spring)
This course is a broad overview of the principles and techniques of research design and methods used in veterinary and translational research, and provides the background a new researcher needs to understand the literature and make good decisions about what is appropriate for their research. prereq: entry level graduate stats course or equivalent

Vienna Executive MBA (VMBA)

VMBA 5700. Managerial Accounting. (; 4 cr. ; A-F or Audit; Every Spring)
How to analyze accounting for use in management decisions. Planning/control. Transfer pricing, performance meansurements, cost behavior, cost allocation, activity based costing, standard costs.

VMBA 5701. Data Analysis and Decision Making. (; 4 cr. ; A-F or Audit; Every Spring & Summer)
Exploratory data analysis, basic inferential procedures, statistical process control, regression analysis, decision models.

VMBA 5702. Financial Management. (; 4 cr. ; A-F or Audit; Every Spring & Summer)
Theory/practice of finance from an analytical approach. Students apply concepts of risk, return, valuation to decisions that a corporate financial officer or person engaged in small business must make about sources/uses of funds during changing financial markets.

VMBA 5703. Marketing Management. (; 4 cr. ; A-F or Audit; Every Spring & Summer)
Developing/implementing most appropriate combination of variables to carry out a firm's strategy in its target markets. Analytic perspectives, concepts, decision tools of marketing for product offering decisions, distribution channel decisions, pricing decisions, communication program decisions.

VMBA 5704. Managing People and Organizations. (; 4 cr. ; A-F or Audit; Every Spring)
Theories/frameworks for analyzing behavior of individuals, groups, organization itself. Emphasizes making decisions, developing action plans. Concepts/principles associated with function of human resource management (e.g., personnel selection, reward/compensation, collective bargaining).

VMBA 5705. Operations Management. (; 4 cr. ; A-F or Audit; Every Fall)
Operations management function in different types of organizations. Emphasizes productive, innovative, competitive operations. Concepts/ principles related to management of quality/ innovation within service/manufacturing organizations.

VMBA 5706. Business, Government, and Macroeconomics. (; 4 cr. ; A-F or Audit; Every Fall)
Roles of government/business in society. Alternative systems of economics, political values. Social, political, economic, cultural conflicts affecting business sector.

VMBA 5707. Economics in Transition. (4 cr. ; A-F or Audit; Every Fall)
Technological, political, and ethical forces that are shaping the competitive environment. Theoretical considerations. Business responses to specific issues. Projects/cases for companies in East Central Europe.

VMBA 5709. Info Tech Mgmt. (4 cr. [max 16 cr.] ; A-F or Audit; Every Spring)
Various information technologies, their applications. Competitive advantages associated with information technology, organizational/managerial implications.

VMBA 5710. Advanced Financial Management for Global Markets. (; 4 cr. ; A-F or Audit; Every Spring)
Advanced financial concepts for corporate financial decisions at executive level. Investment, firm financing, global markets.

VMBA 5711. Managing Globalization (Guangzhou). (4 cr. ; A-F or Audit; Every Spring & Summer)
Developing international strategies for firms wishing to expand into global markets. Emphasizes analyzing opportunities/constraints posed by international environment. Putting global strategies into operation. Managing strategic alliances/networks.

VMBA 5712. Strategies for a Global Company: an Integrative Perspective. (; 6 cr. [max 36 cr.] ; A-F or Audit; Every Spring)
Multi-disciplinary perspectives from strategic marketing, corporate strategy, operations management. Involvement of faculty/corporate executives. Site visits to global companies, student projects. Capstone course.

VMBA 5713. Negotiations and Conflict Management. (; 4 cr. ; A-F only; Every Spring)
Typical challenges faced when negotiating. Strategies for managing challenges and improving skills as a negotiator and conflict manager.

VMBA 5714. Financial Accounting. (; 4 cr. ; A-F or Audit; Every Spring)
External accounting system used by firms to measure economic performance/financial position. Students analyze corporate financial reports. Impact of economic events. Discussions, cases. Role of financial reporting standards/intermediaries.

VMBA 5715. Corporate and Entrepreneurial Strategy. (4 cr. ; A-F or Audit; Every Fall & Spring)
The objective of the course is to help develop analytic skills in the identification of key issues and in the formulation of appropriate strategies for firms, both established and entrepreneurial, facing complex business situations. We also examine the process through which strategic decisions are made and implemented and discuss how strategy is different in the age of the internet.

Virology (VIRO)

VIRO 5030. Virology Research Presentations. (1 cr. [max 10 cr.] ; S-N only; Every Fall & Spring)
This course is designed to enhance knowledge in virology through research presentations as well as the critical evaluation of presentations of other students and researchers. Presentation will includes current virology research, both individual research projects and critical reading, and presentation of current literature. Previously OBIO 5030

VIRO 8010. Molecular Virology. (2 cr. ; A-F or Audit; Every Spring)
This course provides graduate students with a knowledge base for understanding the molecular aspects of replication strategies utilized in virus replication. Topics for the course will focus on the molecular aspects of virus replication for the major virus families (e.g., arenaviruses, bacteriophages,

flaviviruses, herpesviruses, orthomyxoviruses, picornaviruses, and retroviruses) as well as virus evolution, structure, and taxonomy.

VIRO 8020. Virus Pathogenesis and Host Interactions. (2 cr. ; A-F or Audit; Every Spring)
This course provides graduate students with a knowledge base for understanding virus pathogenesis and host interactions. Topics for the course will focus on the molecular, cellular, and organismal aspects of virus pathogenesis and host interactions. The concepts of cellular pathogenesis, tissue tropism, portals of entry, local replication and virus spread, virus dissemination, and congenital infections will be covered. A particular emphasis will be placed on virus pathogenesis of the major virus families (e.g., arenaviruses, bacteriophages, flaviviruses, herpesviruses, orthomyxoviruses, picornaviruses, and retroviruses) and virus-host cell interactions that can restrict virus replication and are responsible for immunity will be discussed.

VIRO 8050. Evolution of Emerging Viruses. (2 cr. ; A-F or Audit; Every Fall)
This course is designed to provide PhD-level graduate students a knowledge base for understanding how HIV and other emerging viruses (e.g., Ebola, influenza, SARS, West Nile virus, hantavirus, hepatitis C) evolve and become public health threats. Topics for the course will focus on the biochemical, molecular, cellular, clinical, and epidemiological aspects of emerging viruses, with an emphasis on how each plays a role in virus evolution and emergence. This course will emphasize HIV as a key example of an emerging virus disease that has had a profound impact on human health. MS-level and advanced undergraduate students should register for OBIO 5050.

Warsaw Executive MBA (WMBA)

WMBA 5658. Financial Management. (; 4.5 cr. ; A-F or Audit; Periodic Fall)
Essentials of financial management theory/practice. Time value of money, valuation of bonds/stocks, risk/return turn-off, capital budgeting, optimal investment decisions, financial analysis/planning, cost of capital, debt/equity choices, firm valuation, mergers/acquisitions.

WMBA 5662. Macroeconomic Business Environment. (; 3 cr. ; A-F or Audit; Every Spring)
Students apply methods of decision-making, and of business/public policy analysis, in various real situations drawn from experience of developed market economies.

Water Resources Science (WRS)

WRS 5050. Special Topics in Water Resources Science. (; 1-3 cr. ; A-F or Audit; Periodic Fall & Spring)
Practical topics for local water resource management. Policy and institutions, watershed science, civic engagement, assessment, communication, implementation practices, and administration. Requires working with a mentor in local water resource management. Online only.

WRS 5101. Water Policy. (; 3 cr. ; Student Option; Every Spring)
Socio-cultural, legal, and economic forces that affect use of water resources by individuals/institutions. Historical trends in water policy, resulting water laws in the United States. Institutional structures whereby water resources are managed at federal, state, and local levels.

WRS 5150. Watershed Specialist Training. (; 2 cr. ; S-N only; Every Fall & Spring)
Practical topics for water resource management professionals. Current policies and institutions, watershed science, civic engagement, assessment, communication, implementation practices, and administration. Requires working with a mentor in local water resource management. Online only.

WRS 8050. Special Topics in Water Resources Science. (; 1-3 cr. [max 6 cr.] ; A-F or Audit; Every Fall & Spring)
Special topics in water resources science.

WRS 8060. Directed Studies in Water Resources Science. (1-3 cr. [max 6 cr.] ; A-F or Audit; Every Fall & Spring)
Directed studies in water resources science. prereq: instr consent

WRS 8095. Plan B Project. (3 cr. ; S-N or Audit; Every Fall & Spring)
Optional course for M.S. Plan B students. Can be taken once for up to 3 credits, and may count towards credit minimum.

WRS 8100. Interdisciplinary Seminar in Water Resources. (0.5 cr. ; Student Option; Every Fall & Spring)
Interdisciplinary Seminar in Water Resources

WRS 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

WRS 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

WRS 8581. Research and Professional Ethics in Water Resources and Environmental Science. (0.5 cr. ; S-N or Audit; Every Spring)
Ethics of water resources science and environmental engineering research/practice. Societal responsibility, plagiarism, recording-keeping, authorship, confidentiality, conflicts of interest, professional relationships, fraud, reporting misconduct. Meets during first eight weeks of spring semester. prereq: [Environmental engineering or water resources science] grad student or instr consent

WRS 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
TBD prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

WRS 8777. Thesis Credits: Master's. (; 1-18 cr. [max 50 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 10 cr total required [Plan A only]

WRS 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 96 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Thesis credit: doctoral. 24 cr required

Writing Studies (WRIT)

WRIT 5001. Introduction to Graduate Studies in Scientific and Technical Communication. (; 3 cr. ; A-F only; Every Fall)
This course offers an overview of the field of scientific and technical communication. Students learn about the history of the field including job titles, industries that hire technical communicators, and trends in the field. Students also learn about research methods (including audience analysis and usability testing); software and apps commonly used in technical communication; social issues in technical communication (including legal, ethical, and organizational); and international issues (including writing for regulated environments such as in the medical device industry). Projects are multi-modal and include written reports; slide presentations with and without voice recordings; visual communication including user documentation and movies. Some projects are done individually but most are done in virtual teams. Weekly discussion forums provide students with opportunities to lead and summarize key themes from each week?s topic. Students in this class participate within a community of technical communication professionals and typically have a background in technical communication, medical/science communication, engineering, software, usability, customer support, writing and communication, marketing, or similar area.

WRIT 5051. Graduate Research Writing for International Students. (; 3 cr. ; Student Option; Every Fall, Spring & Summer)
Graduate research writing emphasizes writing techniques, structures, style, and formal language for scholarly writing including research proposals and abstracts, critiques/reviews, and thesis/dissertations and publications. Special focus on field-specific scholarly expectations, documentation, structure/style, grammar, formal or scholarly vocabulary, and extensive revising/editing based on instructor and mentor feedback to meet graduate standards. Discussions. prereq: Grad student

WRIT 5052. Graduate Research Presentations and Conference Writing for Non-Native Speakers of English. (; 3 cr. ; Student Option; Every Fall & Spring)
Practice in writing/presenting graduate-level research for conferences or professional seminars. Delivery of professional academic presentations to U.S. audiences. Conference

abstract, paper, and poster presentation. Communication in research process. Students select topics from their own research/studies. Format, style, transitions, topic narrowing, non-verbal presentation skills. prereq: [Grad student, non-native speaker of English] or instr consent

WRIT 5112. Information Design: Theory and Practice. (; 3 cr. ; A-F or Audit; Every Spring)
This course examines how verbal, visual, and multimedia content can be designed and combined to create meaning, improve comprehension, and make information more usable. Emphasis is placed on the rhetorical roles of visual elements in print and digital communications, and how technical communicators can use visual means to reach audiences, convey information, and achieve rhetorical goals. Students read and discuss theory, practice information design skills, and apply both to real communications projects suitable for inclusion in a professional portfolio. Projects focus on print and web content design and development; the information design process (plan, design, develop, layout, testing); project planning toward deliverables (web sites, signage, wayfinding); and universal design (color, symbols, etc.)

WRIT 5196. Internship in Scientific and Technical Communication. (; 3-6 cr. ; S-N or Audit; Every Fall, Spring & Summer)
Internship sites may include the University, industry, or government agencies. An internship proposal, progress report, internship journal (optional), and final report with a letter from the internship supervisor are required.

WRIT 5270. Special Topics. (; 3 cr. [max 9 cr.] ; Student Option; Periodic Fall & Spring)
Topics specified in Class Schedule.

WRIT 5291. Independent Study, Reading, and Research. (; 1-3 cr. ; Student Option; Every Fall, Spring & Summer)
Supervised reading/research on advanced projects not covered in regularly scheduled offerings. prereq: instr consent, dept consent

WRIT 5501. Usability and Human Factors in Technical Communication. (; 3 cr. ; A-F only; Every Spring)
Usability is concerned with how people interact with design and technology; usability is commonly known as the "ease of use" of products and technologies by a range of users. This course emphasizes usability and user research and will explore the intersection of usability and technical communication. We will investigate definitions of usability and user-centered design principles, and we will explore a variety of usability research methods including heuristic evaluation, personas, and usability testing. The course will focus heavily on usability testing of web sites, a common technical communication task that involves observation and interviews of human participants interacting with a web site.

WRIT 5531. Introduction to Writing Theory and Pedagogies. (; 3 cr. ; A-F or Audit; Every Fall)
This course explores the nexus of theory and practice in terms of writing instruction and of technical writing and communication to help students identify their pedagogical positions and concrete practices. Designed as a collaborative, exploratory space for a community of teacher-scholars, it approaches the teaching of writing as a process that is both practiced and studied, is aided by reflection with others, and requires ongoing revision. Course texts address the scholarship of Composition, Rhetoric, and Technical Writing. Students put these texts in dialog, including with the ?texts? of their classrooms, to examine and reflect on their teaching practices. The course centers acts of engagement and reflection and emphasizes pedagogical inquiry. Students learn to: place a range of theories on writing instruction in conversation with their teaching; reflect on classroom practices and pedagogical theories; articulate individual philosophies of teaching; explore pedagogical issues of personal interest; foster pedagogical ?habits of mind? that serve students in classrooms at the UMN and beyond; and contribute to an active, supportive, and collaborative teaching community. prereq: Grad student

WRIT 5532. Practicum in Writing Pedagogies. (; 1 cr. [max 3 cr.] ; S-N only; Every Fall & Spring)
WRIT 5532 is designed as a collaborative, developmental, and exploratory space for graduate instructors in the First Year Writing (FYW) program. The course approaches the teaching of writing as an iterative and situated process that is both practiced and studied, is aided by reflection with others, and requires ongoing revision. Course texts include scholarship in Teaching and Learning, in Writing Studies, and in First-Year Composition. These texts will be brought into dialog with the WRIT 1301 classes all students are teaching. The course addresses such questions as: How do people learn, how do they learn writing, and how can instructors teach writing based on those understandings? How can instructors design environments, materials, and practices that equitably help students learn about writing and develop as writers? Class discussions and assignments also invite students to identify and address challenges, tensions, and pedagogical issues of personal interest; to develop habits of mind that will serve them in other classrooms in their teaching careers; and to articulate the classroom practices and pedagogies informing their teaching philosophies. Students in the RSTC MA and PhD programs take WRIT 5532 in spring of their first year after taking WRIT 5531 in fall term. Graduate instructors from other departments who teach WRIT 1301 must register for one credit of WRIT 5532 in the fall and one credit of WRIT 5532 in the spring during their first year teaching in the FYW program. Spring sections of WRIT 5532 are organized as biweekly reflective practice groups (RPGs). RPGs will build on fall term course content in discussions of readings, in teaching journal reflections, and to build teaching portfolios.

WRIT 5561. Editing and Style for Technical Communicators. (; 3 cr. ; A-F only; Every Summer)
In this course, students learn strategies for editing and revising writing for technical and non-technical audiences. Students practice three levels of editing skills: proofreading, copyediting, and comprehensive editing. Strategies include advanced grammar and style, editing tools, quantitative data, global documents, and various style guides. Students also examine an editor?s role with authors, in organizations, in global contexts, and in ethical situations. Editing projects focus on the three levels of editing, using proficient methods, collaborating between authors and editors, identifying audience and contexts, editing documents according to style guides, and using rhetorical principles to analyze and edit final documents.

WRIT 5570. Minnesota Writing Project Directed Studies. (; 1-3 cr. [max 9 cr.] ; A-F or Audit; Every Summer)
Guided individual research into current theories/practices of writing and writing pedagogy.

WRIT 5662. Writing With Digital Technologies. (; 3 cr. ; A-F only; Every Fall)
This course explores current and emerging digital writing technologies and teaches students to assess writing situations and make appropriate decisions about digital form, production, and scholarship. Students learn the basic building blocks of writing in Internet environments (text, sound, images, video, interactivity); the vocabularies, functionalities, and organizing structures of Web 2.0 environments and how each impacts understanding and use of information; and how to produce Web 2.0 environments (i.e., multimedia internet documents) that facilitate interactivity and use. This course includes design projects and practice with apps, markup language (html and xml), and content management systems.

WRIT 5664. Science, Medical, and Health Writing. (; 3 cr. ; A-F or Audit; Every Fall)
This course explores the theories and practices of rhetoric and writing in science, medicine, and health (SMH). Students learn about genres of SMH communication including regulatory documents from the FDA, podcasts created by scientists for the public, patient blogs, and published research articles. The course also engages topics including accessibility, writing in regulated environments, writing for complex audiences, and engaging biomedical and scientific research in writing. Students are challenged to consider how language, science, biomedicine, and health intersect and how different stakeholders such as patients, healthcare providers, scientists, government officials, and insurance companies engage in SMH communication.

WRIT 5671. Visual Rhetoric. (; 3 cr. ; A-F only; Periodic Spring)
This course investigates current understandings of how visuals participate in and extend the rhetorical strategies long associated with speech and writing. Students explore developments in the discipline of visual rhetoric by engaging with an emerging canon of texts that survey the work of rhetoricians,

graphic designers, graphic novelists, commercial artists, fine artists, and technical communicators. Emphasis is placed on the use of visuals in science and technology; identifying shared principles of persuasion through visual information; developing the vocabulary to comment on, critique, and create visuals; and assessing whether visuals meet the needs of intended audiences.

WRIT 5775. Rhetorical Traditions: Classical Period. (; 3 cr. ; A-F or Audit; Fall Odd Year)
This course provides an intensive survey of rhetoric as understood and practiced in ancient Greece and Rome, and serves as an introduction to graduate-level study of historical rhetoric more generally. The course attends to the development of the discipline of rhetoric in the Classical world and to the recurring themes that constitute "the rhetorical tradition." Class discussions and assignments assess the epistemological foundations, ethical status, and socio-political importance of ancient rhetorical training and discourse. Primary readings (in English) include works by sophists and orators of the Greek Classical period, Isocrates, Plato, Aristotle, Cicero, Quintilian, and others. Secondary readings and class discussion will consider political, cultural, and philosophical contexts for ancient rhetorical theory, oratorial practice, and the teaching of speech and writing. This course will prepare graduate students for preliminary exams, research, and pedagogical encounters in rhetoric.

WRIT 5776. The Rhetorical Traditions: Modern Era. (3 cr. ; A-F or Audit; Fall Even Year)
This course is designed to acquaint graduate students with different traditions of rhetorical theory. It surveys a range of rhetorical tools/methods, and sets out to assist students to find a clear purpose for using rhetorical theory and to develop a structured approach to their objects of criticism. It prioritizes Black, Indigenous, transnational, and anti-racist approaches to rhetoric, and situates those as foundational to the traditions of such theoretical traditions as semiotics, deconstruction, genealogy, affect theory, assemblage theory, and psychoanalysis. It is intended to prepare students for comprehensive exams, conference presentations, and pedagogical encounters with rhetoric.

WRIT 8011. Research Methods in Writing Studies and Technical Communication. (; 3 cr. ; A-F or Audit; Spring Odd Year)
The primary objectives of this course are to provide students in the rhetoric and scientific & technical communication (RSTC) MA and PhD programs with an understanding of research literature and approaches in the field and help students gain insights into the arguments made by researchers. This course trains students in strategies for designing and developing their own research, and provides a groundwork in the field's most common approaches to gathering and analyzing data. Students also learn about the research of the RSTC graduate faculty and PhD alumni and complete a University-based course for ethics in human participants research. Upon completion of the course, students should be able to create a persuasive research proposal and justify the means of data collection, analysis, theory, and positioning of the project.

WRIT 8012. Applied Research Methods in Writing Studies and Technical Communication. (; 3 cr. [max 6 cr.] ; A-F or Audit; Every Fall & Spring)
Introduction to one or two quantitative or qualitative research methods in scientific/technical communication or rhetoric (e.g., ethnography, case studies, discourse analysis). prereq: [grad student] or instr consent

WRIT 8333. FTE: Master's. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Master's student, adviser and DGS consent

WRIT 8444. FTE: Doctoral. (; 1 cr. [max 10 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Doctoral student, adviser and DGS consent

WRIT 8505. Professional Practice. (; 3 cr. ; S-N only; Every Spring)
This course is designed to provide a class structure to assist graduate students in completing writing requirements and oral presentations associated with professional projects -- research, scientific writing, and associated reports -- as part of their graduate programs. Learning outcomes include the following: to foster advanced skills in writing and editing scientific and/or technical documents for various audiences; to design and develop research reports and related documents for graduate programs in scientific and technical communication and other technical disciplines; to understand and apply theoretical and research perspectives in scientific and technical communication to professional practice projects; to expand use of online tools for project development and management and data analysis; to enhance skills in oral presentation of scientific and/or technical research information; and to identify and reflect on the culture and value of professional practice from a disciplinary perspective.

WRIT 8510. Seminar in Rhetoric. (; 3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Topics may include theories, history, criticism, major figures, movements, visual or material rhetoric. Topics vary. See the Class Schedule.

WRIT 8520. Seminar in Scientific and Technical Communication. (; 3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Topics may include theories, landmark studies, history, gender, ethics. Topics vary. See the Class Schedule.

WRIT 8540. Seminar in Technical Communication and Composition Pedagogies. (; 3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Topics may include theories of pedagogy or research studies that inform the classroom or workplace, social and ethical concerns, landmark studies, current controversies. Topics vary. See the Class Schedule.

WRIT 8550. Seminar in Technology, Culture, and Communication. (; 3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Topics may include computer-mediated communication, democracy/technology, controversies over digital communication, privacy/ethical issues, feminist theory and interactions of gender with science and technology, communication in legal or medical settings. Topics vary. See the Class Schedule.

WRIT 8560. Seminar in Writing Studies. (; 3 cr. [max 12 cr.] ; A-F or Audit; Periodic Fall & Spring)
Topics may include literacy, genre, history of writing, narrative theory and practice, writing as textual practice. Topics vary. See the Class Schedule.

WRIT 8666. Doctoral Pre-Thesis Credits. (; 1-6 cr. [max 12 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
Doctoral Pre-Thesis Credits prereq: Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; dept consent for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

WRIT 8792. Independent Study, Reading, and Research. (; 1-4 cr. [max 12 cr.] ; S-N only; Every Fall, Spring & Summer)
Supervised study, reading, or research on projects not covered in regularly scheduled offerings. prereq: instr consent

WRIT 8794. Directed Research. (1-4 cr. [max 12 cr.] ; S-N only; Every Fall, Spring & Summer)
Supervised research project. prereq: instr consent

WRIT 8888. Thesis Credit: Doctoral. (; 1-24 cr. [max 100 cr.] ; No Grade Associated; Every Fall, Spring & Summer)
(No description) prereq: Max 18 cr per semester or summer; 24 cr required

Youth Development and Research (YOST)

YOST 5011. Youth Voices: The Fight for Social Change in Croatia. (3 cr. ; A-F only; Periodic Summer)
This international immersion course explores the history, struggles, accomplishments, and experiences of Croatian young people who have engaged in social change efforts. Our focus will be on young people's involvement in a diverse range of social change movements and how these emerged, how they worked, and what caused them to decline.

YOST 5030. Youth Voices: The Fight for Social Change in Croatia. (3 cr. ; A-F only; Periodic Summer)
This international immersion course explores the history, struggles, accomplishments, and experiences of Croatian young people who have engaged in social change efforts. Our focus will be on young people's involvement in a diverse range of social change movements and how these emerged, how they worked, and what caused them to decline.

YOST 5032. Adolescent and Youth Development for Youthworkers. (; 4 cr. ; Student Option; Every Fall & Spring)
Application of theory/research about children/adolescents. How findings/theories facilitate understanding of behavior. prereq: [1001 or 2001 or 2002W or 2101], [any Psych or CPsy course]

YOST 5240. Special Topics in Youth Studies. (; 2-8 cr. [max 40 cr.] ; Student Option; Every Fall, Spring & Summer)
In-depth investigation of one area of youth studies. Teaching procedure and approach determined by specific topic and student needs. Topic announced in advance. prereq: Two social sci courses, exper working with youth or instr consent

YOST 5291. Independent Study in Youth Studies. (; 1-8 cr. [max 16 cr.] ; Student Option; Every Fall, Spring & Summer)
Independent reading and/or research under faculty supervision.

YOST 5301. Communicating With Adolescents About Sexuality. (; 3 cr. ; Student Option; Every Summer)
How to communicate sensitively/effectively with adolescents and their concerned persons about sexuality in everyday life. Healthy sexual development (physical, emotional, ethical), sexual diversities. Gender/body image, disease, sexual violence, intimacy, sex in cyberspace. prereq: [Upper div AdPy course, exper working with youth] or instr consent

YOST 5314. Theatre Activities in Youthwork and Education. (; 2 cr. ; Student Option; Every Spring)
Using experiential learning and theater activities to enhance creativity and imagination of youth workers and educators. Approaches to working with youth in school and agency settings. Application of experiential learning and improvisational theater theory/praxis. prereq: 1001 or 2101

YOST 5315. Youthwork in Schools. (; 4 cr. ; Student Option; Every Fall & Spring)
Craft of youthwork as a framework to understand life-worlds of young people and a practice to enhance healthy development. How young people often make artificially/harmfully divide their lives into "school" and "not school." prereq: Introductory course in education or instr consent

YOST 5316. Media & Youth: Learning, Teaching, and Doing. (; 2 cr. ; Student Option; Periodic Fall & Spring)
This interactive course will introduce interested youth workers to media as a tool for working with youth. It will review the theory and contemporary context of youth media practice. It will showcase exemplar youth media organizations from diverse communities and will introduce and provide hands-on practice with various forms of youth media. This class will focus on a theoretical framework of critical media literacy (CML). CML equips young people with opportunities and resources necessary for them to critically analyze, use, and produce various forms of media. Like traditional notions of literacy, critical media literacy depends on two interdependent components: analysis and production. In terms of analysis, media literacy is the ability to sift through and analyze the messages that inform, entertain and sell to youth every day. It is the ability to bring critical thinking skills to bear on all aspects of media? from online news outlets and podcasts to Facebook algorithms and the shrinking ownership of mass media. In terms of production, the course will provide exposure to and an an opportunity to engage technical skills, artistic expression, contribute to public dialogue, and to experience how young people are contributing to their worlds through youth media projects like: murals, graffiti, spoken word, music, documentaries, magazines, public service announcements, and digital storytelling. prereq: 1001 or 2101 or instr consent

YOST 5319. Understanding Youth Subcultures. (; 3 cr. ; Student Option; Every Summer)
Young people's participation in and understanding of subcultures, life-styles, and event cultures. Place of these in young people's identity, friendship, and life chances. prereq: 2001 or one course each in [Anth, Soc] or instr consent

YOST 5321. Work With Youth: Individual. (2 cr. ; Student Option; Every Fall, Spring & Summer)
Basic assumptions underlying individual work with youth. Special issues and concerns of adolescents and of persons who work with them, especially those who work with youth in one-to-one interactions. prereq: 1001 or 2002W or instr consent

YOST 5322. Work With Youth: Families. (; 2 cr. ; Student Option; Every Fall, Spring & Summer)
Theories and techniques of working with youth and their families. Practical methods of structural change. Developing effective communication. Decision-making and problem-solving systems. Winning the family's cooperation. Role of professional in influencing healthy family development. prereq: 1001 or 2002W or instr consent

YOST 5323. Work with Youth: Groups. (; 2 cr. ; Student Option; Every Fall & Summer)
Social group work. Adolescent group needs and associations. Group process. Working with diverse groups of youth in community, in group living situations, and in group therapy. prereq: 1001 or 2002W or instr consent

YOST 5401. Young People's Spirituality and Youthwork: an Introduction. (; 4 cr. ; A-F or Audit; Every Spring)
Adolescent spirituality, its relation to working with young people. Faith/spirituality as actual/necessary aspects of healthy youth development. Research, active community-based programs. Knowledge, attitudes, and skills to meet adolescent needs/wants. prereq: [2001, one course each in [Anth, Soc, CPsy]] or instr consent

YOST 5402. Youth Policy: Enhancing Healthy Development in Everyday Life. (; 4 cr. ; Student Option; Periodic Fall & Spring)
Youth policy as formulated in response to youth issues, problems, and community and public concerns. Policy as political response to youth panics, as indirect youthwork, and as a community's moral compact with its young people. Perspectives are explored specific to student interests. prereq: [2001, one course each in [FSoS, PolSci, Soc]] or instr consent

YOST 5950. Ways of Knowing in Youth Development Leadership: Using Research and Evlauation to Support Community. (; 3 cr. ; A-F only; Every Fall)
This course aims to stimulate students to think critically about youth development and youth work through exploring different ways of knowing. These paradigms each construct different understandings of young people and offer evidence to support diverse youth development practice and programs. Students will leave with a broad perspective of how youth development and youth work empirical evidence is constructed and used to support healthy youth development.

YOST 5952. Everyday Lives of Youth. (3 cr. ; A-F or Audit; Every Fall)
Youth as idea/lived-reality in scholarship, public discourse, and professional practice. Building practice of work with or on behalf of youth.

YOST 5954. Experiential Learning: Pedagogy for Community and Classroom. (3 cr. ; Student Option; Every Spring)
Relationship between experience and learning in community and school settings. Emphasizes intentional application of experiential learning theory/practice to educational program development.

YOST 5956. Organizational Approaches to Youth Development. (3 cr. ; A-F or Audit; Every Fall)
Historical contexts, theoretical frameworks, organizational practices, and public policies that shape nonformal educational experiences of youth in community-based or school-linked settings.

YOST 5958. Community: Context for Youth Development Leadership. (3 cr. ; A-F or Audit; Every Spring)
Issues/policies in family, school, and community that drive the professional practice of community-based youth work. Practical projects explore what it means to be local, to build social capital for youth, and to involve youth in community change.

YOST 5960. Seminar in Youth Development Leadership. (1 cr. [max 4 cr.] ; S-N or Audit; Every Fall, Spring & Summer)
Group study of topics/issues. Course proposal, educational program development. Students participate in co-created learning experience with a group of peers. Four-course sequence. prereq: YDL student or instr consent

YOST 5962. Leadership Field Experience: Youth Development. (4 cr. ; S-N only; Every Fall, Spring & Summer)
Demonstration of leadership in practice. Project on youth, experiential pedagogy, and community/program settings. Focuses on public policy, advocacy, evaluation, pedagogical issues, program design, curriculum development, or applied research. prereq: YDL student