



UNIVERSITY OF MINNESOTA
Driven to DiscoverSM

University of Minnesota Rochester 2021-22 Undergraduate Courses

This document serves as an official historical record for a specific period in time. The information found is subject to change without notice. Colleges and departments make changes to their degree requirements and course descriptions frequently. More information is available at catalogs.umn.edu.

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 Rochester
111 South Broadway, Suite 300, Rochester, MN 55904

Biochemistry (BIOC)

BIOC 1393. Directed Study in Biochemistry. (1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)

Individual study on selected topics or problems. prereq: instr consent, dept consent

BIOC 3321. Biochemistry. (3 cr. ; A-F or Audit; Every Fall)

In this course, students gain an appreciation for the breadth and depth of current knowledge in biochemistry through an active learning, student-centered approach. Students examine the structure of macromolecules essential to life (including proteins, lipids, and carbohydrates). This analysis gives special consideration to the manner in which molecular structure dictates function. Additionally, students examine the enzymatic pathways responsible for synthesis and degradation of macromolecules, the regulation of enzymes that catalyze these reactions, and the energy expended or produced during these processes. Such pathways include carbohydrate metabolism (glycolysis, gluconeogenesis, citric acid cycle), lipid metabolism (beta-oxidation, lipid synthesis), and oxidative phosphorylation. Students apply these concepts to problem solving within the field, while also gaining confidence in his/her communication of biochemical principles through collaborative, team-based activities. prereq: C or better in all of the following either [BIOL 2311 or BIOL 1009] AND either [CHEM 2131 or CHEM 2302] AND either [CHEM 2335 or CHEM 1062] AND either [MATH 1120 or MATH 1050]

BIOC 3322. Biochemistry II. (4 cr. ; A-F only; Spring Even Year)

This advanced course covers the enzymatic pathways responsible for synthesis and degradation of macromolecules i.e. carbohydrate, lipid and nitrogen metabolism, and the regulation of these processes with an emphasis on metabolic diseases. The course based undergraduate research experience or CURE lab focuses on characterizing novel, unstudied proteins. prereq: C or better in 3321

BIOC 3393. Directed Study or Research in Biochemistry. (1-6 cr. [max 24 cr.] ; Student Option; Every Fall & Spring)

Individual study or research on selected topics or problems. prereq: instr consent, dept consent

BIOC 3721. Special Topics in Biochemistry. (; 1-4 cr. [max 8 cr.] ; A-F or Audit; Periodic Fall & Spring)

In-depth study of special topics in Biochemistry. prereq: instr consent; repeated enrollment allowed only if topics are different

Biology (BIOL)

BIOL 1310. Medical Terminology. (; 2 cr. ; A-F only; Periodic Fall, Spring & Summer)

Review of an extensive medical vocabulary through root words, prefixes, suffixes, plurals, and abbreviations. Includes defining, building, and analyzing medical terminology regarding the human body and the healthcare field.

Emphasizes effective communication through proper spelling and pronunciation.

BIOL 1393. Directed Study in Biology. (1-3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)

Individual study on selected topics or problems. prereq: instr consent, dept consent

BIOL 2311. Integrative Biology. (BIOL,TS; 4 cr. ; A-F or Audit; Every Spring)

Introductory biology course with lab for health sciences majors. Emphasis on scientific literacy, mastery of core biological concepts, the relationship of biology to health sciences and other major disciplines, lifelong learning and citizenship. Taught utilizing student-centered, active learning, and writing-integrated approaches. coreq: WRIT 1512

BIOL 2321. Biology of Human Function. (4 cr. ; A-F or Audit; Every Fall)

Provides students with an understanding the function of human organ systems including the cardiovascular, respiratory, skeletal, muscular, nervous system and special senses. Diseases of these systems are highlighted to provide direct application to popular culture and everyday life. Varied approaches to learning used including presentations, written assignments and group work in a reduced-lecture format. A hands-on, problem based lab component supplements the didactic instruction.

BIOL 2331. Anatomy and Physiology I. (BIOL; 4 cr. ; A-F or Audit; Every Fall)

An introduction to the shape, structure, and function of the human body and its parts including basic anatomy, structure, and function of body systems and special senses. Specific attention is spent differentiating the anatomy and physiological workings of the integument, skeletal, muscular, nervous including the special senses, cardiovascular, respiratory, digestive and urinary systems. Case studies and laboratory activities are used in within a reduced-lecture delivery method to provide a student-centered, active-learning environment. prereq: BIOL 2311

BIOL 3311. Genetics. (BIOL,TS; 3 cr. ; A-F or Audit; Every Fall)

Advanced introduction to genetic information, including molecular aspects of inheritance and disease; gene expression and regulation in cells/organisms; population genetics; mutation and molecular evolution; genome organization; gene databases; and pedigree analysis. Incorporates ethical, social and legal perspectives relevant to advances in genetic technology and increasing availability of human genetic information. Taught utilizing student-centered, active learning and writing-integrated approaches. prereq: Biol 1009 or 2311 and Chem 1333 or 2301

BIOL 3332. Anatomy and Physiology II. (; 4 cr. ; A-F or Audit; Every Spring)

This course reviews and elaborates on the basic structure and function of body systems covered in BIOL 2331. Attention is given to understanding how those systems and concepts are related to higher order physiological phenomena such as: 1) Our

ability to sense stimuli and respond (nervous system, endocrine system, lymphatic system, and immune response); 2) The complex mechanisms/requirements for homeostatic regulation (relationship between nutrition and metabolism and water and ion balance in the human body); 3) Reproduction and fertility?. Case studies and laboratory activities incorporate problem solving and applications to health sciences within a student-centered, active learning environment. Strong emphasis on experimental design and execution. Analysis of data using statistical methods. prereq: C- or better in 2331

BIOL 3344. Microbiology. (ENV; 4 cr. ; A-F or Audit; Every Fall & Spring)

Microbiology examines the evolution, structure, physiology, metabolism, and genetics of microorganisms with an emphasis on bacteria and viruses, the dynamic impact of microbes on humans and the role of microbes in the environment. This course is taught using student-centered, active learning and writing integrated approaches, and fosters an understanding of problem solving within the field and gaining confidence in communication of microbiology through collaborative, team-based assignments. The accompanying laboratory provides exposure to a variety of current microbiology techniques. prereq: C- or better in Biol 2311, Chem 1331, and Math 1120

BIOL 3393. Directed Study or Research in Biology. (1-6 cr. [max 24 cr.] ; Student Option; Every Fall & Spring)

Individual study or research on selected topics or problems. prereq: instr consent, dept consent

BIOL 3721. Special Topics in the Life Sciences. (; 1-4 cr. [max 8 cr.] ; A-F or Audit; Periodic Fall & Spring)

In-depth study of special topics in the life sciences. prereq: instr consent; repeated enrollment allowed only if topics are different

BIOL 4312. Advanced Topics in Molecular and Cellular Biology and Genetics. (4 cr. ; A-F or Audit; Periodic Fall)

Study of the synthesis, function, and regulation of biological molecules (DNA, RNA, and proteins). Examination of the structure of chromosomes and genes and the processes of gene regulation involving DNA replication, transcription, translation, and epigenetic modification. Emphasis placed on the molecular basis of cell function including cellular communication, transport, secretion pathways, movement and more. The course is delivered through an active learning, student-centered and writing-intensive approach. Laboratory exercises maximize student exposure to an array of techniques dealing with DNA, RNA, and proteins while addressing a novel hypothesis. prereq: 3311

BIOL 4342. Neuroscience. (3 cr. ; A-F or Audit; Every Fall)

Investigation into principles of brain function from neurons to behaviors within the context of current technological advances in studies of the brain and nervous system. prereq: 2331; [3332 or 3311 or BIOC 3321]

BIOL 4364. Immunology. (3 cr. ; A-F or Audit; Every Spring)

Immunology explores the general properties of the human immune system including: the structure, function, and origin of participating tissues and cells, the general mechanism of the innate and adaptive immune systems, and the development and deployment of self vs non-self. A multidisciplinary lens is used to examine the social, ethical, and historical perspectives of the immune system through specific cases of disease relevant to the health sciences and prevention of disease through vaccination. prereq: BSHS student; BIOC 3021 or 3321 or Biol 3332 or 3344 or [ANAT 3601 and PHSL 3051] or VBS 2302

Biomed Inform & Comput Biology (BICB)

BICB 5620. Topics in Biomedical Informatics and Computational Biology. (; 0.5-4 cr. [max 24 cr.] ; Student Option; Every Fall, Spring & Summer)

Each section corresponds to a Mayo 5XXX and 6XXX course. prereq: BICB grad student, permission of DGS

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

TBD prereq: Master's student, adviser consent, DGS consent

BICB 8401. Ethics in Bioinformatics and Computational Biology. (1 cr. ; Student Option; Every Fall)

Ethics of scientific investigation. Ethical conduct related to the scientific enterprise. Discussions on ethical topics related to bioinformatics data.

BICB 8444. FTE: Doctoral. (; 1 cr. ; No Grade Associated; Every Fall, Spring & Summer)

TBD prereq: Master's student, adviser consent, DGS consent

BICB 8510. Computation and Biology. (; 2 cr. [max 4 cr.] ; A-F only; Every Fall & Spring)

Course taught in modular form. Overview of topics in, for instance, molecular biology and genetics; mathematics, statistics and biostatistics; programming in FORTRAN and C/C++; programming in Perl; data management; data mining. prereq: BICB grad student or instr consent

BICB 8620. Topics in Biomedical Informatics and Computational Biology. (; 0.5-4 cr. [max 24 cr.] ; Student Option; Every Fall, Spring & Summer)

Each section corresponds to a Mayo 8XXX course. prereq: BICB grad student, permission of DGS

BICB 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

BICB 8670. Topics in Management of Technology. (; 0.5-4 cr. [max 24 cr.] ; Student Option; Periodic Fall, Spring & Summer)

Each section of this course corresponds to one of the MOT courses. prereq: BICB grad student, DGS consent

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

TBD

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

TBD

BICB 8920. BICB Colloquium. (; 1 cr. [max 2 cr.] ; S-N only; Every Fall & Spring)

Weekly colloquium. Features research talks. prereq: BICB grad student

BICB 8930. BICB Journal Club. (; 1 cr. [max 4 cr.] ; S-N only; Every Fall & Spring)

Weekly seminar. Journal articles presented by participants. prereq: BICB grad student or instr consent

BICB 8932. Proposal Writing Seminar. (; 1 cr. ; S-N only; Every Spring)

Process of developing/writing research proposal that serves as basis for preliminary written exam in BICB graduate program. prereq: BICB PhD student or instr consent

BICB 8940. Education and Pedagogy Seminar. (; 1 cr. [max 4 cr.] ; S-N only; Periodic Fall & Spring)

Offered jointly with Center for Learning Innovation (under development at UMR). Pedagogical approaches based on cognitive science research. Current/past literature on how our understanding of learning has shaped classroom teaching. prereq: BICB grad student or instr consent

BICB 8960. Internship. (; 1-6 cr. [max 12 cr.] ; S-N only; Every Fall & Spring)

tbd prereq: BICB Ph.D. student

BICB 8970. Entrepreneurship and Leadership Seminar. (; 1 cr. ; S-N only; Every Spring)

Students will be introduced to aspects of entrepreneurship and leadership primarily in the context of clinical and translational research, such as data confidentiality, policies, challenges to bring research to the market, or federal funding trends. The seminar includes guest speakers. prereq: BICB graduate student or instructor permission

BICB 8990. Seminar on Current Topics. (; 1 cr. [max 4 cr.] ; Student Option; Periodic Fall, Spring & Summer)

Current topics in biomedical informatics and computational biology. prereq: BICB grad student or instr consent

BICB 8991. Independent Study. (; 1-2 cr. [max 4 cr.] ; S-N only; Every Fall, Spring & Summer)

Individual reading on specialized topics. prereq: BICB grad major

BICB 8994. Directed Research. (; 1-3 cr. [max 6 cr.] ; S-N only; Every Fall, Spring & Summer)

Course used to develop a research project prior to enrolling in thesis credits. Project may lead to thesis research. prereq: BICB grad student or instr consent

Center for Learning Innovation (CLI)

CLI 1000. Academic Inquiry into the Health Sciences. (2 cr. [max 3 cr.] ; A-F only; Every Fall)

Provides students with a firm foundation for academic success at UMR. Introduction to and application of basic academic skills in a collaborative, interdisciplinary environment via consideration of a central organizing question. co-req: WRIT 1510

CLI 1196. National Student Exchange: Plan A. (; 1-20 cr. [max 40 cr.] ; S-N only; Every Fall, Spring & Summer)

National Student Exchange enrollment; off-campus study.

CLI 1296. National Student Exchange: Plan B. (0-20 cr. [max 40 cr.] ; No Grade Associated; Every Fall, Spring & Summer)

National Student Exchange enrollment; off-campus study.

CLI 1711. University Experience I. (1 cr. ; S-N or Audit; Every Fall)

Orients students to UMR's campus environment and resources, providing opportunities to connect with members of the campus community. The course focuses on developing strategies for wellbeing (e.g., academic, community, financial, physical, and social) students can implement as they navigate the university experience. prereq: Admitted to Bachelor of Science in Health Sciences (BSHS)

CLI 1712. Personal Development and Career Exploration. (1 cr. ; S-N or Audit; Every Fall & Spring)

This course enables students to develop a deeper understanding and application of their strengths. Strengths and personal values are explored in the context of both personal development and career exploration. Discussion of a wide variety of health careers prepares students to continue their career development in CLI 2713.

CLI 2713. Career Development and Career Skills in the Health Sciences. (1 cr. ; S-N or Audit; Every Fall & Spring)

Builds on foundation of personal development and career exploration. Engage in personal career development through the career decision making process. Utilize and develop career skills including: resume and cover letter writing, interviewing, professionalism, and networking. Reflect on, explore, and engage in meaningful experiences to develop professional competencies. prereq: 1712

CLI 3496. Internship: Professional Experience. (1-6 cr. [max 24 cr.] ; S-N only; Every Fall, Spring & Summer)

Matches student's academic/career goals with opportunities in industry, nonprofit organizations, and government agencies. prereq: instr consent, dept consent, acceptance of internship proposal

CLI 3522. Community Collaboratory. (3 cr. ; A-F only; Every Fall & Spring)

The academic goal of this course is to extend the student learning experience into the local community. Responding to needs identified by local public, private, and nonprofit organizations, students will confront the challenges present in complex human systems and contribute to projects aimed at improving the quality of life in Southeastern Minnesota. In doing so, students participate in sustainable and meaningful partnerships between the University of Minnesota Rochester and the surrounding community. Students will also have the opportunity to build relationships with people of different backgrounds and life experiences, to broaden their worldview, to critically and creatively examine community concerns, and to discover their own capacity to affect change in the world around them. prereq: junior or senior standing

CLI 3712. Capstone Proposal Writing. (2 cr. ; S-N or Audit; Every Fall & Spring)

This course focuses on all aspects of writing and submitting the Capstone Proposal for the BSHS degree. Students will propose a set of learning experiences which connect to a holistic theme. Capstone Proposals are reviewed by the CLI Faculty and must be approved before Capstone experiences can begin.

CLI 3714. Preparing a Competitive Health Professions Application. (1 cr. ; S-N only; Every Spring)

Prepare a compelling and comprehensive application to a health professional program using a centralized application system (e.g. Dental, Med, Optometry, OT, PA, Pharmacy, Podiatry, PT, Vet Med). Create an application plan, write a personal statement and activities statements, navigate the components of the application system, and prepare to interview, all while evaluating preparedness to apply. prereq: 2713

CLI 3715. Learning Away Orientation. (; 1 cr. ; S-N only; Periodic Fall & Spring)

Provides an introduction to the various challenges related to learning away. Students will learn about cultural theories and stumbling blocks to intercultural communication, and acquire new knowledge and attitudes to successfully complete a learning away experience. In addition, the course will provide important information on financial management while away, how to remain healthy and safe, preparing for reentry into the United States and campus community, and how to market an experience away on a resume and cover letter. Online, seven week course. prereq: instructor consent

CLI 3716. Living on Purpose. (1 cr. ; S-N only; Periodic Fall)

Living on Purpose allows students to explore the roles personal purpose and intentional

living play in our lives (e.g., goal setting and career planning). Students will explore their core values via a combination of discussion and activities that will allow students to further clarify their personal and professional values.

CLI 3721. Special Topics in Learning & Development. (; 1-4 cr. [max 8 cr.] ; A-F or Audit; Periodic Fall & Spring)

In-depth study of special topics. prereq: repeated enrollment allowed only if topics are different

CLI 4000. Off-Campus Study. (0-36 cr. [max 72 cr.] ; No Grade Associated; Periodic Fall, Spring & Summer)

Not printed in catalog. A registration mechanism for students pursuing a unique off-campus study experience through either other educational institutions or through private non-credit granting agencies. Limited to students whose study is approved by University of Minnesota Rochester faculty who certify likely departmental credit for successfully completed study as specified by agreement forms signed by both student and faculty. prereq: instr consent

CLI 4394. Off-Campus Directed Research. (1-3 cr. [max 15 cr.] ; S-N only; Periodic Fall, Spring & Summer)

Off-campus research experiences are different from any other type, since they combine elements of directed research with an internship, since typically the research is supervised by a non-faculty member who assigns a grade based on a combination of supervisor feedback and reflective writing. prereq: inst consent, dept consent,

CLI 4713. Capstone Reflections. (; 1 cr. [max 2 cr.] ; S-N only; Every Fall & Spring)

Students will complete this course in the final semester of their UMR capstone experience. This course integrates student life, the curriculum, and career exploration to facilitate student growth and professional development. The purpose of this course is to participate in, observe, analyze, and interpret students' capstone experiences. To illustrate growth, students will record their observations and analysis throughout the semester and present their capstone portfolio in a public presentation.

Chemistry (CHEM)

CHEM 1331. Chemical Structures and Properties. (PHYS; 4 cr. ; A-F or Audit; Every Fall)

This course focuses on the study of the electronic, atomic and molecular structure of matter. Topics include: Atomic composition and mass spectrometry, theory of light, electronic structure and atomic spectroscopy, periodic table, covalent bond and molecular structure, organic functional groups and infrared spectroscopy, conformational analysis and H-NMR, intermolecular forces and phase change, solutions and solubility. Spectroscopic techniques are presented from the beginning as tools for evidence and analysis of atomic and molecular structure and composition. prereq: high school chemistry or equiv

preferred and three years high school math required

CHEM 1333. Chemical Reactivity. (PHYS; 4 cr. ; A-F or Audit; Every Spring)

This course focuses on the following topics: Organic functional groups and organic structure. NMR and IR spectroscopic analysis. Conformational analysis. Stereochemistry: configurational isomerism and R/S descriptors. Introduction to Kinetic and Thermodynamic principles of reaction. Acid/Base: proton transfer, pKa, and acidity. Common themes in organic mechanisms of reaction: electrophile, nucleophile, organic reagents. Kinetics of SN1, SN2, E1, and E2. Nucleophilic addition and nucleophilic elimination. Carbocation rearrangement. Experimental Laboratory: laboratory techniques in organic chemistry, including chromatography, extraction, polarimetry. prereq: C- or better in 1331

CHEM 1393. Directed Study in Chemistry. (1-3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)

Individual study on selected topics or problems. prereq: instr consent, dept consent

CHEM 2131. Organic Chemistry II. (3 cr. ; A-F only; Every Fall)

Organic reactions: nucleophilic substitutions, eliminations, carbonyl additions, acyl substitutions, aromatic electrophilic substitution, rearrangements, oxidation and reduction reactions. Use of spectroscopic tools in structure elucidation: nuclear magnetic resonance, mass spectroscopy, infrared and electronic absorption spectroscopy. Reactivity of biologically important classes of organic compounds such as lipids, carbohydrates, amino acids, peptides, proteins, and nucleic acids. prereq: C- or better in 1333

CHEM 2132. Organic Chemistry II Lab. (1 cr. ; A-F only; Every Fall)

Laboratory techniques: synthesis, isolation and purification techniques including extraction, thin-layer and column chromatography. Characterization of organic compounds using spectroscopy such as NMR, mass spec, IR and UV-Vis. prereq or coreq: 2131

CHEM 2335. General Chemistry II. (3 cr. ; A-F only; Every Spring)

Complex acid-base chemical equilibria: Acid-base buffers, titration curves, and polyprotic acids. Equilibria of partially soluble substances. Chemical kinetics and nuclear chemistry. Chemical thermodynamics and spontaneity of processes. Electrochemistry and redox reactions: Voltaic and electrolytic cells, applications of electrochemistry to health sciences. Effect of concentration on spontaneity. Coordination chemistry: structure and equilibria. prereq: C- or better in 1333; prereq or coreq: C- or better in MATH 1121

CHEM 2336. General Chemistry II Lab. (1 cr. ; A-F only; Every Spring)

Experimental laboratory of chemistry: Solution preparation with volumetric material. Standardization of solutions. Titration by indicator and pH-meter. Using UV/Vis spectrophotometry to measure thermodynamic

and kinetic parameters. Calorimetry. Qualitative analysis of metals. prereq or coreq: 2335

CHEM 3393. Directed Study or Research in Chemistry. (1-6 cr. [max 24 cr.]; Student Option; Every Fall & Spring)

Individual study or research on selected topics or problems. prereq: instr consent, dept consent

CHEM 3721. Special Topics in Chemistry. (; 1-4 cr. [max 8 cr.]; A-F or Audit; Periodic Fall & Spring)

In-depth study of special topics in chemistry. prereq: instr consent; repeated enrollment allowed only if topics are different

CHEM 4331. Chemical Biology/Bioorganic Chemistry. (3 cr. ; A-F or Audit; Every Spring)

Topics include: Chemical control of signal transduction; Polyketide biosynthesis; Non-natural amino acid insertion into proteins (in vivo nonsense suppression); Non-ribosomal peptides; Organic chemistry of polymerase chain reaction; Protein backbone modification - secondary structure stabilization; Chemical biology of fluorescent proteins. DNA binding antibiotics; DNA backbone modification; RNAi; Cell surface engineering through oligosaccharide biosynthesis. prereq: BSHS student; C- or better in CHEM 2131 or 2302

CHEM 4333. Physical Chemistry. (3 cr. ; A-F or Audit; Every Spring)

Statistical mechanics to understand macroscopic description of chemical phenomena: molecular energy levels, Boltzmann factor, and partition functions. Chemical thermodynamics, phase equilibria, liquid-liquid solutions, and chemical equilibria. Introduction to molecular spectroscopy. Principles of nuclear magnetic resonance spectroscopy. prereq: C- or better in Chem 1062 or 2335, Math 1171 or 1271, coreq/prereq Math 2171 or 1272, Phys 1201W or 2251.

Communication Studies (COMM)

COMM 1393. Directed Study in Communication. (1-3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring)

Individual study on selected topics or problems. prereq: instr consent, dept consent

COMM 2511. Communication Methods. (; 3 cr. ; A-F only; Every Fall & Spring)

Students learn the role of communication in the public's understanding of health. Students learn theories and practices of verbal, nonverbal, and visual communication and the impact of interpersonal, group, organizational, and scientific contexts on communication in order to analyze and create messages about health related topics. Students develop public speaking skills using presentation software.

COMM 2711. Communication in Professional Contexts. (3 cr. ; A-F only; Periodic Fall & Spring)

Students learn the role of communication skills for professionals in a health care context developing public speaking skills using presentation software. Students learn theories of communication and how to effectively communicate through verbal and

nonverbal channels while exploring the role of interpersonal, group, and organizational communication in health care settings.

COMM 3393. Directed Study or Research in Communication. (1-6 cr. [max 24 cr.];

Student Option; Periodic Fall & Spring) Individual study or research on selected topics or problems. prereq: instr consent, dept consent

COMM 3721. Special Topics in Communication. (; 1-4 cr. [max 8 cr.]; A-F only; Periodic Fall & Spring)

In-depth study of special topics in communication.

Echocardiography (ECHO)

ECHO 3011. Foundations of Echocardiography. (TS; 2 cr. ; A-F only; Every Fall)

This course is designed to provide students with a fundamental understanding of echocardiographic techniques. The course will provide students with patient care skills required for cardiac sonographers and will identify proper imaging techniques to prevent injury. The course will include recognition of cardiac anatomy on an echocardiogram, provide an understanding of machine instrumentation and basic ultrasound physics, identify proper 2-D, M-mode, and Doppler techniques, and echocardiographic assessment of systolic and diastolic function.

ECHO 3101. Cardiovascular Anatomy & Physiology. (3 cr. ; A-F only; Every Fall)

The course is designed to provide the student with an in-depth understanding of gross and cross-sectional cardiac anatomy and an understanding of normal cardiac physiology. The concepts of cardiovascular physiology will include circulation blood flow, the cardiac cycle, electrical and mechanical properties of the heart, and blood flow hemodynamics of the arterial and venous system. This course will provide the foundation for advanced physiologic concepts and Doppler hemodynamic assessment in subsequent courses.

ECHO 3202. Adult Echocardiography. (6 cr. ; A-F only; Every Spring)

The intent of this course is to provide the student with the necessary knowledge of cardiomyopathies, coronary artery disease, and cardiac diseases due to systemic illness, pericardial diseases, systemic and pulmonary hypertension, cardiac tumors and masses, diseases of the great vessels and echocardiographic assessment of valvular heart disease by utilizing 2-D, M-mode, and Doppler techniques.

ECHO 3301. Clinical Practicum I. (8 cr. ; A-F only; Every Fall)

The intent of this course is to provide the student with an opportunity to perform portions of an echo exam, review position, transducer placement, and terminology in the clinical setting. Two-dimensional (2-D) and Doppler skills learned in Foundations of Echocardiography will be applied in the clinical

setting. Clinical Practicum I will provide the student with the opportunity to observe the clinical environment, understand the clinical application of echocardiography, and interact with clinical staff.

ECHO 3302. Clinical Practicum II. (; 7 cr. ; A-F only; Every Spring)

The intent of this course is to continue to provide the student with the necessary skills and knowledge to integrate academic and clinical learning. Course content will include review of how to perform a routine two-dimensional, Color Flow, and Doppler echocardiography examination and the development of skills necessary to do a complete hemodynamic and Doppler assessment. Course will use hands-on experience to help develop the skills required to do a hemodynamic assessment.

ECHO 3403. Echocardiographic Application. (; 3 cr. ; A-F only; Every Summer)

The intent of this course is to integrate knowledge from previous courses. This course will focus on case reviews and the integration of all 2-D and Doppler data. Students will be able to demonstrate application of echocardiographic data and recognize discrepancies in data, ability to identify key findings, ability to create a preliminary report, and effectively communicate the echo findings to the reviewer.

ECHO 3503. Stress Echocardiography. (; 2 cr. ; A-F only; Every Summer)

This course will provide the student with the necessary knowledge regarding common lab values, ECG, and basis cardiac pharmacology along with a thorough understanding of the different types of stress tests performed in an echocardiographic laboratory and the technical aspects of the digitizing equipment. The role of the sonographer for each procedure will be identified. Students will develop an in-depth understanding of exercise echocardiography and the use of Dobutamine and contrast during a stress echo.

ECHO 4111. Ultrasound Physics I. (2 cr. ; A-F only; Every Fall)

This course is designed to introduce the student to basic physics principles and instrumentation used in diagnostic ultrasound. The course will describe basis ultrasound physics principles, formulae and calculations as well as describe ultrasound itself. Key areas to be covered include: the properties of sound waves, principles of reflection, transmission, scattering and refraction; principles of attenuation and components of sound energy loss; transducer construction and function; sound beam anatomy; spatial resolution; transducer array technology; sound beam steering, and focusing. The course goal is to help the student understand the process by which an image is created, and ultimately identify ways to produce an optimal echo image.

ECHO 4112. Ultrasound Physics II. (; 2 cr. ; A-F only; Every Spring)

The course is designed to expand the information learned in Ultrasound Physics I and

provide new information regarding theory and operation of diagnostic ultrasound equipment. The course will describe 2-dimensional imaging principles and instrumentation, image storage and display, the Doppler effect, pulsed and continuous wave Doppler generation, spectral analysis and display, color flow imaging, image features and artifacts, quality assurance, bioeffects and safety, and will introduce students to newer technologies including contrast and tissue harmonics, Doppler tissue imaging, and power Doppler. The course goal is to help the student understand the process by which an image is created, Doppler information is generated and displayed, and identify ways to produce high quality, diagnostic echocardiographic information.

ECHO 4211. Congenital Heart Disease I. (3 cr. ; A-F only; Every Fall)

The intent of this course is to provide the student with advanced knowledge of anatomy of congenital cardiac abnormalities, adult congenital heart disease (CHD), and follow-up of these patients. Surgical repair and interventional catheterization or methods will be discussed as well as postoperative complications. The student will also be provided necessary information on performing a systematic 2-D, spectral, and Color Flow Doppler examination on a patient with CHD.

ECHO 4303. Clinical Practicum III. (6 cr. ; A-F only; Every Summer)

Clinical Practicum III will primarily focus on development of students clinical skills for 2-Dimensional and Doppler echocardiography. Clinical Practicum III is devoted to clinical training, allowing students an opportunity to apply didactic classroom instruction and develop their clinical skills. Students will begin to integrate the clinical and echo findings and identify final impressions related to the echo exam. Observational rotations will include intraoperative TEE, Outreach echocardiography, Stress Echocardiography, TEE and contrast echocardiography. 3D and strain rate echocardiography and the role of the sonographer for each procedure will also be included in this course. Lab sessions will allow students the opportunity to demonstrate the required skills for 3D and strain rate imaging.

ECHO 4401. Clinical Practicum IV. (8 cr. ; A-F only; Every Fall)

Clinical Practicum IV will continue to develop the student's clinical skills to complete an optimal echocardiographic hemodynamic assessment. The focus of the term will be the ability to integrate 2-D and echo data in an accurate patient report. Clinical Practicum IV will introduce students to congenital echocardiography, to the field of stress echocardiography, and to echocardiographic research.

ECHO 4402. Clinical Practicum V. (9 cr. ; A-F only; Every Spring)

During Clinical Practicum V, the students will apply previous didactic and clinical training to complete a quality echocardiographic examination. Students will be responsible for integrating echo data, preparing preliminary echo findings and delivering the report.

ECHO 4460. Special Procedures. (2 cr. ; A-F only; Every Summer)

Focus on the special procedures performed involving echocardiography and the sonographer's role. Includes anatomy and clinical indications of TEE, intro-operative procedures, pericardiocentesis, cardiac catheterization procedures, and echo assessment of left ventricular assist devices. Introduction to other imaging modalities including Nuclear, CT, and MRI, and the information they can provide about the heart. Also includes 3D and strain echocardiography and the role of the sonographer for each procedure.

ECHO 4501. Research Project and Publication I. (1 cr. ; A-F only; Every Spring)

Students will be responsible for devising, developing and undertaking a research project which would be suitable for submission either to a scientific meeting or for publication. This will include developing a research question, devising and submitting a research protocol, reviewing related literature, and reporting the findings in abstract, paper, and/or a short oral presentation. Research mentors will be assigned to allow guided independent study.

ECHO 4540. Professional Growth and Development. (1 cr. ; A-F only; Every Spring)

Provides students with the skills and knowledge for future professional growth. Discussion of the scope of practice and career advancement for sonographers, medical ethics. Includes registry exam preparation.

English: Literature (ENGL)

ENGL 1393. Directed Study in English. (1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)

Individual study on selected topics or problems. prereq: instr consent, dept consent

ENGL 1433. Introduction to Literature.

(LITR; 3 cr. ; A-F or Audit; Every Fall & Spring) Basic techniques for analyzing/understanding literature and developing critical thinking skills. Readings of novels, short stories, poems, plays.

ENGL 3393. Directed Study or Research in English. (1-6 cr. [max 24 cr.] ; Student Option; Every Fall & Spring)

Individual study or research on selected topics or problems

ENGL 3471. Gender and Sexuality Studies. (DSJ; 3 cr. ; A-F only; Every Spring)

This course explores a variety of theories of gender and sexuality; the literary and media representations of gender and sexuality (both contemporary and historical); and the embodiment, performance and construction of gender and sexual identities. The ethical, social, and political dimensions of gender- and heteronormativity and the role of power in theories and manifestations of gender and sexuality are considered. prereq: 1433 or HIST 1435 or HUM 1437 or PHIL 1441

ENGL 3481. Society, Science, and Science Fiction. (TS; 3 cr. ; A-F only; Every Fall)

Historical/contemporary analysis of science and technology and their representation in literary, cinematic, and/or multimedia science fiction. Course will explore how science/technology figures creation of socio-cultural values and truth production, and may include, but is not limited to, the cultural, psychological, historical, and literary perspectives. Course is discussion-based and project-centered. prereq: 1433 or HIST 1435 or HUM 1437 or PHIL 1441

ENGL 3721. Special Topics in English. (1-4 cr. [max 8 cr.] ; A-F or Audit; Periodic Fall & Spring)

In-depth study of special topics in English. prereq: instr consent; repeated enrollment allowed only if topics are different

Health Professions (HP)

HP 3021. Patient Care Techniques. (1 cr. ; A-F only; Every Fall & Summer)

This multidisciplinary course uses a blended format to introduce students to the fundamental practice, attitudes, and competencies needed by all health care providers. Professionalism, communication skills, infection control, vital signs, ergonomics, patient safety, medical emergencies, medication, and managing tubes are reviewed. Students will practice general patient care procedures and skills and demonstrate competent performance.

HP 4802. Health Economics and Finance.

(DSJ; 3 cr. [max 6 cr.] ; A-F only; Every Spring) Course covers micro- and macro-economic theory applied within the healthcare sector. A flow of funds approach explores finances in healthcare transactions and incentives.

Historical development of third party reimbursement, healthcare financial structures and mechanisms, individual health, and public health factors affecting the delivery system, payment system, and supply/demand system is followed by a wider macroeconomic review to explore factors of change within the healthcare system. National health spending and the role of government and regulators in public and private health is explored by case study and contemporary readings. The health of individuals and the health of groups is studied in terms of cost, economic, ethical, and socioeconomic disparities, and in non-Western countries. The course aims to make the language of healthcare finance and economics understandable and relevant for students in healthcare professions. prereq: junior or senior standing, or PUBH 2561

HP 4902. Management and Leadership in Healthcare. (GP; 2 cr. [max 4 cr.] ; A-F only; Every Spring)

Students acquire background and skills of business/administrative aspects of healthcare. Applications of business theory are applied to medical settings. Functions of management organization models, budget and other planning, information systems, human resource functions including staff scheduling, employee evaluation, productivity management, personal accountability, group leadership, external factors including accreditation and non-Western views will be explored. Alternative

theories including Systems Thinking will be explored and contrasted with traditional management.

History (HIST)

HIST 1393. Directed Study in History. (1-3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring)

Individual study on selected topics or problems. prereq: instr consent, dept consent

HIST 1435. Comparative Global History. (GP,HIS; 3 cr. ; A-F or Audit; Every Fall & Spring)

Examines the cause, course, and consequence of regional, national, and international crises in various parts of the modern world. Exposes students to historical concepts and methodology. Main themes range from genocide, epidemics, ethnic identity, cross-cultural conflict, racism, and humanitarianism.

HIST 3245. Epidemics, Empires, and Environment. (ENV,HIS; 3 cr. ; A-F only; Every Fall)

Analysis of the impact of epidemic diseases on the social, cultural, and political landscapes from the Black Death to the present. Course themes include: environmental and biological components contributing to infectious disease; development of public health measures; intersection of disease control and imperialism; social reactions of mass hysteria and violence; rise of the germ theory of disease; and the impact of industrialization and globalization on the ecological transmission of disease. prereq: BIOL 2311

HIST 3393. Directed Study or Research in History. (1-6 cr. [max 24 cr.]; Student Option; Every Fall & Spring)

Individual study or research on selected topics or problems. prereq: instr consent, dept consent

HIST 3721. Special Topics in History. (; 1-4 cr. [max 8 cr.]; A-F or Audit; Periodic Fall & Spring)

In-depth study of special topics in History. prereq: instr consent; repeated enrollment allowed only if topics are different

Humanities (HUM)

HUM 1437. History of Medicine in the West. (HIS; 3 cr. ; A-F only; Periodic Spring)

This course examines the history of medicine in the Western tradition from the Middle Ages into the modern era. It explores a variety of primary and secondary historical documents to assess the evolution and development of medical theory and practice throughout the centuries.

HUM 3401. Contemplation of Mental Health Using Creativity and Qualitative Analysis. (; 3 cr. ; A-F only; Periodic Spring)

Explore, examine, and experience the parallels between the creative process and healing through 1) participating in and conducting creativity-based sessions offered for patients hospitalized at the Mayo Clinic; 2) examining the theoretical framework of creative thinking,

strength perspectives, creative movement, narrative theory, and creative process as a mutual recovery; and 3) assessing and analyzing qualitative data collected from the participants at the creativity-based sessions. By instructor permission only.

HUM 3721. Special Topics in Humanities. (; 3 cr. [max 6 cr.]; A-F or Audit; Periodic Fall & Spring)

In-depth study of special topics in the humanities. prereq: instr consent; repeated enrollment allowed only if topics are different

Mathematics (MATH)

MATH 1120. Precalculus I. (MATH; 3 cr. ; A-F or Audit; Every Fall)

This course develops skills related to understanding and manipulating equations and connects equations to relations and functions. While studying functions, essential properties to functions are discussed and include function transformations. Attention is given to polynomial and rational functions with an emphasis on linear and quadratic functions. Inverse functions and their applications to exponential and logarithmic functions are also explored. Course concepts are demonstrated in physical contexts using appropriate mathematical and quantitative methods, which includes analytic geometry. Clear and proper communication of the mathematics is stressed. The course utilizes active learning strategies and includes a significant collaboration component. This course includes coverage beyond the usual high school level mathematics courses. prereq: three years of high school mathematics.

MATH 1121. Precalculus II. (MATH; 3 cr. ; A-F only; Every Fall & Spring)

This course develops quantitative reasoning skills that build upon the understanding of a function as well as the foundation presented in Precalculus I. Trigonometric functions and their properties are explored in depth through unit circle analysis. Additionally, inverse trigonometric functions, right triangle trigonometry, Half and Double Angle theorems, and Laws of Sines and Cosines are discussed. Methods of solving systems of equations, including solving by substitution and elimination by addition, are developed. Arithmetic and geometric sequences and series are discussed. Analysis of conic sections is also explored. Vector analysis may also be completed including the dot product. Throughout the course, modelling physical situations with mathematics using appropriate quantitative methods. Clear and proper communication of the mathematics is stressed. The course utilizes active learning strategies and includes a significant collaboration component. This course includes coverage beyond the usual high school level mathematics courses. prereq: MATH 1110, or placement exam

MATH 1161. Introduction to Statistics. (MATH; 3 cr. ; A-F or Audit; Every Fall)

Exploration of statistical analysis in a health sciences context, using technology and active/

peer learning. Build statistical inferences from scientific methods. Gather, sort, describe, arrange and construct visual representations of data sets and generate basic predictive models. Introduction to probability and data distributions, leading to inferential statistics. prereq: three years of high school math

MATH 1171. Calculus, Modeling, and Data I. (MATH; 4 cr. ; A-F or Audit; Every Fall & Spring)

Differential/integral calculus of a single variable. Optimization, numerical methods. Differential equations, graphing. Functions of several variables and Introduction to partial derivatives. Applications emphasize biology, health sciences, and integration of mathematical models. prereq: C- or better in MATH 1121 or placement exam

MATH 1393. Directed Study in Mathematics. (1-3 cr. [max 6 cr.]; Student Option; Every Fall & Spring)

Individual study on selected topics or problems. prereq: instr consent, dept consent

MATH 2161. Biostatistics. (MATH; 3 cr. ; A-F or Audit; Periodic Fall & Spring)

Using real data, this course develops a conceptual understanding of statistical hypothesis testing and critical thinking about sampling techniques and experimental design. Focus on selecting appropriate hypothesis tests for research questions and correctly completing ANOVA tests, non-parametric tests, log/odds ratio tests, logistic regression, and survival analysis. Instruction in using Microsoft Excel and SAS to perform the computational parts of hypothesis testing and produce meaningful graphical representations. Emphasis on discussing statistics in groups, presenting findings, and communicating results. prereq: C- or better in MATH 1161 OR STAT 3011

MATH 2171. Calculus, Modeling, and Data II. (MATH; 4 cr. ; A-F or Audit; Every Spring)

Differential/integral calculus of a single variable. Sequences and series. Differential calculus of multiple variables. Systems of differential equations. Matrices. Phase plane analysis. Applications emphasize biology, health sciences, and integration of mathematical models. prereq: C- or better in 1171 OR 1271 or placement exam BSHS student

MATH 3393. Directed Study or Research in Mathematics. (1-6 cr. [max 24 cr.]; Student Option; Every Fall & Spring)

Individual study or research on selected topics or problems. prereq: instr consent, dept consent

MATH 3721. Special Topics in the Mathematical Sciences. (; 1-4 cr. [max 8 cr.]; A-F or Audit; Periodic Fall & Spring)

In-depth study of special topics in the mathematical sciences. prereq: instr consent; repeated enrollment allowed only if topics are different

Philosophy (PHIL)

PHIL 1393. Directed Study in Philosophy.

(1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)

Individual study on selected topics or problems. prereq: instr consent, dept consent

PHIL 1431. Introduction to Philosophy. (AH; 3 cr. [max 6 cr.] ; A-F or Audit; Every Fall)

This course examines historical and contemporary philosophical problems and introduces students to the standards for evaluating philosophical arguments. Some of the problems that may be examined include: the existence of god, the nature of knowledge, the relationship between the mind and the body, the nature of personal identity, and the problem of free will. Students gain an understanding of the nature and historical origin of these problems and learn to critically evaluate possible solutions to these problems.

PHIL 1441. Introduction to Ethics. (AH,CIV; 3 cr. ; A-F or Audit; Every Fall & Spring)

This course introduces students to basic ethical theories and examines several contemporary ethical problems. Some of the problems that may be examined include: income inequality, immigration, the right to die, the right to health care, civil disobedience, just war theory, paternalism, animal rights, and capital punishment. Students gain an understanding of the nature and historical origin of these problems and learn to critically evaluate possible solutions to these problems.

PHIL 3393. Directed Study or Research in Philosophy. (1-6 cr. [max 24 cr.] ; Student Option; Every Fall & Spring)

Individual study or research on selected topics or problems. prereq: instr consent, dept consent

PHIL 3437. History and Philosophy of Science. (HIS; 3 cr. ; A-F or Audit; Every Spring)

Examination of several historical and contemporary philosophical problems that arise within the context of scientific practice. Problems may include: the nature of scientific explanation, the problem of induction, the problem of demarcation, the role of laws and models in scientific theorizing, the social responsibilities of scientists, and scientific realism. Students gain an understanding of the nature and historical origin of these problems and learn to critically evaluate possible solutions to these problems. prereq: sophomore status or above

PHIL 3441. Ethics of Medicine and the Sciences. (AH,CIV; 3 cr. ; A-F or Audit; Every Fall)

This course examines several contemporary ethical problems that arise within the context of medicine and scientific research. Some of the problems that may be examined include: the social responsibilities of pharmaceutical companies, the role of the family in medical-decision making, cognitive enhancement, the proper payment for research participation, direct-to-consumer advertising of pharmaceutical drugs, empathy and medical professionalism, and the permissibility of religious conscientious objection. Students

will gain an understanding of the nature and historical origin of these problems and learn to critically evaluate possible solutions to these problems. prereq: 1441 or instr consent

PHIL 3721. Special Topics in Philosophy. (; 1-4 cr. [max 8 cr.] ; A-F or Audit; Periodic Fall & Spring)

In-depth study of special topics in Philosophy. prereq: instr consent; repeated enrollment allowed only if topics are different

Physics (PHYS)**PHYS 1251. Physics I.** (PHYS; 4 cr. ; A-F or Audit; Every Fall & Spring)

An activity-based introductory physics course focused on concepts of motion, force, energy, fluid dynamics, and oscillating systems. The course develops problem solving skills through a systematic decision-making framework and develops knowledge through a formal disciplinary integration and application to biomedical and other real world application. The laboratory component enhances knowledge and promotes good experimental design, techniques, and technical writing. prereq: Grade of at least C- in [MATH 1111 or equiv] or [concurrent registration is required (or allowed) in MATH 1171 or equivalent] or MATH 2161

PHYS 1393. Directed Study in Physics. (1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)

Individual study on selected topics or problems. prereq: instr consent, dept consent

PHYS 2251. Physics II. (PHYS; 4 cr. ; A-F or Audit; Every Fall & Spring)

A course covering more fundamental concepts building on concepts of motion, force and energy. The course uses an activity-based approach to cover topics including thermodynamics, electricity and magnetism, optics, and atomic and nuclear physics and integrates these concepts with modern medical applications and technology. The course advances problem solving by building on a core systematic decision-making framework. A laboratory component integrates real world applications. prereq: Grade of at least C- in [1251 or equiv], Grade of at least C- in [MATH 1171 or equiv]

PHYS 3393. Directed Study or Research in Physics. (1-6 cr. [max 24 cr.] ; Student Option; Every Fall & Spring)

Individual study or research on selected topics or problems. prereq: instr consent, dept consent

PHYS 3721. Special Topics in the Physical Sciences. (; 1-4 cr. [max 8 cr.] ; A-F or Audit; Periodic Fall & Spring)

In-depth study of special topics in the physical sciences. prereq: instr consent; repeated enrollment allowed only if topics are different

Psychology (PSY)**PSY 1393. Directed Study in Psychology.** (1-3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)

Individual study on selected topics or problems. prereq: instr consent, dept consent

PSY 1511. Introduction to Psychology. (SOCS; 3 cr. ; A-F or Audit; Every Fall & Spring)

Scientific study of behavior and mental processes. Analysis of historical and contemporary paradigms in psychology, research methods, sequence and processes of human development, and the joint contribution of biological and environmental influences on behavior..

PSY 3393. Directed Study or Research in Psychology. (1-6 cr. [max 24 cr.] ; Student Option; Every Fall & Spring)

Individual study or research on selected topics or problems. prereq: instr consent, dept consent

PSY 3510. Human Development across the Lifespan. (3 cr. ; A-F or Audit; Every Spring)

This course emphasizes the diverse cultural, social, socioeconomic, and historical contexts of human development throughout the lifespan and explores how these contexts directly influence biosocial, cognitive and psychosocial aspects human development. The course covers the basic principles of human development including: major paradigms, research methods, the sequences and processes of development, and the joint contributions of biological and environmental influences. prereq: 1511

PSY 3512. Principles of Abnormal Psychology. (3 cr. ; A-F or Audit; Every Fall)

Abnormal psychology is the study of the classification, explanation and treatment of abnormal phenomena and mental disorder. This course focuses on the major concepts and controversies in the field. We consider how abnormality is defined and classified, and how the biological, psychological, and sociocultural paradigms contribute to understanding and treating individuals with mental disorders. The multicausality of mental disorder is understood using a diathesis-stress model. Common types of mental disorders are covered with an emphasis on the phenomenology of the disorder (i.e., what it is like to have the disorder), the biopsychosocial causes of the disorder, and the major treatment approaches. Attention is given to appreciating the impact of abnormal mental phenomena on the sufferer and their loved ones, and examining the values and ethics that apply to working with people with mental disorder. prereq: 1511

PSY 3721. Special Topics in Psychology. (; 1-4 cr. [max 8 cr.] ; A-F or Audit; Periodic Fall & Spring)

In-depth study of special topics in psychology. prereq: Repeated enrollment allowed only if topics are different

PSY 3810. Neuropsychology of Wellbeing and Resilience. (3 cr. ; A-F or Audit; Periodic Fall & Spring)

This course pulls from current literature in the fields of neuroscience and positive psychology to explore cognition and human behavior from the perspectives of wellbeing, resilience, and coping rather than pathology,

damage, and weakness. To explore this topic, the course emphasizes neuroscientific and psychological perspectives to evaluate positive human functioning on multiple levels that range from the cellular and molecular through the sociocultural. The content and activities guide students through an exploration of how positive experiences, positive individual traits, and positive institutions influence and are influenced by neurophysiology and behavior. The course focuses on prevention and competency building instead of merely correcting disorders and weaknesses. prereq: 1511

PSY 4512. Social Psychology. (3 cr. ; A-F only; Every Fall)

Social Psychology is the scientific study of how peoples' thoughts, feelings, and actions can influence and/or be influenced by others. This course covers topics that include, but are not limited to: research methods, ethics, and classic as well as contemporary research on topics including social influence and social cognition, self and person perception, attitude formation and change, prejudice and stereotypes, aggression and conflict, helping and prosocial behavior. pre-requ: 1511;

Public Health (PUBH)

PUBH 1393. Directed Study in Public Health.

(1-3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)
Individual study on selected topics or problems. prereq: instr consent, dept consent

PUBH 2561. Introduction to Public Health.

(GP; 3 cr. ; A-F or Audit; Every Spring)
Students acquire an understanding of the academic discipline of public health, major public health problems, and public health systems. The course examines core principles of public health, and provides opportunities to apply new knowledge to address complex population health problems both domestically and globally. Course activities promote critical thinking and integration of public health problems and solutions providing the tools to address population health issues that face individuals, our communities, and the world.

PUBH 3331. Health Equity & Social Determinants of Health. (3 cr. ; A-F or Audit; Every Spring)

Students investigate the role of social and community factors that contribute to health inequities. Students identify neighborhood characteristics such as poverty or access to care that play a critical role in higher negative health outcomes within at-risk populations. Examination of these complex public health issues using evidence-based approaches, frameworks and models, and research methods. Course activities promote critical thinking skills to discover root causes of health inequities and to examine interventions intended to eliminate disparate health conditions within neighborhoods or specific populations. prereq: 2561

PUBH 3393. Directed Study or Research in Public Health. (1-6 cr. [max 24 cr.] ; Student Option; Every Fall & Spring)

Individual study or research on selected topics or problems. prereq: instr consent, dept consent

PUBH 3531. Health Policy & Systems.

(GP,SOCS; 3 cr. ; A-F or Audit; Every Fall)
Students explore health policy as it shapes the lives and health of people and populations locally, nationally, and globally. Students use policy analysis frameworks and evidence-based resources to learn the many dimensions of public health and health policy. Attention is paid to policy at multiple levels, from local policies to national to global policies impacting health outcomes. Students examine the creation, implementation, and impact of health policy through a "health in all policies" lens. Students address the challenge of meeting the needs of target populations with often different, and conflicting, viewpoints. prereq: 2561

PUBH 3561. Environmental Health and Environmental Justice. (SOCS,ENV; 3 cr. ; A-F or Audit; Every Fall)

This course examines environmental health issues and the complex challenges that occur within our communities that affect human health. Examination of environmental health at a micro level--investigating problems that occur within the Rochester community--to understand macro concepts. Includes community engagement with learning opportunities to assess current and past environmental conditions throughout the Rochester, MN area. Themes for this course include neighborhood-churning, food, water, air, and waste while investigating corresponding environmental justice issues that contribute to negative health outcomes. Incorporates a variety of hands-on engaged community learning in partnership with community stakeholders with in-class activities and field trip experiences. This "hands-on" learning in our community encourages critical reflection for students to reconcile personal ideals with new knowledge and skills. prereq: 2561

PUBH 3571. EcoliteracySCHOOL: Public Health Immersion Research Experience. (; 3 cr. ; A-F only; Every Fall)

Students take a leadership role in the development and implementation of a student led public health projects part of a team field experience. Students explore the environmental impacts on human health from a public health and ecoliteracy perspective. Students engage in active learning experiences working and mentoring with high school students. Public health project topics align with and support the 3-day immersive EcoliteracySCHOOL field experience. These topics include: Teambuilding Emergency Preparedness Director, Water & Hydration Specialist, Marketing & Creative Director, Mentorship Leader, Grant-writing Specialist, and Mindfulness Instructor, to name a few. Course activities promote collaboration with peers and high-school mentees, project-based applied learning, pursuit of individual interests, use of the evidence-based public health process, and personal and academic leadership and development. Students prepare a project presentation for wider audiences. prereq: instructor permission and 2561

PUBH 3721. Special Topics in Public Health.

(; 1-4 cr. [max 8 cr.] ; A-F only; Periodic Fall & Spring)
In-depth study of special topics in public health.

PUBH 4561. Introduction to Epidemiology.

(; 3 cr. ; A-F or Audit; Periodic Fall, Spring & Summer)
This course examines epidemiologic concepts to introduce students to the systematic methods of disease discovery, control and prevention. Students look at procedures of the distribution and determinants of health and diseases, morbidity, injuries, disability, and mortality in populations. Application of epidemiologic methods investigate the control of conditions such as infectious and chronic diseases, mental disorders, community and environmental health hazards, and unintentional injuries. This course discusses the broader contexts of how epidemiological methods assist in identifying and solving public health issues. prereq: 2561, MATH 1161

PUBH 4571. EcoliteracySCHOOL: Public Health Immersion Research Experience. (; 3 cr. ; A-F only; Every Fall)

Students build on their PUBH 3571 experience to design a research study that investigates facets of the EcoliteracySCHOOL program, public health concepts and/or curriculum. Students work closely with public health faculty to develop and implement a research agenda that meets individual academic goals. Students are encouraged to present findings at selected conferences. Students build on their exploration of the environmental impacts on human health from a public health and ecoliteracy perspective through a research course. Students engage in active learning experiences working and mentoring with high school students throughout the duration of the course. prereq: instructor permission and 3571

Radiography (RADI)

RADI 3011. Foundations of Radiography.

(TS; 2 cr. ; A-F only; Every Summer)
The course introduces students to the imaging and radiologic sciences. Students will explore the radiologic technologist's role within healthcare organizations. The radiologic technologist's ethical responsibility to their profession, institution, and the diverse patient population will be defined in this course. The course examines legal considerations regarding health information management and medical law as it pertains to radiologic technologists.

RADI 3101. Radiographic Procedures I. (; 2 cr. [max 4 cr.] ; A-F only; Every Summer)

This procedural course defines radiographic positioning terminology as it relates to patient anatomy. The anatomy and positioning considerations of the respiratory and skeletal systems will be examined. Radiographic image analysis for routine examinations of the chest and skeletal system will be emphasized.

RADI 3102. Radiographic Procedures II. (; 7 cr. ; A-F only; Every Fall)

This procedural course will examine the anatomy and positioning considerations of

the skeletal, gastrointestinal, and urinary systems. Radiographic image analysis for routine examinations of these systems will be emphasized. Modifications and adaptations on examinations for the trauma, geriatric and pediatric patient will be explored, along with specialized radiology imaging procedures. Procedural considerations for utilizing contrast in radiographic examinations will be identified. prereq: 3101

RADI 3111. Radiation Physics. (; 2 cr. ; A-F only; Every Fall)

Radiation physics presents the students with a history of people and events which lead to the discovery and use of ionizing radiation in medical imaging, with a review of introductory physics concepts and their application to x-radiation production. Electricity, magnification, transformers, and rectification will be discussed as components of x-ray circuitry and production of x-rays. The student will learn and understand each component of the x-ray tube, including its function and contribution to the production of x-radiation. Theoretical concepts and mathematical formulas needed to adjust exposure techniques in radiography practice will be presented. Students will solve algebraic equations to determine how to make adjustments to exposure factors when changes to mA, time, kVp, or distance are necessary; and explain how these changes affect the emission spectrum. prereq: Physics with lab component

RADI 3201. Introduction to Clinical Radiography. (2 cr. ; A-F only; Every Summer)

This course applies concepts learned in Radiographic Procedures I and Foundations of Radiography to the lab and clinical environments. Students will demonstrate patient care skills and proper positioning for designated radiographic examinations while manipulating x-ray equipment in a simulated environment. Students will also identify pertinent anatomy and evaluate radiographic images.

RADI 3202. Principles of Radiographic Exposure. (; 2 cr. ; A-F only; Every Spring)

In this course students will analyze the relationship of factors controlling and affecting radiographic image exposures. Variable effects on image quality factors will be explored. Through critical thinking, students will learn how to manipulate influencing factors of radiographic quality to produce optimal images. Factors that impact image acquisition, display, archiving, and retrieval will be examined. prereq: 3111

RADI 3301. Clinical Practicum I. (; 5 cr. ; A-F only; Every Fall)

The three main components of this course include: clinical, lab practicum, and professional development. In clinicals, students will assist and perform radiology exams under direct supervision. In an energized lab, students will simulate basic examinations learned in the Radiographic Procedures courses. Students will identify pertinent anatomy and evaluate routine radiographic images. prereq: 3101, 3011

RADI 3302. Clinical Practicum II. (; 9 cr. ; A-F only; Every Spring)

Students will experience the day-to-day operations of a radiology department and perform exams in a variety of clinical rotations. Students will simulate exams in the lab setting, continue to identify pertinent anatomy and critically assess radiographic images. The professional development of a radiologic technologist will also be explored. prereq: 3301, 3102

RADI 4103. Radiographic Procedures III. (2 cr. ; A-F only; Every Spring)

This course explores common diseases presented on radiographic images. The radiographic appearance of diseases and the impact on exposure factor selection will be analyzed. Through an in-depth look of the human body, students will also study the location and relationship of gross anatomical structures to one another. prereq: 3102

RADI 4202. Principles of Radiographic Exposure II. (1 cr. ; A-F only; Every Fall)

This course reviews quality management concepts, measurements, interpretation, correcting actions, and governmental regulations insuring compliance are presented. The theoretical concepts and practical application of fluoroscopy, automatic exposure control (AEC) and duplication of radiographs are discussed. prereq: 3202

RADI 4243. Radiation Biology & Protection. (2 cr. ; A-F only; Every Fall)

This course explores the interaction of radiation and its effects on molecules, cells, tissues and the whole body. Factors affecting biological response to radiation will be presented. Students will learn radiation protection principles to ensure the safety of patients, personnel and the public during radiologic examinations, along with federal and state safety requirements. prereq: 3202

RADI 4302. Advanced Modalities. (1 cr. ; A-F only; Every Fall)

This course provides an introduction to additional imaging modalities including: MRI, CT, Cardiovascular Interventional Imaging, and Breast Imaging. The history, theory and required equipment are presented, along with discussion of exams performed in each modality and anatomy visualized. prereq: 4101

RADI 4303. Clinical Practicum III. (; 7 cr. ; A-F only; Every Summer)

Students will progress through more diverse and complex rotations, and perform exams under increasingly indirect supervision. In an energized lab, students will simulate more difficult exams. Advanced level critique and evaluation of images will be emphasized. prereq: 3302, 4101

RADI 4403. Clinical Practicum IV. (7 cr. ; A-F only; Every Fall)

Students will assist with the operations of a radiology department and perform exams, transitioning to a competent member of the team. An emphasis will be placed on trauma radiography, adapting to situations, and critical thinking skills. prereq: 4303

RADI 4501. Certification Exam Review. (2 cr. ; A-F only; Every Fall)

In this comprehensive course, students will review topics in all sections outlined on the American Registry of Radiologic Technologists Radiography Examination Content Specifications.

Respiratory Care (Rochester) (RESP)

RESP 3011. Foundations of Respiratory Care. (TS; 2 cr. ; A-F only; Every Fall)

This course reviews the clinical roles/responsibilities and career options within the fields of respiratory care. In addition, this course provides students with a solid foundation in professional attributes, cardiopulmonary science, chemical and physics relationships, and mathematical skills to promote success as they begin the clinical-based curriculum. Students explore respiratory care subspecialties and role differences in various clinical settings. Class includes laboratory sessions, discussion, simulation and role-playing.

RESP 3101. Respiratory Care Modalities and Equipment I. (; 4 cr. ; A-F only; Every Fall)

Students will become proficient in performing non-invasive monitoring and therapeutic procedures, including medical gas therapy, humidity and aerosol therapy, bronchial drainage and volume expansion therapy. Commonly prescribed aerosol medications will also be reviewed. Learners will practice skills using simulation-based education and in a laboratory setting. Procedures will be discussed in the context of national practice guidelines as to the scientific rationale, limitations, hazards and complications, issues of asepsis and modification to adapt to patient needs.

RESP 3102. Respiratory Care Modalities and Equipment II. (; 4 cr. ; A-F only; Every Spring)

Students will become competent in the implementation and operation of a range of invasive monitoring devices and life support technology used in care of the critically ill patient. Learners will practice skills using simulation-based medical education and in a laboratory setting. This will include airway management, electrocardiogram hemodynamic and respiratory monitoring, and mechanical ventilation for perinatal, pediatric and adult patients. prereq: 3101

RESP 3201. Cardiopulmonary Patient Assessment. (; 4 cr. ; A-F only; Every Fall)

Patient assessment skills are developed to allow students to both gather and interpret a wide range of patient data. This would include the medical record, patient interview, physical examination, medical laboratory tests, pulmonary function reports (including blood gas analysis), hemodynamic record and radiographic imaging. Cardiopulmonary diseases are introduced with emphasis on pathophysiological manifestations that can be assessed. The laboratory provides a setting for role playing, mock exams and practice of assessment skills. A weekly bedside

teaching case review is designed to integrate coursework, examination skills as well as the human aspect of patient care. The Mayo Multidisciplinary Simulation Center allows practice and debriefing of assessment skills in a safe environment.

RESP 3202. Advanced Cardiopulmonary Physiology and Pathophysiology. (; 3 cr. ; A-F only; Every Spring)

The first half of the course will provide students with a detailed review of the physiology of cardiovascular and pulmonary systems. The second section involves a review of adult, pediatric and perinatal cardiopulmonary disorders. Emphasis will be placed on integrating assessment, laboratory evaluation, major pathology, pathophysiologic manifestations and treatment options with focus on respiratory care. A bi-weekly bedside patient case review allows interaction with patients and application of coursework on cardiopulmonary disorders. The Mayo Multidisciplinary Simulation Center allows. Students to apply skills, knowledge and develop as reflective practitioners using simulated patients in a safe environment. prereq: 3201

RESP 3301. Clinical Practicum I. (3 cr. ; S-N only; Every Fall)

Students begin a series of rotations including 18 different clinical areas at the Mayo Medical Center. Each rotation requires completion of specific competencies. Those areas include 9 intensive care units, the operating room, emergency room, general floor care areas, pulmonary function labs, sleep disorders center, smoking cessation clinic, pulmonary rehabilitation program, home care and outpatient clinic. Learners will practice and master skills using simulation-based medical education. Students will perform respiratory care procedures and diagnostic testing with the supervision of a clinical instructor.

RESP 3302. Clinical Practicum II. (3 cr. ; S-N only; Every Spring)

Students continue a series of rotations including 18 different clinical areas at the Mayo Medical Center. Those areas include 9 intensive care units, the operating room, emergency room, general floor care areas, pulmonary function labs, sleep disorders center, smoking cessation clinic, pulmonary rehabilitation program, home care and an outpatient clinic. Learners will practice and master skills using simulation-based medical education. Students will expand their competencies in adult as well as perinatal & pediatric critical respiratory care. prereq: 3301

RESP 3401. Seminar in Respiratory Care I. (; 1 cr. ; A-F only; Every Fall)

Students will attend weekly conferences and seminars in which issues and cases of clinical importance in respiratory care will be discussed. Students will, with faculty guidance, prepare a presentation on a topic and lead class discussion on the topic presented. The emphasis will be on a critical review of the medical literature. Effective presentation skills will be covered. (1 hour-either Pulmonary & Critical Care Medicine Case Conference or

Combined Critical Care Conference) and 1 hour seminar weekly).

RESP 3402. Seminar in Respiratory Care II. (; 1 cr. ; A-F only; Every Spring)

Students will attend weekly conferences and seminars in which cases and issues of clinical importance in respiratory care will be discussed. Students will prepare and present a case presentation and lead discussion on the case and issues raised by the case. The relevant medical literature will be critically reviewed. In the second part of the course students will gain familiarity with the common forms of medical literature and be introduced to the critical appraisal of published articles in a seminar format. prereq: 3401

RESP 3502. Clinical Research: Literature, Methodology, and Application. (3 cr. ; A-F only; Every Spring)

Students will become readers and writers of research literature, especially that literature which pertains to health care. Students will learn the methodologies of scientific investigation. Students will learn to become constructive critics of scientific investigation. The course provides study content in scientific writing, statistics, research study design including problem statement development and protocol development, research questions or hypothesis development, feasibility analysis, sampling methods and instruments, data management, data analysis and interpretation, and dissemination of research. Prereq: Statistics course, 3401

RESP 4300. Clinical Practicum Summer - Adult Critical Care. (2 cr. ; A-F only; Every Summer)

Students will focus on topics relevant to providing respiratory care to critically ill adults. There will be an emphasis on reviewing case examples of cardiopulmonary problems and therapeutic procedures. However, a multi-organ system-wide patient approach will be maintained. Advanced competencies in ventilator management and critical care monitoring, diagnostics and therapeutic procedures will be assured by laboratory experiences. prereq: 3302

RESP 4311. Advanced Perinatal and Pediatric Respiratory Care. (; 3 cr. ; A-F only; Every Fall)

The didactic course combined with its clinical counterpart will allow students to assume the role of the perinatal/pediatrics specialist as defined by the National Board for Respiratory Care (NBRC). A thorough review of the literature on mechanical ventilation, monitoring applied with emphasis on an evidence-based care, will be provided. Current strategies for extended mechanical ventilation or other forms of long-term support will be reviewed using case study examples. prereq: 3202

RESP 4321. Advanced Cardiopulmonary Diagnostics. (; 2 cr. ; A-F only; Every Fall)

Students will review the rationale and methods used in cardiopulmonary diagnostics. This course along with its clinical counterpart will allow students to assume the role of the advanced pulmonary function technologist

and complete the NBRC's CPFT specialty board exams. Procedures in which participants would become competent include inert gas and body plethysmographic measurement of lung capacity, diffusion studies, bronchial provocation, and heart & lung function during maximal exercise. Interpretation of results and quality control in the laboratory will be facilitated by case reviews and laboratory experiences. prereq: 3202

RESP 4331. Cardiopulmonary Rehabilitation, Disease Prevention and Case Management. (; 1 cr. ; A-F only; Every Fall)

Students will review the delivery of care to chronically ill patients with lung and heart disorders with emphasis on respiratory care. The rehabilitation process will be applied to hospital-based program, extended care facilities and in the home. Topics include clinical testing, exercise prescriptions, and practice guidelines for management. Patient care reviews as part of the laboratory will underscore the multidisciplinary approach to case management and responsibilities unique to the respiratory therapist. This course along with its clinical counterpart will allow students to perform the responsibilities attributed to this subspecialty in respiratory care. Students will become certified asthma educators. prereq: 3202

RESP 4341. Clinical Practicum III: Advanced Respiratory Care. (; 3 cr. ; S-N only; Every Fall)

Students will complete competencies focused in the areas of advanced-level respiratory care including clinical subspecialties and related areas important to the respiratory care practitioner desiring greater scope of practice. Learners will practice and master skills using simulation-based medical education. Advanced Perinatal and Pediatric Respiratory Care: Clinical experiences in high-risk delivery, perinatal & pediatric intensive, inter-hospital transport and chronic care. Advanced Cardiopulmonary Diagnostics: Clinical experiences in pulmonary function testing including lung volume measurement, diffusion studies, exercise testing, sleep diagnostics, ventilation control, indirect calorimetry, provocation testing, oxygen titration and laboratory quality control. Cardiopulmonary Rehabilitation, disease prevention and case management: Clinical experiences in cardiopulmonary rehabilitation including cardiopulmonary disease assessment, disease prevention, patient family education, evaluation of impairment/disability, exercise training and social and psychological considerations. prereq: 3302

RESP 4342. Clinical Practicum V: Advanced Respiratory Care. (; 3 cr. ; S-N only; Every Spring)

Students will complete competencies focused in the areas of advanced-level respiratory care including clinical subspecialties and related areas important to the respiratory care practitioner desiring greater scope of practice. Learners will practice and master skills using simulation-based medical education. Advanced

Perinatal and Pediatric Respiratory Care: Clinical experiences in high-risk delivery, perinatal & pediatric intensive, inter-hospital transport and chronic care. Advanced Cardiopulmonary Diagnostics: Clinical experiences in pulmonary function testing including lung volume measurement, diffusion studies, exercise testing, sleep diagnostics, ventilation control, indirect calorimetry, provocation testing, oxygen titration and laboratory quality control. Cardiopulmonary Rehabilitation, disease prevention and case management: Clinical experiences in cardiopulmonary rehabilitation including cardiopulmonary disease assessment, disease prevention, patient family education, evaluation of impairment/disability, exercise training and social and psychological considerations. prereq: 4341

RESP 4400. Advanced Adult Respiratory Critical Care Techniques I. (2 cr. ; A-F only; Every Summer)

Students will focus on topics relevant to providing respiratory care to critically ill adults. There will be an emphasis on reviewing case examples of cardiopulmonary problems and therapeutic procedures. However, a multi-organ system-wide patient approach will be maintained. Advanced competencies in ventilator management and critical care monitoring procedures including hemodynamic monitoring will be assured by laboratory experiences. prereq: 3102

RESP 4401. Clinical Practicum IV: Advanced Adult Respiratory Critical Care. (; 1 cr. ; A-F only; Every Fall)

Clinical experiences in intensive care of patients including post-operative general-surgical, neurology/neurologic surgery ICU, trauma care, medical ICU, thoracic surgical ICU, inter-hospital transport and hemodynamic monitoring. prereq: 3302

RESP 4402. Clinical Practicum VI: Advanced Adult Respiratory Critical Care. (2 cr. ; A-F only; Every Spring)

Clinical experiences in intensive care of patients including post-operative general-surgical, neurology/neurologic surgery ICU, trauma care, medical ICU, thoracic surgical ICU, inter-hospital transport and hemodynamic monitoring. prereq: 4401

RESP 4500. Advanced Adult Respiratory Critical Care Techniques II. (1 cr. ; A-F only; Every Fall)

Students will focus on advanced topics relevant to providing respiratory care to critically ill adults. There will be an emphasis on reviewing complex case examples of cardiopulmonary problems and therapeutic procedures. However, a multi-organ system-wide patient approach will be maintained. Advanced competencies in ventilator management and critical care monitoring, diagnostics and therapeutic procedures will be assured by laboratory experiences. prereq: 4400

RESP 4501. Research Project I. (; 1 cr. ; A-F only; Every Fall)

Students in small groups will be responsible for devising, developing and undertaking a

research project which would be suitable for submission either to a scientific meeting or for publication. This will include developing a research question, devising and submitting a research protocol, carrying out the research and reporting the findings in abstract and a short oral presentation. Research mentors will be assigned to allow guided independent study. prereq: 3502

RESP 4502. Research Project II. (; 1 cr. ; A-F only; Every Spring)

Students in small groups will continue work on their chosen research project from RESP 4501. This project will be suitable for submission to either a scientific meeting or for publication. This will include developing a research question, devising and submitting a research protocol, carrying out the research and reporting the findings in abstract and a short oral presentation. Research mentors will be assigned to allow guided independent study. prereq: 4501

RESP 4602. Grand Rounds. (; 2 cr. ; A-F only; Every Spring)

This capstone course reviews allied health clinical and professional issues over a broad spectrum and also allows reflection on caregiver roles. Presentations cover a wide range of topics that impact allied health practitioners and include global views of national health policy, economics, multiculturalism/diversity, ethical and legal problems, and challenging clinical cases. Group discussion sessions provide a forum for multidisciplinary review of cases in order to bring larger issues down to individual patient and family experiences. A key element of the course will be the opportunity to both experience and apply course topics through service learning activities.

Sociology (SOC)

SOC 1393. Directed Study in Sociology.

(1-3 cr. [max 6 cr.]; Student Option; Periodic Fall & Spring)
Individual study on selected topics or problems. prereq: instr consent, dept consent

SOC 1571. Introduction to Sociology. (DSJ,SOCS; 3 cr. ; A-F or Audit; Every Fall & Spring)

Introduction to foundational ideas and research techniques in sociology. Includes a critical engagement with core concepts, including the sociological imagination, socialization, culture, the interplay between individuals and institutions, and social stratification.

SOC 1641. Social Justice and Ethical Decision Making. (CIV; 3 cr. ; A-F or Audit; Every Spring)

Utilizes foundational sociological concepts to systematically explore the role of policies, regulations, values, norms, and social structures in reinforcing or undermining inequality. Students will exercise decision-making in the context of ethical dilemmas regarding inequality, stratification, research ethics, and biomedical ethics. Students will use reasoned arguments and evidence to support a position on an ethical issue.

SOC 3393. Directed Study or Research in Sociology. (1-6 cr. [max 24 cr.]; Student Option; Every Fall & Spring)

Individual study or research on selected topics or problems. prereq: instr consent, dept consent

SOC 3571. Drugs and Society. (DSJ,SOCS; 3 cr. ; A-F or Audit; Spring Odd Year)

This course investigates a variety of causal factors for drug use, including environmental and biological, and situate these within their social, historical, and cultural contexts. Topics include drug use across cultures; social responses to drug use; drug use and race/class conflict; drug policy, legislation, and enforcement; drug treatment; mass media images of drug use and related activities. prereq: sophomore status or above

SOC 3581. Medical Sociology and Technology. (SOCS,TS; 3 cr. ; A-F or Audit; Spring Even Year)

Exploration of the complicated interplay among health, illness, disease, health care systems, technology, biomedical science, and society. This course utilizes the sociological perspective to investigate the personal, social, cultural, and organizational, and technological issues that influence the health of people in the United States and globally. Topics include the role that society plays in the development of medical technologies, as well as the impact of those technological developments on population health, individual health, and the field of medicine. prereq: sophomore status or above

SOC 3721. Special Topics in Sociology. (; 1-4 cr. [max 8 cr.]; A-F or Audit; Periodic Fall & Spring)

In-depth study of special topics in sociology. prereq: instr consent; repeated enrollment allowed only if topics are different

Sonography (SONO)

SONO 3011. Foundations of Sonography. (TS; 3 cr. ; A-F only; Every Fall)

This introductory course will provide the skills and knowledge necessary to begin a clinical rotation in an ultrasound department. Students will receive lectures and participate in lab exercises to help them understand basic anatomy, physics, instrumentation, ultrasound terminology, scanning techniques, image orientation, film labeling, and scanner controls.

SONO 3111. Abdomen I Sonography. (; 2 cr. ; A-F only; Every Fall)

This course will present the anatomy, physiology, laboratory values, pathology, and sonographic appearances of the prevertebral vessels, kidneys, and spleen. There will be a review of scanning protocols and scanning practice in a controlled environment which will integrate course material with clinical applications.

SONO 3112. Abdomen II Sonography. (; 3 cr. ; A-F only; Every Spring)

This course will use lectures and scanning labs to help students learn the anatomy, physiology, laboratory values, pathology, and sonographic

appearances and scanning techniques for the liver, biliary tree and pancreas.

SONO 3113. Abdomen III Sonography. (; 2 cr. ; A-F only; Every Fall)

This predominantly Blackboard course will present the anatomy, pathophysiology, laboratory values, and sonographic appearances of the GI tract, retroperitoneum, peritoneum, chest cavity, abdominal wall, as well as emergency sonography, transplant sonography and interventional applications. Emphasis and practical application will be placed on topics most commonly encountered in a typical sonography department such as appendix, FAST Scan, hypertrophic pyloric stenosis, renal-pancreas, and liver transplant and ultrasound guided sterile procedures.

SONO 3121. Cross-Sectional Abdominal Anatomy. (; 1 cr. ; A-F only; Every Fall)

This predominantly online course will assist students in identifying abdominal and pelvic anatomical structures in cross-sectional imaging studies. After reviewing anatomical structures using standard anatomy illustrations, the corresponding Ultrasound, CT and MRI planar images will be demonstrated with a focus on location and spatial relationships to each other.

SONO 3201. Gynecologic Sonography. (; 2 cr. ; A-F only; Every Fall)

GYN Sonography is the first course of the obstetrics and gynecology (OB/GYN) curriculum. This course covers gynecologic anatomy, pathophysiology, and GYN ultrasound information. The curriculum includes the following topics: female pelvic anatomy and physiology, uterine, ovarian, and tubal pathology, infertility, and pelvic sonographic scanning techniques.

SONO 3301. Clinical Practicum I. (; 3 cr. ; A-F only; Every Fall)

This course is a 13-week clinical rotation in the following ultrasound areas: General, Vascular, and Obstetrics. Students will learn through observation, scanning, and application of knowledge obtained during didactic coursework and scanning labs. Students will be directly supervised.

SONO 3302. Clinical Practicum II. (; 5 cr. ; A-F only; Every Spring)

This course is a 16-week clinical rotation in the following ultrasound areas: General, Vascular, and Obstetrics. Students will learn through observation, scanning, and application of knowledge obtained during didactic coursework and scanning labs. Students will be directly supervised.

SONO 3311. Vascular Technology. (; 2 cr. ; A-F only; Every Fall)

Vascular I is the first course of the Vascular curriculum. This course provides the student with basic knowledge of the physics of duplex ultrasound imaging. Doppler concepts and machine instrumentation to prepare the student to perform carotid duplex exams and transcranial Doppler exams and identify normal and abnormal anatomy and physiology of the carotid system.

SONO 3312. Vascular Technology II. (; 3 cr. ; A-F only; Every Spring)

This course provides the student with the basic knowledge and skills necessary to perform duplex imaging of the abdominal arteries, lower extremity arteries and veins, and nonimaging testing of the peripheral vessels. Lectures and scanning labs include anatomy, pathophysiology, treatment, and testing techniques (including nonimaging vascular testing) for upper and lower extremity veins and arteries.

SONO 3313. Vascular Technology III. (; 1 cr. ; A-F only; Every Summer)

This course covers anatomy, pathology, treatment, indications, and scanning techniques necessary to perform duplex imaging exams of upper extremity arteries and veins, dialysis grafts and mapping, lower extremity venous insufficiency and perforator veins, and upper and lower extremity venous mapping. Test validation and QA statistics will also be explored.

SONO 3401. OB Sonography. (; 2 cr. ; A-F only; Every Spring)

This course provides the student with the necessary information to perform and aid in interpreting normal and abnormal obstetrical sonograms. The following topics will be presented: embryology, first trimester sonography, normal fetal anatomy, amniotic fluid, invasive procedures, assessment of fetal age and growth restriction, placenta, cord, membranes, high-risk pregnancy, indications and safety.

SONO 3403. Concepts Review and Case Studies. (; 2 cr. ; S-N only; Every Summer)

This course provides the student opportunities to review concepts taught throughout the curriculum by completing computerized review exams and case studies.

SONO 3503. Superficial Sonography. (; 2 cr. ; A-F only; Every Summer)

This course will present anatomy, physiology, laboratory values, pathology and sonographic appearance of the breast, neck, prostate and scrotum. Musculoskeletal ultrasound will also be introduced. There will be review of scanning protocols and practices.

SONO 4111. Ultrasound Physics I. (; 2 cr. ; A-F only; Every Fall)

This course provides the student with a general overview of diagnostic pulse-echo ultrasound imaging devices, basic mathematical concepts, and knowledge of the basic physics of ultrasound and its interaction with tissue.

SONO 4112. Ultrasound Physics II. (2 cr. ; A-F only; Every Spring)

This course provides the student with a detailed description of the physics and technology of diagnostic pulse-echo B-mode ultrasound imaging devices.

SONO 4201. Pediatric Sonography. (; 1 cr. ; A-F only; Every Fall)

This course provides the student with necessary information about the anatomy of the neonatal brain and pathologies of intracranial hemorrhage. Other pediatric

pathophysiologies are also presented including: pediatric renal/urinary tract disease, pediatric abdominal masses and neonatal hips and spines.

SONO 4301. Fetal Anomalies. (; 2 cr. ; A-F only; Every Summer)

The Fetal Anomalies course prepares students to define fetal pathologies and identify classic sonographic findings associated with cranial, thoracic, neck, GI, GU, skeletal, cardiac, and chromosomal fetal anomalies.

SONO 4303. Clinical Practicum III. (; 6 cr. ; A-F only; Every Summer)

This course is a 14-week clinical rotation in the following ultrasound areas: General, Vascular, Obstetrics, Vascular Testing Lab, and affiliate rotations. Students will learn through observation, scanning, and application of knowledge obtained during didactic coursework and scanning labs. Students will be indirectly supervised at the discretion of the Clinical Instructor.

SONO 4401. Clinical Practicum IV. (; 7 cr. ; A-F only; Every Fall)

This course is a 16-week clinical rotation in the following clinical areas: General, Vascular, Obstetrics, Vascular Testing Lab, Neurovascular Lab, and Breast Imaging. Students will learn through observation, scanning, and application of knowledge obtained during didactic coursework and scanning labs. Students will be indirectly supervised at the discretion of the Clinical Instructor.

SONO 4402. Clinical Practicum V. (; 8 cr. ; A-F only; Every Spring)

This course is a 17-week clinical rotation in the following clinical sites: General, Vascular, Obstetrics, Vascular Testing Lab, and selected specialty areas. Students will learn through observation scanning, and application of knowledge obtained during didactic coursework and scanning labs. Students will be indirectly supervised at the discretion of the Clinical Instructor.

SONO 4501. Research Project & Publication. (; 1 cr. ; A-F only; Every Fall)

This course provides the student with the opportunity to explore emerging technologies and advanced concepts in sonography through the completion of a research paper.

SONO 4502. Research Project and Publication II. (; 1 cr. ; A-F only; Every Spring)

This course provides the student with the opportunity to explore emerging technologies and advanced concepts in sonography through the completion of a poster to be submitted for competition at the Minnesota Society of Diagnostic Ultrasound (MSDU) Annual Spring Seminar, or the national SDMS meeting.

SONO 4602. Professional Growth and Development. (1 cr. ; A-F only; Every Spring)

This course provides the student with the opportunity to explore the many aspects of professionalism including: professional interactions, professional responsibilities, sonographer scope of practice, clinical practice standards, ARDMS credentialing requirements,

legal issues, sonography lab expenses, interviewing and resume skills, and current sonographer issues.

SONO 4802. Mock Exams. (1 cr. ; S-N only; Every Spring)

Through a series of course reviews, mock registry examinations and information sessions, students are able to prepare for ARDMS examinations. Information on credentialing examinations, effective test-taking strategies, and ARDMS examination content are also provided. Students will be required to apply for and take the ARDMS Physics and Instrumentation board examination during the last part of Semester 5.

Spanish (SPAN)

SPAN 1393. Directed Study in Spanish. (1-3 cr. [max 6 cr.] ; Student Option; Every Fall & Spring)

Individual study on selected topics or problems. prereq: instr consent, dept consent

SPAN 1521. Spanish I. (3 cr. ; A-F or Audit; Every Fall)

A communicative approach for beginners to grammar and vocabulary within the context of daily life in both personal and professional interactions. Focus on listening, speaking, reading and writing skills in culturally and situationally appropriate ways. Includes an initial exploration of Spanish within the healthcare environment. Students should expect to build their knowledge bank with a large amount of vocabulary necessary to form meaningful conversations. Lecture is limited; class time is spent primarily in small group practice. Taught utilizing student-centered, active learning and writing-integrated approaches. Students who have previously studied Spanish are expected to take the placement exam before enrolling in a course.

SPAN 1522. Spanish II. (3 cr. ; A-F or Audit; Every Spring)

A communicative approach to grammar and vocabulary within the context of daily life and the healthcare environment in both personal and professional interactions. Focus on listening, speaking, reading and writing skills in culturally and situationally appropriate ways. Students should expect to continue building their vocabulary knowledge bank and deepen their understanding of grammar structures. Lecture is limited; class time is spent primarily in small group practice. Taught utilizing student-centered, active learning and writing-integrated approaches. Students must have received at least a C- in Spanish 1521 or have placed into 1522 through the placement exam.

SPAN 2521. Spanish III. (3 cr. ; A-F or Audit; Every Fall)

A communicative approach to grammar and vocabulary at the intermediate level within the context of the healthcare environment in both personal and professional interactions. Focus on listening, speaking, reading and writing skills in culturally and situationally appropriate ways. Students should expect to review and deepen previously covered grammar structures and

learn in-depth medical Spanish vocabulary. Lecture is limited; class time is spent primarily in small group practice. Taught utilizing student-centered, active learning and writing-integrated approaches. Students must have received at least a C- in Spanish 1522 or have placed into 2521 through the placement exam.

SPAN 3393. Directed Study or Research in Spanish. (1-6 cr. [max 24 cr.] ; Student Option; Every Fall & Spring)

Individual study or research on selected topics or problems. prereq: instr consent, dept consent

SPAN 3721. Special Topics in Spanish. (; 1-4 cr. [max 8 cr.] ; A-F or Audit; Periodic Fall & Spring)

In-depth study of special topics in Spanish. prereq: instr consent; repeated enrollment allowed only if topics are different

Writing Studies (WRIT)

WRIT 1393. Directed Study in Writing. (1-3 cr. [max 6 cr.] ; Student Option; Periodic Fall & Spring)

Individual study on selected topics or problems. prereq: instr consent, dept consent

WRIT 1510. Academic Writing: Responding to Ideas. (1 cr. [max 3 cr.] ; A-F only; Every Fall)

Introduction to critical reading and academic writing skills. Students learn to respond to academic ideas with clear thesis statements, develop arguments with specific examples, and use proper in-text and reference citations to cite information. Students also explore using reflective writing to support their personal and academic growth. coreq: CLI 1000

WRIT 1511. Academic Writing: Summarizing & Persuading. (; 1 cr. ; A-F or Audit; Every Fall)

Students explore writing across the disciplines with a focus on paragraph development. Students learn to summarize academic texts using signal phrases, develop cohesive persuasive paragraphs using cited material from academic texts, and use writing to reflect on their experiences. coreq: SOC 1571

WRIT 1512. Academic Research & Scientific Writing. (; 2 cr. ; A-F or Audit; Every Spring)

Course focuses on writing in the sciences, academic research, and collaborative writing. Students actively read and analyze scientific writing, conduct and evaluate academic research, and respond to scientific ideas with well-developed arguments. Students also develop collaborate writing skills through a group project and explore using reflective writing to support their personal and academic growth. coreq: BIOL 2311

WRIT 1520. Introduction to Academic Writing. (2 cr. ; A-F or Audit; Every Fall)

Students develop critical reading and academic writing skills, and explore writing across the disciplines and paragraph development. Students learn to respond to academic ideas with clear thesis statements, develop cohesive persuasive paragraphs using cited material

from academic texts, and use reflective writing to support their personal and academic growth. WRIT 1520 is a combination of WRIT 1510 & 1511.

WRIT 3393. Directed Study or Research in Writing. (1-6 cr. [max 24 cr.] ; Student Option; Every Fall & Spring)

Individual study or research on selected topics or problems prereq: instr consent, dept consent

WRIT 3721. Special Topics in Writing. (; 1-4 cr. [max 6 cr.] ; A-F or Audit; Periodic Fall & Spring)

In-depth study of special topics in writing. prereq: instr consent; repeated enrollment allowed only if topics are different