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Jour 8765. Seminar: Issues in Information Access and Communication. (4 cr; QP–5731 or equiv.; A-F only)

Societal, industry, technological, and policy aspects/developments that affect information access, particularly through mass media.

Jour 8768. Seminar: Constitutional Law—Theories of Freedom of Expression. (3 cr; QP–5777, Δ; SP–5777 or #; A-F only)

Problems of constitutional/tort law affecting the press. Underlying theories.

Jour 8769. Seminar: Research Methods in Media Ethics and Law. (3 cr; A-F only)

Research at intersection of first amendment and media ethics.

Jour 8861. Seminar: International Mass Communication. (3 cr; QP–[5801 or 5825], Δ; SP–4801 or 5825 or #; A-F only)

Main problems/currents. Concepts, research, policy relevant to global development. Issues of freedom/ constraint, media technology, role of journalism in world affairs.

Jour 8721. Seminar: Communication Agencies as Social Institutions. (3 cr [max 3 cr]; QP–[5721] or equiv., Δ; SP–4721 or equiv.; A-F only)

Influence/effects of mass communication, internal dynamics of media organizations, criticism/modes of reform. Theoretical frameworks for analysis.

Jour 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Jour 8801. Seminar: Comparative Research in Mass Communication, a Cross-National Approach. (3 cr; QP–[5801 or 5825], Δ; SP–4801 or 5825; A-F only)

Comparative research designs/strategies. Analysis of production, presentation, transmission, and consumption of mass media products/services (particularly news, entertainment, and information) across national borders. Theoretical concerns, empirical problems, policy. Ethical issues involving research on form/content of mass communication within/between countries.

Jour 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required)

Jour 8990. Special Problems in Mass Communication. (3-4 cr [max 12 cr]; A-F only)

Topics defined in Class Schedule.

Jour 8993. Directed Study. (1-6 cr; SP–Grad mass comm major or minor, #; A-F; A-F only)

Kinesiology (Kin)

School of Kinesiology and Leisure Studies
College of Education and Human Development

Kin 5001. Foundations of Human Factors/Ergonomics. (3 cr; A-F only)

Variability in human performance as influenced by interaction with designs of machines and tools, computers and software, complex technological systems, jobs and working conditions, organizations, and sociotechnical institutions. Emphasizes conceptual, empirical, practical aspects of human factors/ergonomic science.

Kin 5103. Developmental/Adapted Physical Education. (3 cr; A-F only)

Introduction to physical education for students with disabilities, emphasizing conceptual, organizational, and administrative issues. Topics include historical and legal foundations, service components, individualized education plans, professional roles, and assessment of movement skills.

Kin 5104. Physical Activity for Persons with Disabilities. (3 cr; A-F only)

Different approaches to providing physical education service and related movement interventions for persons with disabilities. Topics: movement behavior foundations, movement skill progressions, unique considerations for specific impairments, and support for persons with disabilities.

Kin 5106. Adapted Aquatics. (2 cr; QP–If certification as Adapted Aquatic Instructor desired, then current American Red Cross Water Safety Instructor or equivalent YMCA certification is required; SP–If certification as Adapted Aquatic Instructor desired, then current American Red Cross Water Safety Instructor or equivalent YMCA certification is required)

Introduction to adapted aquatics for students in kinesiology and leisure studies, physical therapy, and those interested in working with people with disabilities. Topics: teaching approaches, programming, accommodations/adaptations, assessments, individualized plans. Activities: pool sessions with/without clients, groups, site observations.

Kin 5111. Sports Facilities. (3 cr; QP–Kin or Rec grad student or M.Ed. student; SP–Rec 5111; Kin or Rec grad student or M.Ed. student; A-F only)

Steps in planning/building facilities for athletics, physical education, and sport for college, professional, and public use.

Kin 5121. Application of Basic Sciences to Kinesiology. (3 cr; A-F only)

Examination of how knowledge from the basics of science can lead to differing perspectives from which to approach questions directed to kinesiological inquiry.

Kin 5122. Applied Exercise Physiology. (3 cr; QP–4385 or equiv or #; SP–4385 or equiv or #; A-F only)

Mechanisms of cardiorespiratory and muscular responses to exercise; application of exercise physiology to assessment of work capacity, athletic conditioning, and requirements of human powered vehicles; low to moderate exercise as an intervention in lowering risk for common health problems.

Kin 5124. Human Factors Physiology. (3 cr; QP–#; SP–#; A-F only)

In-depth view of the concepts, problems, and issues associated with ergonomic applications to improving the design and operation of human work spaces.

Kin 5126. Sport Psychology. (3 cr; SP–3126 or equiv or #)

Theory and research in sport psychology. Focus on the psychological study of human behavior in sport and physical activity settings.

Kin 5132. Motor Development. (3 cr; QP–[3132 or #]; phys ed li; SP–3133 or # or A-F only)

Developmental aspects of human movement behavior/learning. Life span change of motor skills.

Kin 5135. Motor Control and Learning. (3 cr; QP–3135 or #; SP–3133 or #)

Main theoretical ideas/research that have advanced motor control/learning over last three decades.

Kin 5136. Psychology of Coaching. (3 cr)

Psychological dimensions of coaching across age levels, including coaching philosophy, leadership, communication skills, motivation, and mental skills training for performance enhancement.

Kin 5141. Nutrition for Health and Physical Performance. (3 cr; QP–FSC1621 or equiv; SP–FSCI 1121 or equiv; A-F only)

Requirements and physiologic roles of nutrients and physical activity in promotion of health and performance; assessment of energy requirements. RDAs, food composition and safety, weight management, and prevention of chronic diseases with emphasis on cardiovascular disease prevention.

Kin 5152. Curriculum Development in Physical Education. (2 cr; QP–Init li; M.Ed. phys ed student or #; SP–Init li/M.Ed. phys ed student; A-F only)

Trends, issues, and challenges in early childhood/K-12 physical education. Potential effect on curriculum.

Kin 5171. Foundations of Kinesiology. (3 cr; QP–Kin major or #; A-F only)

Introduction to the emerging field of kinesiology, broadly conceived as the study of human movement. Development and emergence of the term kinesiology and the scholarly, political, and educational ramifications of its development.

Kin 5196. Practicum: Developmental/Adapted Physical Education. (1-4 cr [max 4 cr]; QP–5100 or equiv or #; SP–5103 or equiv or #; S-N only)

Observation of, participation in physical education instruction for students with disabilities. Current issues in development/adapted physical education. Exchange of ideas/problems.

Kin 5235. Advanced Biomechanics II: Kinetics. (3 cr; QP–[3112 or equiv]; PMed 5135, undergrad college physics, intro calculus; A-F only)


Kin 5328. International and Comparative Sport and Physical Education: The Olympic Games. (3 cr; QP–Grad or #; SP–Grad or #; A-F only)

Explores the role the Olympic Games has played and continues to play in the global village. Advanced insight into translation of the substance, nature, and significance of sport to nation building and the international and comparative sociocultural process.

Kin 5365. Health Promotion Program Design and Implementation. (3 cr; QP–3001; SP–3001; A-F only)

Study of behavioral change methodology and theory related to nutrition, weight control, exercise, stress management, healthy lifestyles, and lifetime health. Application of these concepts in health promotion settings including work sites, managed care organizations, clinics, fitness centers, and educational institutes.

Kin 5371. Sociology of Sport. (3 cr; QP–5126, grad or #; SP–3126, grad or #; A-F only)

A study of sport, sporting processes, social influences, systems, and structures that have affected and exist within, and among societies, nations, and cultures. Exploration of contemporary issues concerning social differentiation and social concerns such as violence and honesty.

Kin 5375. Competitive Sport for Children and Youth. (3 cr)

Cognitive, behavioral, and biological factors having important implications for competitive sport participation from early childhood through high school age. Emphasis on translating sport science research into practical implications for youth sport coaches, teachers, and administrators.

Kin 5385. Exercise for Special Populations. (2 cr)

QP–Undergrad physiology or biology; SP–Undergrad physiologist or biology; A-F only)

Exercise testing and prescription with modifications required because of special considerations associated with aging, gender differences, environmental conditions, and the presence of medical conditions.

Kin 5461. Foundations of Sport Management. (3 cr; QP–Kin or rec major; grad, M.Ed.; SP–Kin or rec major; grad, M.Ed.; 5460, 5460; A-F only)

Principles of sport management including theories and techniques in administration and management of sport enterprises. Organizational theory and policy with practical examples of sport management skills and strategies.

Kin 5505. Human-Centered Design: Principles and Applications. (3 cr; SP–53505)

Application of design to meet human needs. Design of fabricated products, tools/machines, software/hardware interfaces, art/culture, living environments, and complex sociotechnical systems.

Kin 5511. Women in Sport and Leisure. (3 cr; SP–Rec 5511; A-F only)

Critically examines women’s involvement in/contributions to sport, physical activity, and leisure.

Courses
Kin 5621. Advanced Athletic Training: Evaluation of Athletic Injury. (3 cr; QP–3114, CBN 1027; SP–3114, [3027 or CBN 1027]; A-F only) Theory, principles, techniques to recognize/evaluate athletic injury to all major body parts.

Kin 5622. Therapeutic Modalities in Athletic Training. (3 cr; QP–3114; SP–3114; A-F only) Theoretically based guide for the use of therapeutic modalities for the management of athletic injuries in a practical setting.

Kin 5696. Practice in Kinesiology. (1-6 cr [max 6 cr]; SP–Grad student in Kin, #; S-N only) Practical experience in kinesiology under supervision of a University adviser and an agency supervisor.

Kin 5697. Student Teaching: Coaching. (1-10 cr [max 10 cr]; QP–#; SP–Admission to coaching program, #; S-N only) Student coaching experience under supervision of a mentor coach.

Kin 5702. Special Topics in Kinesiology. (1-8 cr [max 9 cr]; SP–Upper div undergrad or grad student in kin or #) Current issues in the broad field and subfields in kinesiology, or related coursework in areas not normally available through regular offerings.


Kin 5723. Psychology of Sport Injury. (3 cr; QP–Intro psych course; SP–Intro psy course) Psychosocial bases of risk factors preceding sport injury, responses to the occurrence of sport injury, and the rehabilitation process. Lecture, discussion, guest lecture, interviews, and presentation experience.

Kin 5725. Organization and Management of Physical Education and Sport. (3 cr; QP–Grad/init lic or #; SP–Grad/init lic or #; A-F only) Comprehensive analysis of organization and management of physical education and sport in educational settings. Focus on management and planning processes, management skills, functions, roles, decision making, leadership, shared systems, and organizational motivation. For physical education teachers, coaches, community sport administrators.

Kin 5726. Physical Education—Teaming and Trekking. (2 cr; QP–Kin major, M.Ed. student, or #; SP–Kin major, M.Ed. student, or #; A-F only) Development of self-awareness and team-building activities, group planning, and leadership skills in preparation for a two-day trip in a state park using practiced outdoor skills of camping, canoeing, and backpacking. Must be comfortable in water.

Kin 5727. Physical Education—An Adventure Experience. (1 cr; QP–Kin major, M.Ed. student, or #; SP–Kin major, M.Ed. student, or #; A-F only) Group and individual initiatives in an experientially based program emphasizing participation in leadership, group cooperation, problem solving, low ropes, climbing walls, sensible risk taking, and trust-oriented activities.

Kin 5740. Topics: Coaching of Individual, Dual, or Team Sports. (1-9 cr [max 9 cr]; QP–PHEL, SP–PHEL; A-F only) Instruction at the advanced level, including analyses of skills, game strategies, specific techniques of coaching, and methods of training and conditioning.

Kin 5801. Legal Aspects of Sport and Recreation. (4 cr; QP–Kin or rec major; SP–SPEP 5801; Kin or rec major; A-F only) Legal issues related to recreation, park, and sport programs/facilities in public/private sectors.

Kin 5941. Neural Basis of Movement. (3 cr; QP–[3111, CBN 1027] or equiv; [Phsl 3051 or equiv]; A-F only) Overview of various neural subsystems involved in controlling human/primate sensorimotor behavior.

Kin 5981. Research Methodology in Kinesiology and Leisure Studies. (3 cr; QP–[3150 or equiv; SP–5981; 3151 or equiv; A-F only) Defines/reviews various types of research in exercise/sport science, physical education, and recreation studies. Qualitative research, field studies, and methods of introspection as alternative research strategies to traditional scientific paradigm.

Kin 5992. Readings in Kinesiology. (1-9 cr [max 9 cr]; QP–CEHD student, grad; SP–CEHD student, grad; A-F only) Independent study under tutorial guidance.

Kin 5995. Research Problems in Kinesiology or Physical Education. (1-6 cr [max 6 cr]; SP–Grad student or [M.Ed. student in kin, Phys Ed Lic] or #; SP–Grad student or M.Ed. student in kin or #; A-F only) Focus on selected topics in physical activity/human performance.

Kin 8122. Seminar: Exercise Physiology. (2-6 cr [max 6 cr]; QP–5122 or equiv; SP–5122 or equiv or #; A-F only) Classic and contemporary literature in exercise physiology and allied disciplines, emphasizing contributions of major leaders in the field and opportunities for interdisciplinary research.

Kin 8126. Seminar: Sport Psychology. (3 cr; QP–5126 or equiv; SP–5126 or #; A-F only) Literature, theoretical constructs, research methodology, design. Focuses on student-selected topics/problems.

Kin 8132. Seminar: Motor Development. (3 cr; QP–5132 or equiv; SP–5132 or equiv or #; A-F only) Contemporary research literature focusing on motor skill development from before birth to senescence; emphasizes interaction between physical, environmental, and performer constraints, and coordination and control of movement.

Kin 8135. Seminar: Motor Control and Learning. (3 cr; QP–5135 or equiv; SP–5135 or equiv or #; A-F only) Advanced reading and discussion of research on motor control, motor learning, and human performance.

Kin 8333. FTE: Master's. (1 cr; SP–Master’s student, adviser and DGS consent)

Kin 8444. FTE: Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)

Kin 8667. Seminar: International and Comparative Physical Education and Sport. (3 cr; SP–#; A-F only) Comparative analysis of selected physical education and sport delivery systems, structures, sport policies, and management of practices and systems of selected countries. Sociocultural impact and issues concerning conduct of sport.

Kin 8866. Doctoral Pre-Thesis Credits. (1-18 cr [max 60 cr]; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

Kin 8869. Internship: Applied Sport Psychology. (3-6 cr [max 6 cr]; QP–5126, 8126, #; SP–5126, 8126, kin PhD student, #; S-N only) Supervised internship; emphasis on educational sport psychology approaches to athletic performance enhancement and psychological adjustment to sport injury.

Kin 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 total required [Plan A only])

Kin 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required)

Kin 8980. Graduate Research Seminar in Kinesiology. (1-9 cr [max 9 cr]; SP–Grad kin major, #; S-N only) Reporting and discussion of student and faculty research activity.


Laboratory Medicine and Pathology (LaMP)

Department of Laboratory Medicine and Pathology

Medical School

LaMP 5125. Chronobiology. (2-6 cr; A-F only) How to interpret biologic time series and how to use them in practice as well as in designing chronobiology experiments. Chronobiologic procedures of data collection and analysis, interpretation of the output in clinical practice.

Landscape Architecture (LA)

Department of Landscape Architecture

College of Architecture and Landscape Architecture

LA 5201. Making Landscape Spaces and Types. (6 cr; SP–B.E.D. accelerated status or LA grad or #; A-F only) Design exploration using 3-D models and historical precedent studies to create outdoor spaces for human habitation and use. Application of the basic landscape palette of form, plants, and structures to give physical, emotional, cognitive, and social definition to created places.

LA 5202. Landscape Analysis Workshop. (1 cr; S-N only) Introduction to field techniques for site analysis, including vegetation, soil, and landscape description. One-week session, before fall term, at lake Itasca Forestry and Biological Station.

LA 5203. Ecological Dimensions of Space Making. (6 cr; SP–LA major or #; recommended for both B.E.D. and grad students; A-F only) Design studio experience drawing on ecological, cultural, aesthetic influences to explore development of design ideas responsive to ecological issues and human experience.

LA 5301. Introduction to Drawing in Architecture and Landscape Architecture. (3 cr; SP–5301; LA grad student, accelerated B.E.D. student; A-F only) Perceiving/representing material environment. Sketching/drawing conventions, visual phenomena/ forms.

LA 5351. AutoCAD I. (3 cr; SP–B.E.D. major or LA grad or #; may not be taken for graduate credit A-F only) Basic concepts, tools, and techniques of computer-aided drawing. Introduction to current AutoCAD Release software. Strategies and techniques for producing dimensioned and annotated drawings. Introduction to 3-D drawing capabilities. Use of dimension variables, attributes, blocks, symbols, and creation of customized menus.

LA 5352. AutoCAD II. (3 cr; SP–Arch/LA 5351 or LA 5351, B.E.D. major or LA grad or #; may not be taken for graduate credit; A-F only) Intermediate concepts, tools, and techniques of computer-aided drawing with current AutoCAD Release software. Strategies and techniques for producing dimensioned and annotated drawing. Use of dimension variables, attributes, blocks, symbols, and creation of customized menus.

LA 5371. Computer Methods I. (1 cr; SP–B.E.D. accelerated status or LA grad or #) Introduction to current techniques, programs, and new editions of computer programs, and their application to landscape architecture computing.

LA 5372. Computer Methods II. (1 cr; SP–Arch/LA 5371, LA grad or #) Current techniques and computer programs, and their application to landscape architecture computing.
Courses

LgTT 5110. Technology in the Second Language Classroom. (2 cr; SP–4501) Examine, evaluate, and use technology in language teaching. Theoretical background, demonstration, hands-on exploration.

LgTT 5611. Technology in Second Language Instruction. (3 cr; SP–SLC post bac or #) Using audio, video, and computer technology in second language teaching/learning in classroom, independent study, and distance education environments.

LgTT 5710. Special Topics in Language Teaching and Technology. (1-3 cr [max 12 cr]) Examine, evaluate, apply specific area of technology to K-higher education, second/foreign language teaching/learning in classroom, independent study, distance education environments.

Latin (Lat)

Department of Classical and Near Eastern Studies

College of Liberal Arts

Lat 5012. Latin Prose Composition. (3 cr; SP–3114 or A) Advanced understanding of Latin grammar, syntax, diction, and prose style through graduated exercises in prose composition.

Lat 5032. Text Criticism. (3 cr; SP–3114) Theory and practice. Elements of paleography and manuscript study. Basic tools for analyzing a textual apparatus with some independence; constructing a critical edition of a literary text.

Lat 5310. Latin Literature: History. (3 cr [max 12 cr]) One or more appropriate authors studied each semester.

Lat 5320. Latin Literature: Epistles and Essays. (3 cr [max 12 cr]) One or more appropriate authors studied each semester.

Lat 5330. Latin Literature: Oratory. (3 cr [max 12 cr]) One or more appropriate authors studied each semester.

Lat 5340. Latin Literature: Epic and Pastoral. (3 cr [max 12 cr]) One or more appropriate authors studied each semester.

Lat 5350. Latin Literature: Lyric and Elegiac Poetry. (3 cr [max 12 cr]) One or more appropriate authors studied each semester.

Lat 5360. Latin Literature: Latin Dramatists. (3 cr [max 12 cr]) One or more appropriate authors studied each semester. Authors vary.

Lat 5370. Latin Literature: Satire. (3 cr [max 12 cr]; SP–Grad student or #) One or more authors.

Lat 5380. Latin Literature: Legal Texts. (3 cr [max 12 cr]) One or more appropriate authors studied each semester.

Lat 5390. Literature: Religious Texts. (3 cr [max 12 cr; SP–3114]) Reading and discussion of religious texts from Latin antiquity, such as Varro’s Antiquitates Divinae, Cicero’s De natura deorum, Apuleius’s Metamorphoses, or Christian writers (Tertullian, Cyprian, Lactantius, Jerome, Augustine).

Lat 5410. Latin of Late Antiquity. (3 cr [max 12 cr; SP–34xx or equiv or #]) Pagan and Christian Latin literature selected from authors of the 3rd to 6th centuries A.D. Topics specified in Class Schedule.

Lat 5420. Medieval Latin. (3 cr [max 12 cr; SP–34xx or equiv or #]) Literature from 6th to 15th centuries. Authors and genres vary; topics specified in Class Schedule.

Lat 5621. Latin Paleography. (3 cr; SP–Three 3xxx-5xxx Latin cr or #) Analysis of various hands used in manuscripts of Latin authors with attention to date and provenance; transmission of ancient Latin literature.

Lat 5715. Introduction to the Historical-Comparative Grammar of Greek and Latin. (3 cr; SP–# or 2 yrs college Greek) Historical and comparative grammar of Greek and Latin from their Proto-Indo-European origins to the classical norms.

Lat 5717. History of Latin. (3 cr) Reading and analysis of documents illustrating the stylistic registers and evolution of the Latin language from its earliest attestations through the Middle Ages.

Lat 5993. Directed Studies. (1-12 cr [max 20 cr]; SP–#) Guided individual reading or study.

Lat 5994. Directed Research. (1-12 cr [max 20 cr]; SP–#) Guided research on original topic chosen by student.

Lat 5996. Directed Instruction. (1-12 cr [max 20 cr]; SP–#) Supervised teaching internship.

Lat 8120. Latin Text Course. (3 cr [max 15 cr; SP–3111 or A; not for students in dept of Classical and NR East Studies] Students attend 3xxx Latin courses. Supplementary work at discretion of instructor.

Lat 8262. Survey of Latin Literature I. (3 cr) Extensive readings in variety of works from republican and early Augustan period.

Lat 8263. Survey of Latin Literature II. (3 cr) Variety of works from Augustan and imperial periods.

Lat 8267. Graduate Survey of Latin Literature of Late Antiquity. (3 cr; SP–#) Latin literature of 3rd to 6th centuries A.D., including Ammianus and Augustine.

Lat 8910. Seminar. (3 cr [max 30 cr]) Various topics in Latin literature examined in depth with emphasis on current scholarship and original student research.

Learning and Academic Skills (LASk)

Department of Educational Psychology

College of Education and Human Development

LASK 5201. Effective Job Search and Interview Skills for Non-Native Speakers. (1 cr; SP–§3200; S-N only) Practical assistance for career search process; immediate/long-term career objectives. Develop effective job search strategies; refine written, verbal, behavioral communication job seeking skills; deal with diversity issues. Video-tape mock interviews.

LASK 5301. Career Development and Job-Seeking Skills for Students with Disabilities. (2 cr; SP–§3300) Adapt career planning, job-seeking process to specialized educational, vocational, personal, and social needs of students with disabilities. Assess skills, interests, values, personality, goals as related to career decisions. Practical assistance occupational choices, resumes, interviewing, evaluating job offers. Legal rights, discrimination, disclosure issues.

LASK 5960. Topics in Graduate Studies. (1 cr; S-N only) Special classes or seminars on topics related to successful learning and academic performance in graduate school. Topics listed in Learning and Academic Skills Center Office (104 Eddy Hall).

Liberal Studies (LS)

College of Continuing Education

LS 5100. Liberal Studies Seminar. (1-4 cr [max 24 cr]; A-F only) Interdisciplinary topics.

LS 5993. Directed Studies. (1-4 cr [max 15 cr]; SP–Grad student) Guided individual reading or study.

LS 5994. Directed Research. (1-4 cr [max 15 cr]; SP–#) Tutorial for qualified graduate students.

LS 8001. Introduction to Interdisciplinary Inquiry. (3 cr; SP–M.L.S. student; A-F only) Required course. Emphasizes what students need to know or be able to do to successfully complete their individually crafted program, including critical thinking, clear writing, and interdisciplinary research.

LS 8002. Final Project for Graduate Liberal Studies. (3 cr; SP–M.L.S.; all M.L.S. coursework must be completed by end of sem; A-F only) Students synthesize/complete final project.

LS 8333. FTE: Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)

Linguistics (Ling)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

Ling 5001. Introduction to Linguistics. (4 cr; QP–§3001, §3011H or graduate; SP–§3001, §3011; grad #) Phonetics, phonology, morphology, syntax, semantics, and historical-comparative linguistics; language learning and psychology of language; linguistic universals; language in society.

Ling 5005. Introduction to Applied Linguistics. (3 cr; QP–3001 or 3001H or 5001 or #; SP–3001 or 3011 or 5001 or #) Relationships between linguistics and neighboring disciplines; applications to practical fields such as lexicography, orthography, translation and interpreting, language planning, reading, language teaching, bilingual education, education of the deaf and correction of language disorders; computer applications; forensic applications. Topics may vary with each offering.

Ling 5101. Language Types and Linguistic Universals. (3 cr; QP–3001 or 3001H or 5001 or #; SP–3001 or 3011 or 5001 or #) Comparison of languages and language types; cross-linguistic similarities and universals of language, and their explanation.

Ling 5105. Field Methods in Linguistics I. (4 cr; QP–§5201, §5302 or #; SP–5201, 5302 or #) Techniques for obtaining and analyzing linguistic data from unfamiliar languages through direct interaction with a native speaker.

Ling 5106. Field Methods in Linguistics II. (4 cr; SP–§5105) Techniques for obtaining and analyzing linguistic data from unfamiliar languages through direct interaction with a native speaker.

Ling 5201. Introduction to Syntax. (3 cr; QP–3001 or 3001H or 5001 or #; SP–3001 or 3011 or 5001 or #) Examination of syntactic phenomena and constructions in a variety of languages; principles of grammar construction and evaluation; syntactic theories as instruments of grammatical analysis.

Ling 5202. Syntactic Theory. (3 cr; QP–§5201; SP–§5201) A thorough foundation in modern syntactic theory through the investigation of a number of syntactic phenomena in various languages. Emphasizes syntactic argumentation and the development of constraints on grammar formalisms.
Mgmt 5177. The Business Plan. (2 cr; SP–4008, Acct 5160) or #. A-F only
Understanding the structure of business plans. Critically analyzing business plans. Formulating an original business plan.

Mgmt 8101. Theory Building and Research Design. (4 cr; SP–Business admin Ph.D. student or #) Problem formulation, conceptual modeling, theory building, and research design in the social and behavioral sciences.

Mgmt 8201. Foundations of Business, Government, and Society. (4 cr; SP–Business admin Ph.D. student or #; offered alt yrs) Considers works in political and legal philosophy, ethics, and economics.

Mgmt 8202. Seminar in International Management. (4 cr; SP–Business admin Ph.D. student or #; offered alt yrs) Overview of the field of international management research.


Mgmt 8301. Seminar in Organizational Behavior. (4 cr; SP–Business admin Ph.D. student or #; offered alt yrs) Major theories and current research on individual behavior and group processes in organizations from a micro perspective.

Mgmt 8302. Seminar in Organizations Theory. (4 cr; SP–Business admin Ph.D. student or #; offered alt yrs) Major theories and current research on organizational and interorganizational topics from a macro perspective.

Mgmt 8303. Organizations Seminar. (4 cr; SP–Business admin Ph.D. student or #) Topics vary.

Mgmt 8401. Seminar in Strategy Content. (4 cr; SP–Business admin Ph.D. student or #; offered alt yrs) Review of research in strategy formulation.

Mgmt 8402. Seminar in Strategy Process. (4 cr; SP–Business admin Ph.D. student or #; offered alt yrs) Examines research on process by which strategy is formulated and implemented in firms.

Mgmt 8403. Strategy Seminar. (4 cr; SP–Business admin Ph.D. student or #) Strategic management. Topics vary.

Mgmt 8892. Readings in Management Theory and Administration. (1-8 cr [max 16 cr]; SP–Business admin Ph.D. student or #) Intensive research on a management topic; major term paper.

Mgmt 8894. Graduate Research in Management Theory and Administration. (1-8 cr [max 16 cr]; SP–Business admin Ph.D. student or #, adviser consent) Research project on a management problem of interest to student; may be completed in cooperation with a business firm.

MOT 8111. Management Accounting. (2 cr; QP–9MBA 8035; SP–Grad MOT major; A-F only) Introduction to methods for estimating and analyzing product costs and for using cost information to make product mix and pricing decisions. Cases from manufacturing firms illustrate principles of activity-based costing. Uses of cost data in managerial decision making, budgeting and control, and financial statement analysis.

MOT 8113. Operations Management for Competitive Advantage. (2.5 cr; QP–9MBA 8030, SOMS 5100; SP–Grad MOT major; A-F only) Strategic framework to describe key relationships between operations and other business functions to achieve optimized operational decisions. Product-process design, production-inventory control. Quality improvement, quality-in-the-product development process. Just-in-time production, work force issues, role of technology.

MOT 8114. Strategic Technology Analysis. (1 cr; SP–Grad MOT major) Technology, technology-related management procedures, general business disciplines, management functions. Developing a macro-mindset that is comprehensive, future-focused, global, and change-oriented.

MOT 8121. Managing in a Technological Environment. (2 cr; SP–Grad MOT major; A-F only) General management principles with applications to management of professional, technical, and research and development personnel. Discussions, readings, cases, and projects.

MOT 8122. Financial Management for Technology-Based Organizations. (2 cr; QP–9MBA 8040; SP–Grad MOT major; A-F only) Creating value within the organization. Financial methods important to managers of technology-based organizations, including budgeting capital, projecting financial needs, and managing working capital.

MOT 8133. Communications in a Technical Environment. (2 cr; SP–Grad MOT major; A-F only) Oral and written communication. Introductory and specialized workshops on topics such as presentation skills, memo and report writing, listening skills, and visual and design integration.

MOT 8122. Managing Internal and External Interfaces in New Product Development. (2 cr; SP–Grad MOT major; A-F only) Need for and problems of organizational integration in development of product policy. Execution of development program through development line. Organizational interactions among marketing, research and development, and operations in design and delivery of products.

MOT 8123. Business, Government, and Macroeconomics. (2 cr; QP–9MBA 8055; SP–Grad MOT major; A-F only) Business-government relations, especially as they affect scientific and technical issues; global competitiveness; macro-economic policies influencing corporations’ domestic and international strategies and operations. Effects of legal and economic forces on management and technical strategies of corporations.

MOT 8214. Technology Foresight and Forecasting. (2 cr; SP–Grad MOT major; A-F only) Introduction to methods of technology assessment/forecasting. Application to study of the history of technology/industry. Technological developments and their economic, social, and industrial impacts.

MOT 8221. Project Management and Leadership. (2 cr; QP–SOMS 8641; SP–Grad MOT major; A-F only) Principles and methods for planning and controlling a project, including development of a project plan, resource planning and scheduling (PERT/CPM), project monitoring, and termination. Leadership for effective teamwork. Skills to effectively manage interdisciplinary project teams.

MOT 8224. Pivotal Technologies. (2 cr; SP–Mot grad major; A-F only) Technologies expected to play pivotal roles in industrial development. State-of-the-art technology, principal barriers to its commercialization. Student development/present course projects on applying technology to industry. Lectures by guest experts, international field experience.

MOT 8231. Managing Information Resources in a Technology-Based Organization. (1.5 cr; QP–4152c 8101; SP–Grad MOT major; A-F only) Information technologies such as database management systems and telecommunications. Managerial issues such as power/politics of information systems, role of information technology in organizations, information systems as competitive weapons.

MOT 8232. Managing Innovation in a Technological Environment. (2 cr; A-F only) Reviews managing innovation based on scientific studies. Inputs, processes, outputs of innovation ventures from concept through implementation. Focuses on developing a “road map” to guide an innovation manager. Conditions that facilitate/inhibit innovation. Typical patterns of innovation development. Adopting innovations developed elsewhere.

MOT 8233. Strategic Management of Technology. (2 cr; SP–Grad MOT major; A-F only) Technology from perspective of a general manager as a key strategic resource for building competitive advantage of an organization. Important links between technology and strategic planning. Technology and global competition, creating, acquiring, and leveraging technology competencies.

MOT 8234. Capstone Project. (1-2 cr [max 3 cr]; SP–Completion of two semesters, grad MOT major; A-F only) Practicum carried out in cooperation with home organization of each participant. Full development, analysis, and proposed resolution of a significant issue. Students expected to perform adequate research in problem areas as well as apply concepts and methods learned in the MOT program working with a faculty adviser and a current organization mentor.

MOT 8333. FTE: Masters’. (1 cr; SP–Mast’r’s student, adviser and DGS consent)

MOT 8900. Conflict Management. (0.5 cr; SP–Grad MOT major) Theory and methods for applying conflict management techniques in organizations. Cooperative versus competitive models of conflict, basics of bargaining, conflict strategies, communication styles, listening skills, dispute resolution, third-party mediation, and use of computers for conflict mediation.

MOT 8910. Corporate Responsibility. (1 cr; SP–Grad MOT major; A-F only) Principles of stakeholder management. Ethical framework for responsible management of investors, employees, suppliers, customers, and external community. Moral leadership, trust in organizations, and quality control. New metaphors and techniques for managing the socially responsible organization.

MOT 8920. Science and Technology Policy. (1.5 cr; SP–MOT grad student; A-F only) Contribution of science/technology to economic growth/development. Why characteristics of technology R&D necessitate government intervention. Role of government in science/technology R&D and policy. How Congress operates in science/technology areas. How to participate in workings of Congress.

MOT 8930. Topics in Emerging Technologies. (0.5 cr; SP–MOT grad student; S-N only) Invited speakers give half- or full-day seminars on special topics in emerging technologies (e.g., energy systems, tissue engineering, thermal spray coating technology).
Manufacturing Systems (MS)

Institute of Technology

MS 5101. Manufacturing Strategy and Operations Management. (3 cr; SP–Grad MS major; A-F only)

Strategic roles of manufacturing, process technology, operations management, and market strategies; their impact on manufacturing. Overview of operational functions such as demand forecasting, capacity planning, inventory planning, inventory control, materials management, Kanban & JIT, facility selection, strategic alliances, and outsourcing.

MS 5102. Manufacturing Processes. (3 cr; SP–Grad MS major; A-F only)


MS 5103. Quality Engineering. (3 cr; SP–Grad MS major; A-F only)


MS 5104. Design of Manufacturing Systems. (3 cr; SP–Grad MS major; A-F only)


MS 5105. Financial Decision Making in Manufacturing. (2 cr; SP–Grad MS major; A-F only)

Fundamental topics in engineering economics, such as risk and uncertainty, equity and debt, accounting, cost accounting, time value of money, investments, and capital. Skills developed in budget management, capital cost justification, cost estimation, value engineering, equipment depreciation and replacement, and creating business plans.

MS 5106. Intelligent Decision Support Systems in Engineering. (3 cr; SP–Grad MS major; A-F only)

Methods for identifying where to apply DSSs, technologies for building them, strategies for evaluating their effectiveness. Examples from many engineering areas.

MS 5107. Simulation of Manufacturing Systems. (1 cr; SP–MS grad student; A-F only)

Using integrated simulation/animate environment to create, analyze, and evaluate realistic models for various manufacturing, assembly, and material handling systems. Experimental design for simulation. Random number generation, selecting input distributions, evaluating simulation output.

MS 5199. Topics in Manufacturing Systems. (1 cr [max 3 cr]; SP–Grad MS student; A-F only) See Class Schedule.

MS 5201. Project Management. (1 cr; SP–Grad MS major; A-F only)

Practical understanding of project management. Project planning; scheduling; budgeting; staffing; task and cost control; and communicating with, motivating, and managing team members.

MS 5202. Technology Forecasting. (1 cr; SP–Grad MS major; A-F only)

Introduction to methods of technology assessment/forecasting. Applications to history of technology/industry. Technological developments and their economic, social, and industrial impacts.

MS 5203. Minimizing Environmental Impacts in Manufacturing. (2 cr; SP–Grad MS major; A-F only)


MS 5204. Automated Machining Processes. (1 cr; SP–Grad MS major; A-F only)

Description and demonstration of automated machine tools and machining cells. Machining center configuration and operation, machine tool controller, machining code generation, in-process sensing and control, cell controllers, and system simulation.

MS 5205. Issues in Quality. (1 cr; SP–Grad MS major; A-F only)


MS 5206. Industrial Safety. (1 cr; SP–Grad MS major; A-F only)


MS 5207. Design for Manufacturability. (1 cr; SP–Grad MS major; A-F only)

Machine design practice plans for assembly of components into systems. Basic design principles.

MS 5208. Plasma Processing. (1 cr; SP–Grad MS major; A-F only)

Plasma coating processes, manufacturing issues. Details of technologies such as plasma spraying and diamond deposition. Lab demonstrations.

MS 5209. Micro Electrical Mechanical Systems. (1 cr; SP–Grad MS major; A-F only)

Introduces MEMS by presenting various microfabrication techniques such as integrated circuit microfabrication processes, bulk micromachining, bonding, and high-spectrums processes. MEMS design processes. MEMS applications. Future of MEMS.

MS 5210. Robotics. (1 cr; SP–Grad MS major; A-F only)

Standard methods of making polymer and composite parts. Standard test methods, both destructive and nondestructive. Students make polymer parts and test them. Lab.

MS 5502. ISE: Public Interactions. (1 cr [max 4 cr]; SP–ISE grad student; A-F only)

Techniques for effective public communication. How to run a successful public hearing. Resources for publishing public notices.

MS 5900. Directed Study. (1-3 cr; A-F only)

Directed study/research in manufacturing systems. Topics chosen in collaboration with instructor.

MS 8333. FTE: Master's. (1 cr; SP–Master's student, adviser and DGS consent)

MS 8760. Computer-Assisted Product Realization: Capstone Project. (4 cr; SP–Grad manufacturing systems major; A-F only)

Students experience the complete part design to production process. Manufacturing process design and commercial software packages for use, in part, in design process.

Marathi (Mar)

Department of Asian Languages and Literatures

College of Liberal Arts

Mar 5992. Directored Readings. (3-5 cr [max 12 cr]; SP–4, 6, 7, 8)

Individualized guided reading or study of modern Marathi texts.

Mar 5994. Directed Research. (3-5 cr [max 12 cr]; SP–4, 6, 7, 8)

Directed research on a subject agreed upon by student and instructor.

Marketing (Mktg)

Department of Marketing and Logistics Management

Curtis L. Carlson School of Management

Mktg 8811. Seminar: Consumer Behavior. (4 cr; QP–MBA 8045 or 8210 or equiv; SP–MBA 6210 or equiv, business admin Ph.D. student or #; offered alt yrs)

Theories and research in consumer behavior and related disciplines of social and cognitive psychology. Perspective primarily from information processing or social cognition. Consumer categorization, memory, beliefs, attitudes, and attitude change.

Mktg 8831. Seminar: Inter-Organizational Relations. (4 cr; QP–MBA 8045 or 8210 or equiv; SP–MBA 6210 or equiv, business admin Ph.D. student or #; offered alt yrs)

From an efficiency perspective, inter-organizational networks involved in task of moving goods and services from point of production to point of consumption. Literature covering the functional, institutional, analytical, and methodological traditions, as well as the behavioral school of thought and transaction cost DSS and relational contracting.

Mktg 8841. Seminar: Theory and Methods of Measurement. (4 cr; QP–MBA 8045 or 8210 or equiv; SP–MBA 6210 or equiv, business admin Ph.D. student or #; offered alt yrs)

Issues surrounding validity and reliability of measures developed as key indicators of constructs in a behavioral context. Various methods of measurement such as indicators of reliability, Multi-Trait Multi-Method, exploratory factor analysis, and confirmatory factor analysis using Lisrel.

Mktg 8851. Seminar: Marketing Management and Strategy. (4 cr; QP–MBA 8045 or 8210 or equiv; SP–MBA 6210 or equiv, business admin Ph.D. student or #; offered alt yrs)

Topics in marketing management and formulation and implementation of marketing strategies. Exposes students to diversity of thought, within marketing and the strategic management literature.

Mktg 8890. Seminar: Marketing Topics. (4 cr [max 8 cr]; QP–MBA 8045 or 8210 or equiv; SP–MBA 6210 or equiv, business admin Ph.D. student or #; offered alt yrs)

Current topics and problems of interest considered in depth. Topics vary with each offering.

Mktg 8892. Readings in Marketing. (1-8 cr [max 16 cr]; QP–MBA 8045 or 8210 or equiv; SP–MBA 6210 or equiv, business admin Ph.D. student or #)

Readings useful to student’s individual program and objectives that are not available in regular courses.
Mktg 6894. Graduate Research in Marketing. (1-8 cr; max 16 cr; QP—MBA 8045 or 8210 or equiv; SP—MBA 6210 or equiv; business admin Ph.D. student or #) Individual research on an approved topic appropriate to student’s program and objectives.

Master of Business Taxation (MBT)
Department of Strategic Management and Organization
Curtis L. Carlson School of Management
MBT 8333, FTE: Master’s. (1 cr; SP—Master’s student, adviser and DGS consent)

Master of Healthcare Administration (MHA)
Curtis L. Carlson School of Management
MHA 8750. Seminar: Alternative Patterns of Healthcare. (2 cr; A-F only) Social and psychological components of health and medical care. Organization and delivery of healthcare services, their problems and perspectives; focus on the patient, provider of care, and environment in which healthcare services are dispensed.

MHA 8762. Contemporary Problems in Healthcare. (2 cr; SP—Ph.D. student; A-F only) Current concepts, problems, principles, and future developments of health and healthcare selected by students; developing models, based on current literature and research; verbal and written presentations from policy and issue perspectives.

MHA 8763. External Forces Affecting Health Services Delivery. (2 cr; SP—Ph.D. student; A-F only) Guidance in development of concepts, models, and principles of financing, social policy making, and organizing and human resource development for health services delivery. Written paper and teaching presentation required.

MHA 8764. Research Applications to Health Services Delivery. (2 cr; SP—Ph.D. student; A-F only) Tutorial guidance and supervised course development covering research design, application, analysis, and presentation in health services delivery.

MHA 8780. Non-Parametric Statistical Methods in Healthcare Research. (2 cr; QP—Theoretical stat course, parametric stat course; SP—Theoretical stat course, parametric stat course; A-F only) Development of student-selected, non-parametric statistics and its application to health-care delivery and research.

MHA 8782. Research Practicum. (2 cr; SP—Ph.D. student; A-F only) Field experience in healthcare research. Supervised independent and team research on selected topics and problems.

MHA 8790. Seminar: Political Aspects of Healthcare. (2 cr; SP—HRSP&A grad major or #; A-F only) Interrelationships between government, politics, and healthcare; political and social basis of health legislation and community decision making in provision and modification of health services.

Courses

Materials Science (MatS)
Department of Chemical Engineering and Materials Science
Institute of Technology
MatS 5221. Introduction to Polymer Chemistry. (4 cr; QP—Chem 3302, 5502; SP—(Chem 2302, 3502) or #; A-F only) Condensation, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties.

MatS 5223W. Polymer Laboratory. (2 cr; QP—5610 or Chem 5610 or #; SP—5221 or Chem 5221 or 8221 or #; A-F only) Synthesis, characterization, and physical properties of polymers. Free radical, condensation, emulsion, anionic, polymerization. Infrared spectroscopy/gel permeation chromatography. Viscoelasticity, rubber elasticity, crystallization.

MatS 5517. Electron Microscopy. (3 cr; A-F only) Transmission electron microscope, scattering and diffraction, electron sources, lenses, apertures and resolution, specimen preparation, diffraction patterns, kikuchi diffraction, planar defects, strain fields, high resolution imaging, X-ray spectrometry.

MatS 5521. Thin Films and Interfaces. (3 cr; QP—MatS 5013, upper div IT or grad; SP—IT upper div or grad student; MatS 4013 or #) Fundamentals of vacuum science; vapor pressures and thin film deposition processes (physical and chemical vapor deposition, sputtering, laser ablation); thermodynamics and kinetics of thin film growth; epitaxy; film stability and reactions; structure-property relationship; multilayers and diffusion barriers; characterization techniques to include photon, electron, and ion spectroscopies. Computer-based homework problems.

MatS 5531. Electrochemical Engineering. (3 cr; QP—MatS 5011, upper div IT or grad; SP—MatS 3011 or #, upper div IT or grad) Fundamentals of electrochemical engineering. Topics include electrochemical mass transfer electrokinetics, thermodynamics of cells, modern sensors, formation of thin films and microstructured materials. Computer-based problems will be assigned.


MatS 8002. Thermodynamics and Kinetics. (3 cr; A-F only) First three laws of thermodynamics, free energy, equilibrium constants, fugacity and activity relationships, solution models, order-disorder transitions, phase transitions. Elementary statistical mechanics. Applications to materials systems, including surface energies, multicomponent equilibria, reaction kinetics, mass transport, diffusion.


MatS 8004. Mechanical Properties. (3 cr; A-F only) Defects in crystalline materials, including point defects, dislocations, and grain boundaries. Structure and movement of defects related to mechanical behavior of materials. Tools used to understand crystals and crystallography.

MatS 8005. Dislocations and Interfaces. (3 cr; A-F only) Structure and properties at interfaces. Basic thermodynamics and kinetics of interfaces. Influence of bonding and crystallography on structures of dislocations cores. CSL and DSCL theory of grain boundaries and of structures of phase boundaries in heterojunctions including thin film epitaxies. Effect of defects on electrical, optical, magnetic, and superconducting behavior of materials.

MatS 8211. Physical Chemistry of Polymers. (3 cr; QP—Undergrad physical chem; SP—Undergrad physical chem or #; A-F only) Introduction to polymer physical chemistry. Chain conformations; thermodynamics of polymer solutions, blends, and copolymers; light, neutron, and X-ray scattering; dynamics in dilute solutions and polymer characterization; dynamics in melt and solution; viscoelasticity; rubber elasticity, networks, and gels; glass transitions; crystallization.

MatS 8212. Solid State Reaction Kinetics. (3 cr; QP—8112; SP—8002) Reactions between ceramic solids in terms of transport mechanisms. Thermodynamics of point defects in binary and ternary ionic solids, diffusion in the bulk and along line and surface defects, chemical and electrochemical potential gradients, reaction interfaces, practical examples drawn from oxidation and solid/solid reactions of ceramics.


MatS 8215. Electronic Ceramics. (3 cr; SP—#; A-F only) Electronic properties of ceramics; electronic and ionic conduction; dielectric behavior; ferroelectric, piezoelectric, pyroelectric, and electrostatic properties. Relationships between structure (crystal structure, microstructure) and properties. Introduction to applications (e.g., capacitors, sensors, actuators).

MatS 8216. Contact and Fracture Mechanics. (3 cr; A-F only) Theories of indentation contact and fracture resistance emphasizing structure/property relationships. Surfaces, thin film interfaces, coatings, and bulk behavior. Theoretical basis and experimental techniques for measuring mechanical behavior at the nano-scale. Lab exercises.

MatS 8218. Thin Film Growth and Epitaxy. (3 cr; A-F only) Principles of epitaxial growth. Growth models, thermodynamics, kinetics, homoepitaxial growth, continuum models of homoepitaxial growth, models of heteroepitaxial growth, surfaces, interfaces, defects, coincident lattices, experimental methods of growth, characterization.


MatS 8333. FTE: Master’s. (1 cr; SP—Master’s student, adviser and DGS consent)

MatS 8444. FTE: Doctoral. (1 cr; SP—Doctoral student, adviser and DGS consent)
Mathematics (Math)

School of Mathematics

Institute of Technology

Math 5067. Actuarial Mathematics I. I,4 cr; QP–5056, [one qr [4xxx or 5xxx] [probability or statistics] course]; SP–4065, [one sem [4xxx or 5xxx] [probability or statistics] course]; SP–5067


Math 5068. Actuarial Mathematics II. I, 4 cr; QP–5056

Multiple decrement insurance, pension valuation. Expense analysis, gross premium, reserves. Problem of withdrawals. Regulatory reserves systems. Minimum cash values. Additional topics at instructor’s discretion.

Math 5075. Mathematics of Options, Futures, and Derivative Securities I. I,4 cr; QP–Two yrs calculus, basic computer skills; SP–Two yrs calculus, basic computer skills; QP–A only

Mathematical background (e.g., partial differential equations, Fourier series, computational methods, Black-Scholes theory, numerical methods—including Monte Carlo simulation). Interest-rate derivative securities, exotic options, risk theory. First course of two-course sequence.

Math 5076. Mathematics of Options, Futures, and Derivative Securities II. I, 4 cr; QP–[4xxx or 5xxx] [probability or statistics] course]; SP–5075; QP–A only

Mathematical background such as partial differential equations, Fourier series, computational methods, Black-Scholes theory, numerical methods—including Monte Carlo simulation), interest-rate derivative securities, exotic options, risk theory.

Math 5165. Mathematical Logic I. I, 4 cr; QP–3262 or Phil 5201 or Csci course in theory of algorithms or #; SP–2283 or 3283 or Phil 5201 or Csci course in theory of algorithms or #


Math 5166. Mathematical Logic II. I, 4 cr; QP–5156

First-order logic: provability/truth in formal systems, models of axiom systems, Gödel’s completeness theorem. Gödel’s incompleteness theorem: decidable theories, representability of recursive functions in formal theories, undecidable theories, models of arithmetic.

Math 5246. Cryptology and Number Theory. I, 4 cr; SP–Soph math course


Math 5251. Error-Correcting Codes, Finite Fields, Algebraic Curves. I, 4 cr; SP–Soph math course; QP–Soph math course


Math 5283H. Honors: Fundamental Structures of Algebra I. I, 4 cr; QP–[2243 or 2373 or 2573]; (2283 or 2574 or 3283)

Review of matrix theory, linear algebra. Vector spaces, linear transformations over abstract fields. Group theory, including non-abelian groups, quotient groups, homomorphisms, class equation, Sylow’s theorems. Specific examples: permutation groups, symmetry groups of geometric figures, matrix groups.

Math 5286H. Honors: Fundamental Structures of Algebra II. I, 4 cr; QP–5285

Ring/module theory, including ideals, quotients, homomorphisms, domains (unique factorization, Euclidean, principal ideal), fundamental theorem for finitely generated modules over Euclidean domains, Jordan canonical form. Introduction to field theory, including finite fields, algebraic/transcendental extensions, Galois theory.

Math 5335. Geometry I. I, 4 cr; QP–[3251 or 3354 or 3551]; (3261 or 3355 or 3552); SP–[2243 or 2373 or 2573]; [M2263 or #2374 or #3274]

Advanced two-dimensional Euclidean geometry from a vector viewpoint. Theorems/problems about triangles/circles, isometries, connections with Euclid’s axioms. Hyperbolic geometry, how it compares with Euclidean geometry.

Math 5336. Geometry II. I, 4 cr; QP–5335

Projective geometry, including: relation to Euclidean geometry, finite geometries, fundamental theorem of projective geometry, N-dimensional Euclidean geometry, geometry from a vector viewpoint. Emphasizes N=3, including: polyhedra, spheres, isometries.

Math 5345. Introduction to Topology. I, 4 cr; QP–[3252 or 3355], 3262; SP–[2263 or 2374 or 2573], [M2283 or #2574 or #3283]

Set theory. Euclidean/metric spaces. Basics of general topology, including compactness/connectedness.

Math 5378. Differential Geometry. I, 4 cr; QP–[3252 or 3355], 3262; SP–[2263 or 2374 or 2573], [2283 or 2574 or 3283]

Basic geometry of curves in plane and in space, including Frenet formula, theory of surfaces, differential forms, Riemannian geometry.

Math 5385. Introduction to Computational Algebraic Geometry. I, 4 cr; QP–[2351 or 3354 or 3551]; SP–[2263 or 2573]

Geometry of curves/surfaces defined by polynomial equations. Emphasizes computer computations with polynomials using computer packages, interpolation between algebra and geometry. Abstract algebra presented as needed.

Math 5467. Introduction to the Mathematics of Waves. I, 3 cr; QP–SP–[2243 or 2373 or 2573]; [2283 or 2574 or 3283 or #]; (2263 or 2374, 4567 recommended)


Math 5481. Mathematics of Industrial Problems I. I, 4 cr; QP–Two yrs calc, familiarity with some programming language; SP–[2243 or 2373 or 2573], [2263 or 2374 or 2574]; familiarity with some programming language]

Topics in industrial math, including crystal precipitation, air quality modeling, electron beam lithography. Problems treated both theoretically and numerically.

Math 5482. Mathematics of Industrial Problems II. I, 4 cr; QP–Two yrs calc, familiarity with some programming language; SP–[2243 or 2373 or 2573], [2263 or 2374 or 2574]; familiarity with some programming language]

Topics in industrial math, including color photography, catalytic converters, photocopying.

Math 5485. Introduction to Numerical Methods I. I, 4 cr; QP–3261 or 3355 or 3551; some computer skills recommended; SP–[2243 or 2373 or 2573; some computer skills recommended]

Solution of nonlinear equations in one variable. Interpolation, polynomial approximation, numerical integration/differentiation, numerical solution of initial-value problems.

Math 5486. Introduction to Numerical Methods II. I, 4 cr; QP–SP–5485


Math 5487. Computational Methods for Differential and Integral Equations in Engineering and Science I. I, 4 cr; QP–5424; SP–4424


Math 5488. Computational Methods for Differential and Integral Equations in Engineering and Science II. I, 4 cr; QP–5487


Math 5525. Introduction to Ordinary Differential Equations. I, 4 cr; QP–[3252 or 3355], 3262; SP–[2243 or 2373 or 2573], [2283 or 2574 or 3283]


Math 5535. Dynamical Systems and Chaos. I, 4 cr; QP–[3352 or 3355], [3261 or 3356]; SP–[2243 or 2373 or 2573], [2367 or 2574 or 3283]

Dynamical systems theory. Emphasizes iteration of one-dimensional mappings. Fixed points, periodic points, stability, bifurcations, symbolic dynamics, chaos, fractals, Julia/Mandelbrot sets.

Math 5583. Complex Analysis. I, 4 cr; QP–5553, 3252 or 3355 or 3552; SP–2263 or 2374 or 2573


Math 5587. Elementary Partial Differential Equations I. I, 4 cr; QP–1 yr soph calculus; [SP–2243 or 2373 or 2573], [2263 or 2374 or 2574]

Emphasizes partial differential equations w/physical applications, including heat, wave, Laplace’s equations. Interpretations of boundary conditions. Characteristics, Fourier series, transforms, Green’s functions, images, computational methods. Applications include wave propagation, diffusions, electrostatics, shocks.

Math 5588. Elementary Partial Differential Equations II. I, 4 cr; QP–1 yr soph calculus; [SP–2243 or 2373 or 2573], [2263 or 2374 or 2574]; 5587 not a prereq but see instructor; A-F only

Math 5615H. Honors: Introduction to Analysis I (3 cr; QP–8202 or 8203; SP–8202 or #; A-F only)

Math 5616H. Honors: Introduction to Analysis II (4 cr; QP–8203; SP–8203 or #; A-F only)

Math 5651. Basic Theory of Probability and Statistics. (4 cr; QP–Math grad student in good standing or #; S-N only)
Applying techniques of mathematical logic to other areas of mathematics, computer science. Complexity of computation, computable analysis, unsolvability of diophantine problems, program verification, database theory. Course is generally self-contained.

Math 8142. Applied Logic. (3 cr [max 3 cr]; QP–8140; SP–8140, A-F only)
Applying techniques of mathematical logic to other areas of mathematics, computer science. Complexity of computation, computable analysis, unsolvability of diophantine problems, program verification, database theory.

Math 8151. Axionic Set Theory. (3 cr; QP–5162-5163; SP–5164; #; A-F only)
Axiomatic development of basic properties of ordinal/cardinal numbers, infinitary combinatorics, well founded sets, consistency of axiom of foundation, constructible sets, consistency of axiom of choice and of generalized continuum hypothesis.

Math 8152. Axionic Set Theory. (3 cr; QP–8150; SP–8151 or #; A-F only)
Notion of forcing, generic extensions, forcing with finite partial functions, independence of continuum hypothesis, forcing with partial functions of infinite cardinalities, relationship between partial orderings and Boolean algebras, Boolean-valued models, independence of axiom of choice.

Math 8166. Recursion Theory. (3 cr; SP–Math grad student or #; A-F only)

Math 8167. Recursion Theory. (3 cr; QP–8166; SP–8166, A-F only)
Sample topics: complexity theory, recursive analysis, generalized recursion theory, analytical hierarchy, constructive ordinals.

Math 8172. Model Theory. (3 cr; QP–Math grad student or #; A-F only)
Interplay of formal theories, their models. Elementary equivalence, elementary extensions, partial isomorphisms. Lowenheim-Skolem theorems, compactness theorems, preservation theorems. Ultraproducts.

Math 8173. Model Theory. (3 cr; QP–8172, SP–8172 or #; A-F only)
Types of elements. Prime models, homogeneity, saturation, categoricity in power. Forking.

Math 8190. Topics in Logic. (1-3 cr [max 12 cr]; SP–A-F only)
Offered for one year or one semester as circumstances warrant; A-F only)

Math 8201. General Algebra. (3 cr; QP–5xxx algebra or equival; SP–4xxx algebra or equiv or #; A-F only)
Groups through Sylow, Jordan-Hölder theorems, structure of finitely generated Abelian groups. Rings and algebras, including Gauss theory of factorization. Rings and algebras, including Gauss theory of factorization. Modules, including projective and injective modules, chain conditions, Hilbert basis theorem, and structure of modules over principal ideal domains.

Math 8202. General Algebra. (3 cr; QP–8200; SP–8201 or #; A-F only)
Classical field theory through Galois theory, including solvable equations. Symmetric, Hermitian, orthogonal, and unitary form. Tensor and exterior algebra. Basic Wedderburn theory of rings; basic representation theory of groups.

Math 8207. Theory of Modular Forms and L-Functions. (3 cr; QP–8202; SP–8202 or #; A-F only)

Math 8253. Algebraic Geometry. (3 cr; QP–8202; SP–8202 or #; A-F only)

Math 8254. Algebraic Geometry. (3 cr; QP–8203; SP–8203 or #; A-F only)

Math 8270. Topics in Algebraic Geometry. (1-3 cr [max 12 cr]; SP–Math 8201, 8202; offered for one year or one semester as circumstances warrant; A-F only)

Math 8271. Lie Groups and Lie Algebras. (3 cr; QP–8302; SP–8302 or #; A-F only)
Definitions and basic properties of Lie groups and Lie algebras; classical matrix Lie groups; Lie subgroups and their corresponding Lie subalgebras; covering groups; Maurer-Cartan forms; exponential map; correspondence between Lie algebras and simply connected Lie groups; Baker-Campbell-Hausdorff formula; homogeneous spaces.

Math 8272. Lie Groups and Lie Algebras. (3 cr; QP–8270; SP–8270 or #; A-F only)
Applications of Eisenstein series: special values and analytic continuation and functional equations of L-functions. Trace formulas. Applications of representation theory. Computations.

Math 8280. Theory of Modular Forms and L-Functions. (3 cr; QP–8208 or #; A-F only)
Applications of Eisenstein series: special values and analytic continuation and functional equations of L-functions. Trace formulas. Applications of representation theory. Computations.

Math 8300. Topics in Algebra. (1-3 cr [max 12 cr]; SP–Grad math major or #; offered as one yr or one sem as circumstances warrant; A-F only)

Math 8301. Applied Logic. (3 cr; SP–A-F only)
Applying techniques of mathematical logic to other areas of mathematics and computer science. Sample topics: complexity of computation, computable analysis, unsolvability of diophantine problems, program verification, database theory. Course is generally self-contained.

Math 8302. Introduction to Analysis. (3 cr; SP–A-F only)
Applying techniques of mathematical logic to other areas of mathematics and computer science. Sample topics: complexity of computation, computable analysis, unsolvability of diophantine problems, program verification, database theory. Course is generally self-contained.
Math 8301. Manifolds and Topology. (3 cr;QP–Some point-set topology, algebra; SP–Some point-set topology, algebra) or A-F; A-F only
Classification of compact surfaces, fundamental group/pcovering spaces. Homology group, basic cohomology. Application to degree of a map, invariance of domain/dimension.

Math 8302. Manifolds and Topology. (3 cr;QP–8300; #; SP–8301 or #; A-F only)

Math 8306. Algebraic Topology. (3 cr;QP–8300; #; SP–8301 or #; A-F only)
Singular homology, cohomology theory with coefficients. Eilenberg-Steenrod axioms, Mayer-Vietoris theorem.

Math 8307. Algebraic Topology. (3 cr;QP–8306; #; SP–8306 or #; A-F only)
Basic homotopy theory, cohomology rings with applications. Time permitting: fibre spaces, cohomology operations, extra-ordinary cohomology theories.

Math 8333. FTE: Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)

Math 8360. Topics in Topology. (1-3 cr [max 12 cr];QP–8300 or basic point-set topology; SP–8301 or basic point-set topology or #; A-F only)
Selected topics.

Math 8365. Riemannian Geometry. (3 cr;QP–8300 or basic point-set topology; SP–8301 or basic point-set topology or #; A-F only)
Riemannian metrics, curvature. Bianchi identities, Gauss-Bonnet theorem, Myers’s theorem, Cartan-Hadamard theorem.

Math 8366. Riemannian Geometry. (3 cr;QP–8365; #; SP–8365 or #; A-F only)
Gauss, Codazzi equations. Tensor calculus, Hodge theory, spinors, global differential geometry, applications.

Math 8370. Topics in Differential Geometry. (1-3 cr [max 12 cr];QP–8300 or 8365; SP–8301 or 8365; offered for one yr or one sem as circumstances warrant; A-F only)
Current research in differential geometry.

Math 8380. Topics in Advanced Geometry. (1-3 cr [max 12 cr];QP–8300 or 8365; offered for one yr or one sem as circumstances warrant; A-F only)
Math 8388. Mathematical Modeling of Industrial Problems. (3 cr;QP–8380; SP–8397 or #; A-F only)
Techniques for analysis of mathematical models. Asymptotic methods; design of simulation and visualization techniques. Specific computation for models arising in industrial problems.

Math 8390. Topics in Mathematical Physics. (1-3 cr [max 12 cr];QP–8365; offered for one yr or one sem as circumstances warrant; A-F only)
Current research.

Math 8401. Mathematical Methods and Methods of Applied Mathematics. (3 cr;QP–5xxx numerical analysis and applied linear algebra; SP–4xxx numerical analysis and applied linear algebra or #; A-F only)
Dimension analysis, similarity solutions, linearization, stability theory, well-posedness, and characterization of type. Fourier series and integrals, wavelets, Green’s functions, weak solutions and distributions.

Math 8402. Mathematical Modeling and Methods of Applied Mathematics. (3 cr;QP–8401; SP–8401 or #; A-F only)

Math 8431. Mathematical Fluid Mechanics. (3 cr;QP–5xxx numerical analysis of partial differential equations; SP–5xxx numerical analysis of partial differential equations or #; A-F only)

Math 8432. Mathematical Fluid Mechanics. (3 cr;QP–8430; SP–8431 or #)

Math 8441. Numerical Analysis and Scientific Computing. (3 cr;QP–5xxx analysis, 5xxx applied linear algebra; SP–[4xxx analysis, 4xxx applied linear algebra] or #)

Math 8442. Numerical Analysis and Scientific Computing. (3 cr;QP–8441; SP–8441 or #; 5477-5478 recommended for engineering and science grad students)

Math 8444. FTE: Doctoral. (1 cr;SP–Doctoral student, adviser and DGS consent)

Math 8445. Numerical Analysis of Differential Equations. (3 cr;QP–5xxx numerical analysis, 5xxx partial differential equations; SP–4xxx numerical analysis, 4xxx partial differential equations or #; A-F only)
Finite element and finite difference methods for elliptic boundary value problems (e.g., Laplace’s equation) and methods for solving linear systems by direct and iterative methods.

Math 8446. Numerical Analysis of Differential Equations. (3 cr;QP–8445; SP–8445 or #; A-F only)
Numerical methods for parabolic equations (e.g., heat equations). Methods for elasticity, fluid mechanics, electromagnetics. Applications to specific computations.

Math 8450. Topics in Numerical Analysis. (1-3 cr [max 12 cr];QP–Grad math major or #; offered as one yr or one sem as circumstances warrant; A-F only)
Selected topics.

Math 8470. Topics in Mathematical Theory of Continuum Mechanics. (1-3 cr;QP–12 cr;SP–#; offered for one year or one semester as circumstances warrant; A-F only)

Math 8501. Theory of Ordinary Differential Equations. (3 cr;QP–5xxx ODE; SP–4xxx ODE or #; A-F only)
Existence, uniqueness, continuity, and differentiability of solutions. Linear theory and hyperbolicity. Basics of dynamical systems. Local behavior near a fixed point, a periodic orbit, and a homoclinic or heteroclinic orbit: Perturbation theory.

Math 8502. Dynamical Systems and Differential Equations. (3 cr;QP–8500; SP–8501 or #; A-F only)

Math 8503. Bifurcation Theory in Ordinary Differential Equations. (3 cr;QP–8500; SP–8501 or #; A-F only)

Math 8505. Applied Dynamical Systems and Bifurcation Theory I. (3 cr;QP–5522 or 5533;SP–5525 or 8502 or #; A-F only)
Static/Hopf bifurcations, invariant manifold theory, normal forms, averaging, Hopf bifurcation in maps, forced oscillations, coupled oscillators, chaotic dynamics, co-dimension 2 bifurcations. Emphasizes computational aspects/applications from biology, chemistry, engineering, physics.

Math 8506. Applied Dynamical Systems and Bifurcation Theory II. (3 cr;QP–5522, 5573;SP–5587 or #; A-F only)
Background on analysis in Banach spaces, linear operator theory. Lyapunov-Schmidt reduction, static bifurcation, stability at a simple eigenvalue, Hopf bifurcation in infinite dimensions invariant manifold theory. Applications to hydrodynamic stability problems, reaction-diffusion equations, pattern formation, and elasticity.

Math 8520. Topics in Dynamical Systems. (1-3 cr [max 12 cr];QP–8520;SP–8502; offered for one yr or one sem as circumstances warrant; A-F only)
Current research.

Math 8530. Topics in Ordinary Differential Equations. (1-3 cr;QP–8502;SP–8502; offered for one year or one semester as circumstances warrant; A-F only)
Math 8540. Topics in Mathematical Biology. (1-3 cr [max 12 cr];SP–#;A-F;A-F only)
Offered for one year or one semester as circumstances warrant.

Math 8571. Theory of Evolutionary Equations. (3 cr;QP–8502;SP–8502 or #; A-F only)
Infinite dimensional dynamical systems, global attractors, existence and robustness. Linear semigroups, analytic semigroups. Linear and nonlinear reaction diffusion equations, strong and weak solutions, well-posedness of solutions.

Math 8572. Theory of Evolutionary Equations. (3 cr;QP–8570;SP–8571 or #; A-F only)

Math 8580. Topics in Evolutionary Equations. (1-3 cr [max 12 cr];QP–8582;SP–8572 or #; offered for one yr or one sem as circumstances warrant; A-F only)


Math 6859. Topics in Partial Differential Equations. (1-3 cr; QP–8602; SP–8602; offered for one yr or one sem as circumstances warrant; A-F only) Research topics.

Math 6860. Advanced in Applied Mathematics. (1-3 cr; max 12 cr; SP– offered for one yr or one semester as circumstances warrant; S-N only) Topics. Set theory/fundamentals. Axiom of choice, measures, measure spaces. Borel/Lebesgue measure, integration, fundamental convergence theorems, Riesz representation.


Math 6864. Topics in Real Analysis. (3 cr; max 12 cr; QP–8602; SP–8602 or #; offered for one yr or one sem as circumstances warrant; A-F only) Current research.

Math 6861. Spatial Ecology. (3 cr; QP–Three qtrs calculus, theoretical population ecology or six qtrs more robust calculus, course in statistics or probability; SP–Two semesters calculus, theoretical population ecology or four semesters more robust calculus, course in statistics or probability or #; S-N only) Introduction: role of space in population dynamics and interspecific interaction; includes single species and multispecies models, deterministic and stochastic theory, different modeling approaches, effects of implicit/explicit space on competition, pattern formation, stability diversity and invasion. Recent literature. Computer lab.


Math 6852. Theory of Probability Including Measure Theory. (3 cr; QP–8602; SP–8651 or #) Conditional distributions and expectations, convergence of sequences of distributions on real line and on Polish spaces, central limit theorem and related limit theorems, Brownian motion, martingales and introduction to other stochastic sequences.

Math 6854. Fundamentals of Probability Theory and Stochastic Processes. (3 cr; QP–8656 or 8662; SP–8651 or 8652 or #) Review of basic theorems of probability for independent random variables; introductions to Brownian motion, martingales and on Polish spaces, central limit theorem and related concepts, such as Markov sequences and processes, stationary processes, martingales, super- and sub-martingales, Doob-Meyer decomposition.

Math 6855. Stochastic Calculus with Applications. (3 cr; QP–8654 or 8662; SP–8654 or 8659 or #) Stochastic integration with respect to martingales, Itô’s formula, applications to business models, filtering, and stochastic control theory.

Math 6859. Stochastic Processes. (3 cr; SP–8652 or #) In-depth coverage of various stochastic processes and related concepts, such as Markov sequences and processes, renewal sequences, exchangeable sequences, stationary sequences, Poisson point processes, Levy processes, interacting particle systems, diffusions, and stochastic integrals.

Math 6860. Topics in Probability. (1-3 cr [max 12 cr]; SP–offered for one yr or one sem as circumstances warrant) Markov sequences and processes, stationary sequences, Poisson point processes, Levy processes, interacting particle systems, diffusions, and stochastic integrals.

Math 6866. Doctoral Pre-Thesis Credits. (1-18 cr; max 60 cr; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral) Further topics in enumeration, including symmetric functions, Schensted correspondence, and standard tableaux; non-enumerative combinatorics, including graph theory and coloring, matching theory, connectivity, flows in networks, codes, and extremal set theory.

Math 6860. Topics in Combinatorics. (1-3 cr [max 12 cr]; SP–Grad math major or #; offered as one yr or one sem cr as circumstances warrant; A-F only) Further topics in enumeration, including symmetric functions, Schensted correspondence, and standard tableaux; non-enumerative combinatorics, including graph theory and coloring, matching theory, connectivity, flows in networks, codes, and extremal set theory.


Math 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required) Research, readings, teaching assistantship.

Math 8991. Independent Study. (1-6 cr [max 24 cr]; SP–#; S-N only) Individually directed study.

Math 8992. Directed Reading. (1-6 cr [max 24 cr]; SP–#; S-N only) Individually directed reading.

Math 8993. Directed Study. (1-6 cr [max 24 cr]; SP–#; S-N only) Individually directed study.
MthE 5161. Developing Leadership in School Mathematics. (3 cr; QP–Tchg exper or #; SP–Tchg exper or #)

Current developments in the psychology and pedagogy of mathematics education as related to the evolving nature of mathematics education objectives. Emerging use of technology in the mathematics classroom. Techniques for the development of supervisory abilities. Characteristics of effective staff development.

MthE 5170. Historical Topics in the Mathematics Classroom. (1-3 cr)

Historical understandings of school mathematics content and methodology. Cross-cultural contributions in the development of mathematical ideas. Development of lessons, activities, and materials for school use.

MthE 5171. Teaching Problem Solving. (3 cr)

Investigation of fundamental concepts and principles of problem solving, reasoning, and proof. Emphasis on activities and applications appropriate for junior and senior high classes. Pedagogical experiences to prepare teachers to teach problem solving, reasoning, and proof in classrooms.

MthE 5172. Teaching Probability and Statistics. (3 cr)

Investigation of fundamental concepts and principles of probability and statistics. Emphasis on activities and applications appropriate for junior and senior high school classes. Pedagogical experiences to prepare teachers to integrate quantitative literacy accurately and effectively in classrooms.

MthE 5174. Ethics, Psychophysical Human Development, and the Internet. (1 cr)

Investigation of concepts and themes common to ethics, mathematics, physical science, human development, and the Internet. Emphasis on the development of understanding of fundamental concepts and principles, on problem solving in a distributed intelligence environment (WWW) and on activities appropriate for K-12 classes.

MthE 5313. Teaching and Learning Mathematics in the Middle School. (3 cr; SP–Tchg exper or #)

Mathematics learning, instruction methods, mathematical topics, and assessment procedures appropriate for the middle grades. Examination of newer curricular materials. Illustration of successful instructional techniques. Discussion of the relationship between the nature of the learner and effective instruction.

MthE 5314. Teaching and Learning Mathematics. (3 cr; SP–Math ex or grad student or #)

Methods, materials, and curriculum development; principles of learning; review of research; preparation and evaluation of tests, units, and materials of instruction; recent developments in mathematics curriculum and instructional alternatives; issues in teaching and learning; program planning and evaluation.

MthE 5355. Mathematics for Diverse Learners. (3 cr; SP–Teaching license or student in elem ed or special ed or #)

Mathematical concepts and methods for exceptional students, both low achieving and gifted. Experimental materials and methods designed for underachieving students.

MthE 5366. Technology-Assisted Mathematics Instruction. (3 cr)

Technology—including computers, programmable and graphing calculators, and video—as instructional tools in mathematics; design and evaluation of technology-based mathematics lessons; the effect of technology on the mathematics curriculum; managing the technology-enriched classroom.

MthE 5696. Student Teaching in Mathematics. (1-8 cr [max 8 cr]; SP–M.Ed/init lic student or #; S-N only)

Student teaching in secondary school mathematics classes.

MthE 5993. Directed Studies in Mathematics Education. (1-6 cr; SP–Math ed M.Ed. student, #; S-N only)

Secondary school classroom teaching project to improve specific teaching skills, planned by student, approved/directed by student’s adviser.

MthE 8501. Theory and Classical Research in Mathematics Education. (3 cr; SP–Grad math educ major)

Critical review of research and relevant theoretical formulations; criteria for appraising research methods; educational implications.

MthE 8571. Research in Mathematics Education. (3 cr; SP–Grad student or #)

Designed for advanced graduate students in mathematics education. Presentation and discussion of Ph.D. thesis proposals and other contemporary research.

MthE 8591. Seminar: Mathematics Education. (1-3 cr; SP–Math educ Ph.D. student)

Problems of mathematics instruction from kindergarten through junior college; opportunity to develop proposals and design models for empirical research.

MthE 8995. Projects: Mathematics Education. (max 12 cr [max 12 cr]; SP–Ph.D. educ major with math educ concentration)

Students survey most recent literature and design and prepare research reports on special topics.

ME 5080. Topics in Mechanical Engineering. (4 cr; QP–IT upper div or grad student; SP–Upper div IT or grad student, submission of permission form, #)

Topics vary each semester.

ME 5090. Advanced Engineering Problems. (1-4 cr; QP–Subject to approval of department form; SP–ME upper div, upper div, #)

Special investigations in various fields of mechanical engineering and related areas including an independent study project.

ME 5101. Vapor Cycle Systems. (4 cr; QP–IT or grad student; ME 3303; SP–IT upper div or grad student; A-F only)

Vapor compression and absorption refrigeration systems; heat pumps; vapor power cycle analysis, regeneration, reheat, compound cycle modifications, combines gas turbine—vapor cycle systems.

ME 5103. Thermal Environmental Engineering. (4 cr; QP–IT or grad student, 3303, 5342; SP–IT upper div or grad student, 3322 or 3323; A-F only)

Thermodynamic properties of moist air; psychrometric charts; HVAC systems; solar energy; human thermal comfort; indoor air quality; heating and cooling loads in buildings.

ME 5105. HVAC System Design. (4 cr; QP–IT upper div or grad student, ME 3303, ME 5342; SP–IT upper div or grad student, 3322 or 3323; A-F only)

Design procedures used for heat exchangers, cooling towers, hydronic systems, and air handling systems. HVAC system design for a commercial building. Applications and transport.

ME 5113. Aerosol/Particle Engineering. (4 cr; QP–IT upper div or grad student, 3303; SP–IT upper div or grad student; A-F only)

Kinetic theory, definition, theory and measurement of particle properties, elementary particle mechanics, particle statistics, Brownian motion and diffusion, coagulation, evaporation and condensation, sampling and transport.

ME 5115. Air Quality and Air Pollution Control. (4 cr; QP–IT upper div or grad student; SP–IT upper div or grad student; A-F only)


ME 5116. Cleanroom Technology and Particle Monitoring. (4 cr; QP–IT upper div or grad student, 3303 or #; SP–IT upper div or grad student; A-F only)

Fundamentals of clean room technology for microelectronics manufacturing; airborne and liquid-borne particulate contaminants; particle monitors; optical and condensation particle counters, wafer surface scanner, microscopy; filter performance and testing; clean room design and operation; high purity systems; particle detection in processing equipment.

ME 5133. Aerosol Measurement Laboratory. (4 cr; QP–IT upper div or grad student, 3260 or equiv; SP–3221, AEM 3031, CSCI 1113, MATH 2001; A-F only)


ME 5221. Computer-Assisted Product Realization. (4 cr; QP–IT or grad student, 5260 or equiv; SP–3221, AEM 3031, CSCI 1113, MATH 2001; A-F only)

Injection molding with emphasis on design of manufacturing processes. Tooling design and specification of processing conditions using computer-based tools; process simulation software and computer-controlled machine tools. Simultaneous process and part design. Production of tooling and parts. Part evaluation.

ME 5223. Materials in Design. (4 cr; QP–IT upper div or grad student, 5260 or equiv; SP–3221)

Fundamental properties of engineering materials. Fabrication, treatment. Physical and corrosive properties. Failure mechanism, cost and value analysis as related to material selection and specification.

ME 5228. Introduction to Finite Element Modeling, Analysis, and Design. (4 cr; QP–IT upper div or grad student, 3020, AEM 3016, MATH 3261, FORTRAN; SP–IT upper div or grad, 3221, AEM 3031, CSCI 1113, MATH 2001; A-F only)

Finite elements as principal analysis tool in computer-aided design (CAD); theoretical issues and implementation aspects for modeling and analyzing engineering problems encompassing stress analysis, heat transfer, and flow problems for linear situations. One-, two-, and three-dimensional practical engineering applications.

ME 5231. Digital and Analog Control Laboratory. (4 cr; QP–IT or grad student; SP–ME or AEM upper div or grad student; 5281 or equiv; A-F only)

Lab experiments illustrate and apply control theory to mechanical engineering systems. Emphasis on real-life control design and implementation, including dynamic modeling, controller design, analysis and simulation, hardware implementation, measurement techniques, sensor calibration, data acquisition, and processing.

ME 5241. Computer-Aided Engineering. (4 cr; QP–IT or grad student, 3020, 3203, 3205; SP–IT upper div or grad, 3222, CSCI 1113 or equiv; A-F only)

Apply computer-aided design to mechanical design. Engineering design projects and case studies using computer-aided design and finite element analysis software; design optimization and computer-aided graphical presentation of results.
Courses

ME 5243. Advanced Mechanism Design. (4 cr; QP–IT or grad student, CE 3320 or equiv.; SP–Upper div IT or grad student, 3322 or equiv; basic kinematics and dynamics of machines; knowledge of CAD packages such as Pro-E helpful; A-F only)

Analytical methods of kinematic, dynamic, and kinetoelestodynamic analysis and synthesis of mechanisms. Computerized design for function, path, and motion generation based on Burmester theory.

ME 5247. Stress Analysis, Sensing, and Transducers. (4 cr; QP–IT upper div or grad student, AEM 3016; SP–AEM 3031, MatS 2001, A-F only)


ME 5248. Vibration Engineering. (4 cr; QP–IT or grad student, ME 3201 or equivalent; SP–Upper div IT or grad, 3281)

Apply vibration theory to design; optimize isolators, detuning mechanisms, viscoelastic suspensions and structures. Focus on modeling to describe free vibration of complex systems, relating to both theoretical and test procedures.

ME 5281. Analog and Digital Control. (4 cr; QP–IT or grad student, ME 5283; SP–3281)

Continuous and discrete time feedback control systems. Frequency response analysis, stability poles and zeros; transient responses; Nyquist and Bode diagrams; root locus; lead-lag and PID compensators. Nicols-Ziegler design method. Digital implementation alisiertion analog-to-digital and digital-to-analog control system.

ME 5286. Robotics. (4 cr; QP–IT or grad student, ME 5283; SP–Upper div ME or AEM or CSci or grad student, 5281 or equiv; A-F only)

Manipulator forward and inverse kinematics, homogeneous transformations and coordinate frames, the Jacobian and velocity control, task primitives and programming, computational issues; determining path trajectories; reaction forces; manipulator dynamics - and control; vehicle kinematics, dynamics and guidance. Lab project demonstrates concepts.

ME 5288. Modeling and Simulation of Dynamic Systems. (4 cr; QP–IT or grad student, 5283 or equiv.; SP–Upper div upper div or grad, 5281; A-F only)

Bond graphs as structured methodology for developing unified models of mechanical, electrical, magnetic, fluid, thermal, and hybrid systems. Causality and formulation of state-space equations. Analytical and numerical solution of equations of motion. Multisport fields, rigid body dynamics, and distributed parameter systems.

ME 5341. Case Studies in Thermal Engineering and Design. (4 cr; QP–IT or grad student, 5342; SP–Upper div or grad student, 3321, 3322, A-F only)

Characteristics of applied heat transfer problems: nature of problem specification, incompleteness of needed knowledge base, accuracy issues. Categories of applied heat transfer problems (e.g., materials processing, turbomachinery, cooling of electronic equipment, biomedical thermal therapeutic devices, heat exchangers, HVAC systems).

ME 5344. Thermodynamics of Fluid Flow with Applications. (4 cr; SP–3321, 3322, IT upper div or grad student, CSci 2003; A-F only)


ME 5348. Heat Transfer in Electronic Equipment. (4 cr; QP–IT or grad student, 5342; SP–Upper div IT or grad student, 3322 or 3324)

Technology trends and packaging needs of microelectronic components; thermal characteristics, heat transfer mechanisms, and thermal failure modes of modern microelectronics; materials; manufacturing equipment; reliability prediction techniques; thermal stress and strain in layered structures and solder joints.

ME 5351. Computational Heat Transfer. (4 cr; QP–IT or grad student, 5342; SP–Upper div or grad student, 3322, A-F only)

Numerical solution of heat conduction and analogous physical processes. Develop and use a computer program to solve complex problems involving steady and unsteady heat conduction, flow and heat transfer in ducts, flow in porous media, and other special applications.

ME 5361. Plasma-Aided Manufacturing. (4 cr; QP–IT upper div or grad student, 3301, 5342 or equiv; SP–SEE 5611, upper div or IT or grad student, 3321, 3322 or equiv; A-F only)

Properties of plasmas as a processing medium, process control and system design considerations using specific examples of plasma spray coating, welding, and microelectronics processing.

ME 5381. Biological Transport Processes. (4 cr; QP–IT upper div or grad student, CE 3400 or equiv.; SP–CHEn 5753, SMDEn 5310, upper div IT or grad student, transport class [3322 or ChEn 5103 or K-F; A-F only])


ME 5446. Introduction to Combustion. (4 cr; QP–IT or grad student, 5342 or equiv; SP–Upper div IT or grad student, 3321, 3322, A-F only)

Thermodynamics, kinetics, energy and mass transport, and pollutants in reacting systems. Reactors, laminar and turbulent flames. Ignition, quenching, and flame stability. Diffusion flames. Combustion in reciprocating engines, furnaces, and turbines, with emphasis on internal combustion engine performance and emissions.

ME 5461. Internal Combustion Engines. (4 cr; QP–IT or grad student, 3301 or equiv; SP–Upper div upper div or grad student, C or better in 3322 or 3324; A-F only)

Basic spark ignition and diesel engine principles, air, fuel-air and actual engine cycles, cycle modeling, combustion and emissions, knock phenomena, air flow and volumetric efficiency, mixture requirements, ignition requirements and performance. Lectures and complement sequence.

ME 5462. Gas Turbines. (4 cr; QP–IT or grad student, 3301 or equiv; SP–Upper div IT or grad student, 3321, 3322, A-F only)

Gas turbine cycles, regeneration, recuperation, reheating, intercooling, combined cycle plants, and thermochemical regeneration. Axial and radial flow compressors and turbines; combustor designs, energy analysis, emissions, and noise. Turbojet, fanjet, turboprop engine performance. Stationary power plants, vehicular propulsion, hybrid vehicles.

ME 8113. Advanced Aerosol/Particle Engineering. (4 cr; QP–5613, 5614; SP–IT grad student or K; A-F only)

Introduction to kinetic theory, definition, theory, and measurement of particle properties; elementary particle mechanics, particle statistics; Brownian motion, diffusion, coagulation, evaporation and condensation, sampling, and transport.

ME 8221. New Product Design and Business Development I. (4 cr; SP–Entr 6087, IT grad student, some design experience required)

Students and faculty work with company representatives to develop a product concept, a working physical prototype, and an extensive business plan. Concept design, detail design, manufacturing, marketing, introduction strategy, and profit forecasting. Sponsoring company intends to bring product to market. Must be taken in sequence with 8221 the same year.

ME 8222. New Product Design and Business Development II. (4 cr; QP–5250, SP–Ent 6087, 8221; A-F only)

Students and faculty work with company representatives to develop a product concept, a working physical prototype, and an extensive business plan. Concept design, detail design, manufacturing, marketing, introduction strategy, and profit forecasting. Sponsoring company intends to bring product to market. Must be taken in sequence with 8221 the same year.

ME 8228. Finite Elements in Multidisciplinary Flow/Thermal/Thrust and Manufacturing Applications. (4 cr; QP–5227, AEM 8516, AEM 8522, programming; SP–3322, 5341, AEM 3031, CSci 1113; A-F only)


ME 8229. Finite Element Methods for Computational Mechanics:Transient/Dynamic Problems. (4 cr; QP–5227, programming; SP–5228 or equiv, 5341, AEM 3031, CSci 1113; A-F only)

Computational mechanics involving transient or dynamic situations; development and analysis of computational algorithms. Stability and accuracy of computational algorithms, convergence issues; homology situations. Implicit, explicit, mixed, and variable time discretization approaches; modular-based methods for engineering problems.

ME 8243. Advanced Kinematics and Mechanism Dynamics. (4 cr; QP–5203; SP–5241, 5243, CSci 1113, IT grad student; A-F only)

Advanced Burmester theory; dimensional synthesis of complex linkages; solution rectification; 3-D synthesis and analysis; application of graph theory to mechanism synthesis; optimization as linkage synthesis technique; application of dynamics to selected mechanism problems; mechanism balancing.

ME 8262. Analysis and Modeling of Manufacturing Processes. (4 cr; QP–5260; SP–3221, 5229, AEM 3031, CSci 1113, IT upper div student; A-F only)

Finite element simulations of selected manufacturing processes; machining, forming, molding. Models of stress fields, temperature, and fluid flow. Comparison of predicted and measured process and part characteristics: forces, temperature, part shape.

ME 8268. Properties and Fabrication of Plastics and Composites. (4 cr; SP–3221, AEM 3031, Mats 2001; A-F only)


ME 8281. Multivariable Control Systems. (4 cr; QP–5283, 8280; SP–IT grad student; A-F only)


ME 8287. Digital Control and Signal Processing. (4 cr; QP–5283, 8280; SP–IT grad student; A-F only)


ME 8333. FTE: Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)

ME 8337. Experimental Methods in Heat Transfer. (3 cr; SP–8341, 8343 or K; A-F only)

Planning experiments; uncertainty, quantification, visualization, analogies; temperature, pressure, heat flux, and flow measurements; signal processing and analysis.
ME 8339. Optical Diagnostics of Flow Systems. (3 cr; QP–Undergrad physics course; SP–IT grad student, undergrad physics course; A-F only) Overview of ray, wave, and quantum principles of light; capabilities and limitations of various diagnostics. Propagation and imaging properties of lenses; interference phenomena; diffraction; light scattering; laser- and phase-Doppler anemometry; introduction to emission and absorption spectroscopy.

ME 8341. Thermal Conduction. (3 cr; QP–#; SP–#; A-F only)

ME 8343. Convective Heat Transfer. (3 cr; QP–#; SP–#; A-F only)
Heat transfer in fluids flowing around bodies, in tubes and ducts. Forced and natural convection. Laminar and turbulent flow regimes. Turbulent transport and modeling, high-speed flows, viscous dissipation, and variable property effects. Application to heat exchange devices. Convective mass transfer.

ME 8344. Boiling Heat Transfer and Two-Phase Flow. (3 cr; QP–#; SP–#; A-F only)
Phenomena pertaining to ebullient heat transfer and two-phase flow; superheat, nucleation, bubble characteristics and dynamics, nucleate boiling, interfacial transport, critical heat flux, dryout, film boiling: flow patterns in two-phase flow, void fraction, pressure drop.


ME 8346. Radiation Heat Transfer. (3 cr; QP–#; SP–#; A-F only) Fundamentals of processes and solution methods to selected radiation exchange problems. Specific applications include radiation exchange between surfaces, lighting, radiation transfer in semitransparent media, and in participating media.

ME 8361. Introduction to Plasma Technology. (3 cr; QP–#; SP–#; A-F only) Methods for characterizing thermal plasmas by modeling and diagnostics. Several plasma applications described in detail.

ME 8362. Advanced Plasma Technology. (3 cr; QP–#; SP–#; A-F only) Fundamentals of modern physics as they apply to understanding of thermal plasmas, including introduction to atomic theory, gaseous electronic, irreversible thermodynamics, plasma properties, and generation of plasmas.

ME 8381. Biobehav and Mass Transfer. (3 cr; SP–IT grad student, upper-division transport/fluids course; (physics, biology) recommended) Analytical/numerical tools to analyze heat/mass transfer phenomenon in cryobiological, hyperthermic, other biomedically relevant applications.

ME 8444. FTE. Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)

ME 8462. Turbomachinery. (3 cr; QP–#; SP–#; A-F only) Thermodynamic analysis of energy transfer between fluid and rotor; dimensional analysis; principles of axial, mixed, and radial flow pumps, fans, compressors, and turbines; cascade performance; computer flow simulations; applications to propulsion systems and power plants.

ME 8641. Statistical and Non-Equilibrium Thermodynamics. (3 cr; QP–#; SP–IT student; A-F only) Statistical approaches for calculating transport coefficients and deriving basic statistical laws. Statistical and probability theorems, kinetic gas theory, and distribution of molecular velocities; Boltzmann, Bose-Einstein, and Fermi-Dirac statistics and their applications. Chemical reactions and systems; irreversible thermodynamics.

ME 8646. Reacting Flows. (3 cr; SP–IT grad student or A-F only) Introduction to simple methods for thermophysical data estimation, principles/application of chemical kinetics, simulation of homogeneous/heterogeneous kinetics, including transport. These principles are applied to problems in combustion and materials processing (CVD, plasma processing) through computer exercises employing CHEMKIN suite of programs.

ME 8666. Doctoral Pre-Thesis Credits. (1-18 cr; max 60 cr; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)
Recent developments.

ME 8773. Graduate Seminar. (1 cr; SP–IT grad student; S-N only) Recent developments.

ME 8774. Graduate Seminar. (1 cr; SP–#; S-N only) Recent developments.

ME 8775. Technical Communication. (1 cr; S-N only) One-day workshop on preparing a seminar. Students deliver one-hour seminar on technical topic and attend nine other technical seminars.

ME 8777. Thesis Credits. Master’s. (1-18 cr; max 50 cr; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only]) Directed research.

ME 8800. Modern Developments in Mechanical Engineering. (1 cr; max 2 cr; SP–IT grad student; S-N only) Seminars on topics in engineering science of importance to mechanical engineers. Invited scholars deliver five-lecture series on each topic; two to five topics each semester.

ME 8888. Thesis Credits. Doctoral. (1-24 cr; max 100 cr; SP–Max 18 cr per semester or summer; 24 cr required)

Medc. Department of Medicinal Chemistry
Medc College of Pharmacy

Medc 5185. Principles of Biomolecular Simulation. (3 cr; QP–Chem 5521 or A-F only) Molecular simulation for students in medicinal chemistry, pharmacology, biochemistry, and chemical physics


Medc 5202. Research and Development Process of Pharmaceutical Products. (2 cr; S-N only) New drug development process in the U.S. pharmaceutical industry.

Medc 5245. Introduction to Drug Design. (3 cr; SP–Chem; A-F only) Concepts that govern design/discovery of drugs. Physical, biochemical, medicinal chemical principles applied to explain rational design, mechanism of action drugs.

Medc 5494. Advanced Methods in Quantitative Drug Analysis. (1-18 cr; max 60 cr; SP–Grad med chem major or A-F only) Quantitative methods (HPLC, GC, TLC, and immunoassays) for analysis of drugs and metabolites in biological fluids. Advanced techniques such as capillary electrophoresis, supercritical fluid chromatography, GC-MS, LC-MS, and tandem mass spectrometry. Chromatographic theory and statistical approaches to method validation.

Medc 5959. Vistas in Medicinal Chemistry Research. (1 cr; S-N only) Selected topics of contemporary interest in medicinal chemistry.

Medc 5600. General Principles of Medicinal Chemistry. (3 cr; QP–#; A-F only) General principles of drug receptors as therapeutic targets, drug-receptor interactions, enzyme inhibitors, drug metabolism and disposition.

Medc 8100. Medicinal Chemistry Seminar. (1 cr; max 6 cr; SP–#) Current topics.

Medc 8333. FTE. Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)

Medc 8444. FTE. Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)

Medc 8500. Design of Chemotherapeutic Agents. (2 cr; QP–#; SP–#; A-F only) Modern aspects of designing chemotherapeutic agents. Strategies for enzyme inhibition and metabolic blocks in development of anticancer, antiviral, and antiviral agents.

Medc 8600. Chemical Aspects of Drug Metabolism and Bioactivation. (2 cr; QP–#; SP–#; A-F only) Chemical and enzymatic mechanisms of biotransformation and bioactivation of drugs and other xenobiotics. Reactivity and fate of bioactivated metabolites.

Medc 8666. Doctoral Pre-Thesis Credits. (1-18 cr; max 50 cr; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

Medc 8700. Advanced Concepts in Drug Design. (2 cr; QP–#; SP–#; A-F only) Current approaches to rational design of drugs.

Medc 8760. Design of Peptidometrics. (2 cr; QP–#; SP–#; A-F only) Current approaches to design and synthesis of mimetics of biologically active peptides. Structural and conformational rationale used in peptidomimetic design.

Medc 8777. Thesis Credits. Master’s. (1-18 cr; max 50 cr; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Medc 8800. Medicinal Chemistry Laboratory Techniques. (1-2 cr; max 4 cr; SP–Grad med chem major or A-F only) Experiential rotations in medicinal chemistry research laboratories.

Medc 8888. Thesis Credits. Doctoral. (1-24 cr; max 100 cr; SP–Max 18 cr per semester or summer; 24 cr required)

Medc 8900. Research in Medicinal Chemistry. (1-4 cr; max 8 cr; SP–Grad med chem major or A-F only) Study and experimental investigation.
Medieval Studies (MeSt)

Center for Medieval Studies
College of Liberal Arts

MeSt 5610. Advanced Topics in Medieval Studies. (3-4 cr [max 15 cr]; SP—One yr work in some area of Middle Ages, reading knowledge of appropriate language, #) From late antiquity through the end of the Middle Ages (circa 300-1500 A.D.). Current topics specified in Class Schedule.

MeSt 5993. Directed Studies in Medieval Studies. (3 cr [max 6 cr]; SP—One yr work in some area of Middle Ages, reading knowledge of appropriate language, #) Directed study with one of the core faculty of medieval studies program.

MeSt 8010. Medieval Studies Colloquium. (1 cr [max 3 cr]; SP—#; S-N only) Lectures by and discussions with faculty and visiting speakers.

MeSt 8110. Seminar in Medieval Studies. (3-4 cr [max 48 cr]; SP—Appropriate languages, #; A-F only) Offered when feasible.

Microbiology, Immunology, and Cancer Biology (MICa)

Department of Microbiology
Medical School

MICa 5000. Practicum: Teaching. (1 cr [max 4 cr]; QP—MIMP grad major or #; SP—MIMP grad major or #; A-F only) Supervised experience in lab instruction: development of skills in effective use of instructional materials, tests and measurement.

MICa 8001. Integrated Topics in Microbiology, Immunology, and Molecular Pathobiology. (3 cr; SP—#; A-F only) Molecular, structural, and biochemical complexity of microbes; molecular mechanisms of disease; cell death and injury; adaptive immune responses, immunological tolerance.

MICa 8002. Structure, Function, and Genetics of Bacteria and Viruses. (4 cr; QP—Beginning biochem, cell biol, general microbi, micro, organic chem; SP—8001 or 8004 or 8003 or 8000 or #; A-F only) Structure, function, and metabolism of microorganisms; microbial genetics; molecular virology.

MICa 8003. Immunity and Immunopathology. (4 cr; QP—Path 8216, Path 8217, Path 8218, Biol 5001 or equiv, MiEB 5218; SP—8001 or #) Lymphocyte activation, signal transduction in lymphocytes, antigen receptor genetics, antigen presentation, lymphoid anatomy, adaptive immune responses to microbes, immunodeficiency, immunopathology, cytokines, transplantation, and autoimmune.

MICa 8004. Cellular and Molecular Pathobiology. (4 cr; QP—MiEB 5100, 5101) Molecular basis of inflammation and cancer metastasis to genetic basis for inherited disorders and gene therapy. Molecular mechanisms of pathogenesis.

MICa 8005. Topics in Microbiology, Immunology, and Molecular Pathobiology. (1-4 cr; SP—8001, two of 8002 or 8003 or 8004) Colloquium format with in-depth readings and discussion on a specialized topic.

MICa 8006. Protein Sequence Analysis. (3 cr; QP—Biochem course, knowledge of UNIX operating system recommended, SP—Biochem course, knowledge of UNIX operating system recommended) DNA and protein sequence and protein structure databases; protein sequence analysis; methods for display of sequence comparison and prediction results; Genetics Computer Group (GCG) sequence analysis programs; and current literature and research problems.

MICa 8007. Cell Biology and Biochemistry of the Extracellular Matrix. (3 cr; QP—MiEB 5100-5101 or equiv, Path 8108-8109-8110; SP—8002 or 8004 or #; A-F only) Concepts in cell adhesion and tissue composition and importance of cell adhesion in tissue function and disease. Topics range from structure/function assembly of tissue components to cellular adhesion mechanisms.

MICa 8008. Mammalian Gene Transfer and Expression. (2 cr; SP—#; A-F only) Current gene transfer technology. Applications of genetic modification in animals, particularly transgenic animals and human gene therapy.

MICa 8009. Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death. (2 cr; QP—Path 8108, undergraduate biochem, cell biol; SP—8004 or (BioC 3021, Biol 4004) or #) Aspects of mechanisms involved in growth control at level of nuclear function. Neoplasia in hormonal cancers (such as prostate cancer) and role of protein phosphorylation in normal and abnormal growth. Mechanisms of cell death via apoptosis and its implications in normal and abnormal proliferation.

MICa 8094. Research in Microbiology, Immunology, and Molecular Pathobiology. (1 cr [max 5 cr]; SP—Grad MicE major) First-yr students regis S-N, as they do not make a presentation; second-yr students regis A-F, as they present a seminar ) Student presentations of thesis research and presentations by invited speakers.

Microbial Engineering (MicE)

Graduate School

MicE 5309. Biocatalysis and Biodegradation. (3 cr; SP—Chem through organic chem, microbial or adv chem, knowledge of word proc, e-mail, WWW access; access to college level sci library recommended) Assessing validity of information on biocatalysis and biodegradation; fundamentals of microbial catabolic metabolism as it pertains to biodegradation of environmental pollutants; biocatalysis for specialty chemical synthesis; display of this information on the World Wide Web.

MicE 5355. Advanced Fermentation and Biocatalysis Laboratory. (3 cr; SP—BioI 3301 or MicE 3301, grad student in microbial engineering or upper-div major in [microbiology or chem engineering or biochemistry], #; A-F only) Methods in industrial microbiology, laboratory, and pilot scale fermentation/biocatalysis engineering. Laboratory experiments carried out in fermentation pilot plant. Operation of bench scale and pilot scale bioreactors, designing bioreactors, process optimization, process monitoring/control, scale-up experiments, experimental design, data analysis.

MicE 8333. FTE: Master’s. (1 cr; SP—Master’s student, adviser and DGS consent) MicE 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; SP—Max 18 cr per semester or summer; 10 cr total required (Plan A only))

MicE 8920. Teaching Practicum. (1 cr [max 4 cr]; SP—Grad MicE major) Supervised experience in classroom, laboratory, and/or recitation instruction; develops skills in effective use of instructional techniques, materials, tests, and measurements.

MicE 8990. Biotechnology Seminar. (1 cr [max 2 cr]; SP—First-yr students regis S-N, as they do not make a presentation; second-yr students regis A-F, as they present a seminar ) Student presentations of thesis research and presentations by invited speakers.

Microbiology (MicB)

Department of Microbiology
Medical School

MicB 5505. Microbiology and Immunology for Medical Students. (0-7 cr) Basic/clinical human immunology, medical microbiology. Molecular/cellular basis of immune responses, tolerance. Immunologic disease, serology, antimicrobial agents, chemotherapy. Basic/medical bacteriology, parasitology, mycology, virology. Unifying principles governing pathogenesis. Diseases are grouped with organisms important in differential diagnosis.

MicB 5352. Applied Microbial Biochemistry. (3 cr; QP—BioI 3301 or MicE 3301 or MicB 5321, BioI 3303/MicE 5105 or #; SP—Bioc 3352; Biol/BioI 3301 or BioI 4331 or MicI 4111, MicB 3301 or #) Biochemistry of microorganisms and enzymes of industrial interest. Heterologous peptide overproduction by microorganisms and yeasts; polymer, antibiotic, organic acid, and amino acid production; genetics of industrially useful microorganisms; biological systems useful for biotransformation and environmental remediation; introduction to fermentation technology.
and Literatures
MCDG 8333. FTE: Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)
MCDG 8444. FTE: Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)
MCDG 8666. Doctoral Pre-Thesis Credits. (1-18 cr [max 60 cr]; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)
MCDG 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])
MCDG 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required)

MCDG 8900. Student Research Seminar. (1 cr [max 10 cr]; SP–Grad MCDG major or ∆ S-N only)
Presentation and discussion of student thesis research.
MCDG 8910. Journal Presentations. (1 cr [max 2 cr]; SP–Grad MCDG major or ∆ S-N only)
Discussion of original scientific literature; for first-year graduate students.
MCDG 8920. Special Topics. (1-4 cr [max 8 cr]; SP–Grad MCDG major or A)

Molecular Veterinary Bioscience (MVB)

Department of Veterinary Pathobiology
College of Veterinary Medicine
MVB 5200. Introductory Statistical Genetics and Genomics. (4 cr; QP–Stat 3091 or equiv; [GCB 3022 or Biol 4004 or equiv]; A–F only)
Statistical issues in genomics. Gene detection, including statistical analysis/designs for linkage study and for mapping quantitative trait loci. Linkage analysis using pedigree data for codominant/dominant markers. Using radiation hybrid mapping/single cell typing. Design issues in linkage analysis, parentage testing, and marker polymorphism.
MVB 5594. Directed Research in Molecular Veterinary Biosciences. (1-4 cr [max 4 cr]; SP–3rd yr MVB grad student; A–F only)
Directed research determined by student’s interests, in consultation with faculty mentor.
MVB 8100. Research Rotation in Molecular Veterinary Biosciences. (4 cr [max 8 cr]; SP–1st yr MVB grad student; A–F only)
Directed research laboratory rotations. Experimentation, supplemental reading, research presentations under guidance of faculty member who is potential thesis adviser. Taught by program faculty.
MVB 8201. Mechanisms of Animal Health and Disease I. (3 cr; SP–1st yr MVB grad student or approval of course coordinator; A–F only)
MVB 8202. Mechanisms of Animal Health and Disease II. (3 cr; SP–8201)
Basic mechanisms of animal health; innate and acquired immunity; immune avoidance; cellular basis for pathogenesis of animal diseases; molecular and genetic mechanisms of host resistance; host/pathogen interactions.
MVB 8333. Molecular Biology Techniques. (3 cr; SP–Biol 5001, Biol 5003 or equiv or A–F only)
Basic theory and current methodologies of molecular biology and recombinant DNA technology. Lab work includes DNA and RNA hybridization, gene transfer, and polymerase chain reaction techniques. Primarily for students with limited exposure to molecular biology.
Courses

School of Music

College of Liberal Arts

Mus 5101. Piano Pedagogy I. (2 cr; SP–8 cr in MusA 1301 or MusA1401 or #) Demonstration and discussion of teaching techniques, methods, and materials for group and individual instruction at the elementary, early intermediate, and late intermediate levels.

Mus 5102. Piano Pedagogy II. (2 cr; SP–8 cr in MusA 1301 or MusA 1401 or #) Demonstration and discussion of teaching techniques, methods, and materials for group and individual instruction at the elementary, early intermediate, and late intermediate levels.

Mus 5111. Advanced Piano Pedagogy I. (2 cr; SP–5102 or grad piano major or #; A–F only) Demonstration and discussion of teaching techniques, methods, and materials for group and individual instruction at the intermediate and early advanced levels.

Mus 5112. Advanced Piano Pedagogy II. (2 cr; SP–5101 or grad piano major or #; A–F only) Demonstration and discussion of teaching techniques, methods, and materials for group and individual instruction at the intermediate and early advanced levels.

Mus 5120. Piano Pedagogy Practicum. (1 cr [max 4 cr]; SP–5101–5102 or 5111–5112 or #; A–F only) Supervised teaching of a piano pupil or group of pupils for one semester (minimum 12 weeks for one half-hour per week). Supervising instructor will assist with selection of materials, periodic consultation, and observation (live or video taped) of selected lessons.

Mus 5131. Advanced Keyboard Skills I. (2 cr; SP–3502 or grad; A–F only) Diatonic and chromatic harmony at the piano. Realization of figured basses of the 17th and 18th centuries. Performance of choral, orchestral, and chamber music of the 17th to 20th centuries, from open score using all clefs.

Mus 5132. Advanced Keyboard Skills II. (2 cr; SP–3502, sr or grad; A–F only) Diatonic and chromatic harmony at the piano. Realization of figured basses of the 17th and 18th centuries. Performance of choral, orchestral, and chamber music of the 17th to 20th centuries, from open score using all clefs.

Mus 5141. Piano Literature. (2 cr; SP–12 cr of MusA 1301 or MusA 1401 or #; A–F only) Introductory survey of representative keyboard literature from the Baroque to the mid-20th century. Study of typical forms, style features, technical issues, and performance practice for each period.

Mus 5150. Body Awareness in Activity: The Alexander Technique for Musicians. (2 cr [max 4 cr]) Alexander technique with specific applications to music performance. Emphasis on body/mind awareness to promote technical ease and freedom.

Mus 5151. Organ Literature I. (3 cr; SP–3502, 3603, sr or grad or #; A–F only) Organ literature from the 14th century to the mid-18th century. Influence of organ design of various periods and national schools on the literature and its performance.

Mus 5152. Organ Literature II. (3 cr; SP–3502, 3603, sr or grad or #; A–F only) Organ literature of J. S. Bach and of other 19th- and 20th-century composers. Influence of organ design of various periods and national schools on the literature and its performance.

Mus 5160. Instrumental Accompanying Skills and Repertoire. (2 cr; SP–Advanced major or #; A–F only) Performance class in accompanying skills particular to orchestral reductions and non-sonata instrumental accompanying. Repertoire to include, but not be limited to, classical and romantic string concertos, and “encore” pieces.

Mus 5170. Vocal Accompanying Skills and Repertoire. (2 cr [max 4 cr]; SP–French, German and Italian diction, accomp or grad vocal major; A–F only) Performance class (Lieder, melodic, opera) with emphasis on coaching techniques and performance skills of pianists and singers.

Mus 5181. Advanced Piano Literature I. (2 cr; SP–grad piano maj or #; A–F only) Literature for piano from late Baroque period to mid-20th century.

Mus 5182. Advanced Piano Literature II. (2 cr; SP–grad piano major or #; A–F only) Literature for piano from late Baroque period to mid-20th century.

Mus 5230. Chorus. (1 cr [max 8 cr]; SP–Choral and/or instrumental music background; audition, #) University Women’s Chorus, Concert Choir and Choral Union. Choruses participate in a variety of programs exploring both Western and non-Western repertoire from the Middle Ages through the 20th century. Concerts include touring, and collaborative campus and community performances.

Mus 5240. Chamber Singers. (1 cr [max 8 cr]; SP–Audition, #; A–F only) Mixed chorus of about 24 voices. Performances each semester of works for small choirs.

Mus 5241. Vocal Literature I. (3 cr; SP–12 cr in MusA 1304, grad music student or #; A–F only) Vocal literature of major/minor composers from 17th century to present. Structure, style, performance practice.

Mus 5242. Vocal Literature II. (2 cr; SP–12 cr in MusA 1104 or MusA 1304, grad music major or #; A–F only) Vocal literature of major/minor composers from 18th century to present; structure, style, and performance practice.

Mus 5250. Opera Workshop and Ensemble. (1 cr [max 8 cr]; SP–Audition; #; A–F only) Preparation and performance of operatic arias, choruses, and scenes. Participation in fully staged or workshop productions of music theatre repertoire.

Mus 5260. Stage Movement and Acting for Singers. (1 cr [max 4 cr]; SP–Audition; #; SP–Audition; #; A–F only) Basic techniques of stage movement and acting styles, application to various forms of music theatre.

Mus 5270. Voice Practicum. (1 cr [max 2 cr]; SP–Undergrad sr vocal major or #) Teaching voice class or individual students with peer and faculty feedback. Assist in class voice instruction or teach two students weekly in conjunction with two one-hour observation labs. May be taken for two semesters.

Mus 5271. Diction for Singers I. (2 cr; SP–12 cr of MusA 1304 or grad music major or #; A–F only) Principles and techniques of singing in English, Italian, Spanish, German, and French. International Phonetic Association alphabet used.

Mus 5272. Diction for Singers II. (2 cr; SP–12 cr of MusA 1304 or grad music major or #; A–F only) Principles and techniques of singing in English, Italian, Spanish, German, and French. International Phonetic Association alphabet used.

Mus 5275. Vocal Pedagogy I. (3 cr; SP–Sr vocal major or #) Advanced study of mind/body preparations for singing, anatomy, and physiology of the vocal mechanism. Voice use and care, historical and comparative pedagogy, learning theories, models and guidelines for teaching, instructional techniques, and diagnosing and solving vocal problems.

Mus 5276. Vocal Pedagogy II. (2 cr; SP–Sr vocal major or #; A–F only) History of solo vocal performance; selection and preparation of beginning level solo vocal repertoire; development of vocal performance skills (interpretation, expression, artistry), recital preparation, and vocal career counseling.

Mus 5277. Vocal Workshop. (1 cr; SP–Music major or #; A–F only) Short term vocal workshops address specific topics including voice science, pedagogy, and performance of vocal repertoire. One workshop focuses on class voice instruction.

Mus 5279. Group Voice: Performance/Pedagogy. (2 cr; SP–Performance only track: 2 cr per sem; performance/pedagogy track 3 cr per sem; upper div student or grad student); #; A–F only) Foundations/fundamentals of speech/singing. Vocal production, anatomy, physiology, terminology. Application of vocal techniques in learning/performing repertoire. Teaching methods, including voice/motion exercises.

Mus 5280. Opera Theatre. (2 cr [max 16 cr]; SP–Audition; #; A–F only) Preparation and performance of fully-staged operatic production. Major involvement in singing, acting, and technical aspects of opera.

Mus 5283. Choral Conducting Technique. (1 cr; SP–#; A–F only) Choral conducting, rehearsal techniques, interpretation of music.

Mus 5284. Choral Conducting I: Gregorian Chant Through Baroque Era. (3 cr; SP–#; A–F only) Techniques and rehearsal procedures. Focus on music before 1750 including works by Lassus, Schutz, Bach, and Handel.

Mus 5285. Choral Conducting II: Classical Era to the Present. (3 cr; SP–#; A–F only) Technique and rehearsal procedures. Focus on music after 1750 including works by Mozart, Haydn, Beethoven, Mendelssohn, Brahms, and Stravinsky.

Mus 5300. Jazz Rhythm Section Techniques. (1 cr [max 8 cr]; SP–#; A–F only) Study and function of instruments in the jazz rhythm section. Bass line construction, voicings for piano and guitar, and style patterns for percussion.

Mus 5336. Jazz Arranging. (3 cr; SP–3502 or #; A–F only) Beginning techniques of arranging for jazz combo and jazz ensemble; vocal and instrumental.

Mus 5340. Jazz Ensemble. (1 cr [max 6 cr]; SP–Audition; #; A–F only) A 20-member performing organization covering significant jazz compositions and arrangements written specifically for this medium.

Mus 5341. Jazz Pedagogy. (2 cr; SP–#; A–F only) Teaching methods of vocal and instrumental jazz improvisation, basic arranging techniques, and jazz history; bibliographies and materials.

Mus 5342. Jazz Theory. (2 cr; SP–3502 or #; A–F only) Beginning techniques for basic chord construction, extended chords, and nomenclature in jazz idiom.

Mus 5390. Jazz Singers. (1 cr [max 10 cr]; SP–Audition; #; A–F only) Study and performance of representative vocal jazz literature.

Mus 5410. University Wind Bands. (1 cr [max 8 cr]; SP–Audition; #; A–F only) Wind ensemble and symphony bands perform standard and contemporary literature; concerts and tour appearances. Players from all colleges may participate.
Mus 5415. Literature for Band and Wind Ensemble. (2 cr; A-F only)
Ensemble literature for winds and percussion; analysis and study of repertoire from classical period to the present.
Mus 5420. Orchestra. (1 cr; max 8 cr; SP—Audition; #; A-F only)
Symphony orchestra performs standard repertory and major works with chorus; concerts and tour appearances. Players from all colleges may participate.
Mus 5421. Suzuki Violin Pedagogy I. (2 cr; SP—Violin major or #; A-F only)
Philosophy and teaching techniques of Japanese pedagogue Shinichi Suzuki and their applications in Western culture. Discussion, playing experience, and observation of children’s lessons in the MacPhail Center Suzuki Program.
Mus 5422. Suzuki Violin Pedagogy II. (2 cr; SP—5421 or #; A-F only)
Philosophy and teaching techniques of Japanese pedagogue Shinichi Suzuki and their applications in Western culture. Discussion, playing experience, and observation of children’s lessons in the MacPhail Center Suzuki Program.
Mus 5423. Suzuki Pedagogy Practicum. (1 cr; max 1 cr; SP—[5424 or 5425], grad music student) or #; A-F only)
Supervised teaching of both individual and group lessons. Instructor provides periodic critiques from observation of live or videotaped lessons.
Mus 5424. Advanced Suzuki Violin Pedagogy I. (2 cr; SP—5422 or #; A-F only)
Intensive examination of Suzuki techniques for intermediate and advanced violin students in Western society. Discussion, playing experience, observation of children’s lessons in the MacPhail Center Suzuki Program, and practical teaching experience.
Mus 5425. Advanced Suzuki Violin Pedagogy II. (2 cr; SP—5424 or #; A-F only)
Intensive examination of Suzuki techniques for intermediate and advanced violin students in Western society. Discussion, playing experience, observation of children’s lessons in the MacPhail Center Suzuki Program, and practical teaching experience.
Mus 5426. Final Project in Suzuki Pedagogy. (1 cr; SP—Grad music student in Violin Performance and Suzuki Program Program; A-F only)
Research project.
Mus 5427. Violin Pedagogy I. (2 cr; SP—Violin or viola major or #; A-F only)
Private teaching of violin students at beginning, intermediate, and advanced levels. Discussion and demonstrations of pedagogical techniques.
Mus 5428. Violin Pedagogy II. (2 cr; SP—Violin or viola major or #; A-F only)
Private teaching of violin students at beginning, intermediate, and advanced levels. Discussion and demonstrations of pedagogical techniques.
Mus 5430. Concerto Grosso Ensemble. (1 cr; max 8 cr; SP—Audition, #; A-F only)
Study and performance of string orchestra and small chamber ensemble literature.
Mus 5440. Chamber Ensemble. (1 cr; max 8 cr; SP—Audition; #; A-F only)
Performance of chamber music; duos, trios, quartets, quintets, and other ensemble combinations for instruments and/or voices.
Mus 5450. Orchestral Repertoire. (1 cr; max 3 cr; SP—#; A-F only)
Investigation of practical and performance problems in standard orchestral repertoire with regard to style and interpretation.
Mus 5464. Cello Pedagogy. (2 cr; A-F only)
Concentration study of cello teaching methods. Provides students with the strategies for teaching cello privately, develops analytical skills, and increases knowledge of cello repertoire. For practical application in conjunction with string technique course.
Mus 5466. Guitar Pedagogy. (2 cr; SP—Guitar principal or major or #; A-F only)
Historical survey of methods and etudes from late 18th century to present, reflecting variety of content and approach. Works by Aguado, Sor, Giuliani, Tarrega, Segovia, Carlevaro, Duncan, Izraola, Dodgson, and Brindle.
Mus 5470. Woodwind Chamber Ensemble. (1 cr; max 8 cr; SP—Audition; #; A-F only)
Chamber music performance using homogeneous or mixed combinations of woodwind instruments.
Mus 5471. Woodwind Literature and Pedagogy I. (3 cr; SP—Music major or #; A-F only)
A study of the major teaching materials for the five woodwind instruments including methods, duets, and solos used primarily for pedagogical reasons.
Mus 5472. Woodwind Literature and Pedagogy II. (3 cr; SP—Music major or #; A-F only)
A study of chamber music involving one or more woodwind instruments. May include additional instruments such as piano, strings, and/or voice.
Mus 5473. History and Acoustics of Single Reed Instruments. (2 cr; SP—Music major or #; A-F only)
Study of clarinet and saxophone history and literature, mechanical design and development, acoustics, modern schools of performance, selected teaching and performance techniques.
Mus 5480. University Brass Choir. (1 cr; max 8 cr; SP—Audition; #)
The University Brass Choir is an ensemble of 16 brass and percussion players exploring unique literature that spans 400 years. From the rich antiphonal music of Giovanni Gabrieli (1557-1612) to the works of the 20th century. The Brass Choir performs in Twin Cities churches and concert halls.
Mus 5481. Trumpet Pedagogy. (2 cr; SP—Sr or grad in music or #)
Principles of trumpet pedagogy. Discussion of literature, history, and current teaching aids.
Mus 5485. Transcription for Winds. (2 cr; SP—3502 or #)
Principles of music manuscript and examination of transcription examples. Transcription projects with score and parts. Smaller projects that involve arrangements and original compositions.
Mus 5490. Percussion Ensemble. (1 cr; max 10 cr; SP—#; A-F only)
Practice and performance of standard and contemporary compositions for percussion instruments in various combinations.
Mus 5491. Percussion Literature I. (2 cr; SP—Jr or Sr or grad or #; A-F only)
Repertoire derived from orchestral and band literature for solo drum, timpani, mallet instruments, and various percussion accessories. Major works of the 20th century written for solo percussion, percussion ensemble, and chamber groups of percussion and non-percussion instruments.
Mus 5492. Percussion Literature II. (2 cr; SP—Jr or Sr or grad or #; A-F only)
Repertoire derived from orchestral and band literature for solo drum, timpani, mallet instruments, and various percussion accessories. Major works of the 20th century written for solo percussion, percussion ensemble, and chamber groups of percussion and non-percussion instruments.
Mus 5501. Intensive Theory and Analysis of 20th-Century Music. (4 cr; SP—3505 or #; A-F only)
Designed for music majors only, the course is comprised of an intensive introduction to the theory and analysis of art music in various styles developed during the 20th century.
Mus 5533. Music Since 1945. (3 cr; SP—3502; #; A-F only)
Examines principal techniques of music composed since 1945. Integral serialism, sound mass, electronic music, indeterminacy, improvisation, and minimalism in the works of Babbitt, Ligeti, Davidovsky, Oliveros, Cage, Riley, and Reich.
Mus 5541. Counterpoint I. (3 cr; SP—3501, 3511 or #; A-F only)
Practice writing in polyphonic styles of Renaissance and Baroque; species counterpoint, canonic and fugal, and other imitative procedures. Study representative forms: motets, inventions, fugues, and chorale-based idioms. Analysis of works by Lassus, Palestrina, Victoria, Purcell, Buxtehude, Fischer, and Bach.
Mus 5542. Counterpoint II. (4 cr; SP—5541; A-F only)
Advanced writing in three and more voice polyphonic styles of Renaissance and Baroque. Analyze works of such composers as Lassus, Palestrina, and Bach; emphasis on canonic and fugal procedures.
Mus 5550. Composition. (2 cr; max 8 cr; SP—3502 or equiv; 3551 or grad; #; A-F only)
Original works in various forms. Development of individual compositional style in a post-tonal idiom. Exploration of a variety of forms, performing forces, and techniques.
Mus 5561. Orchestration I. (3 cr; SP—3502; A-F only)
Scoring techniques for ensembles in combination and full orchestra; year-long sequence. Score study of representative works from 18th through 20th centuries.
Mus 5562. Orchestration II. (3 cr; SP—5561; A-F only)
Scoring techniques for ensembles in combination and full orchestra; year-long sequence. Score study of representative works from 18th through 20th centuries.
Mus 5571. Schenkerian Analysis for Performers. (3 cr; SP—3502; A-F only)
Theorization of tonal music using principles developed by Henrich Schenker. Basic concepts/notation, their application to excerpts/short pieces from 18th/19th centuries.
Mus 5572. Chromaticism in Tonal Music. (3 cr; SP—3502)
Exploration of chromatic tonal practices through analysis of selected repertoire, completion of written exercises (figured bass, harmonization of melodies, model composition), ear-training, and keyboard exercises.
Mus 5591. Electronic Music: History, Literature, Principles. (3 cr; SP—#; A-F only)
Mus 5592. Digital Music Synthesis and Processing Techniques. (3 cr; SP—5591 or #; A-F only)
Study of specific DSP topics such as filtering, formant synthesis, reverberation techniques, and additive synthesis. Work with interactive MIDI applications.
Mus 5597. Music and Text. (3 cr; SP—3502; A-F only)
Designed for music majors only, this course gives an introduction to the analysis of music with texts such as art song and opera.
Mus 5611. Resources for Music Research. (3 cr; SP—3603; A-F only)
Development of skills in identifying, locating, and evaluating resources for research in music. Computer-searching techniques, acquaintance with basic reference sources in the field, preparation of the music research paper.
Mus 5620. Topics in Opera History. (3 cr; max 6 cr; SP—grad music major or #; A-F only)
Through the study of specific operas, students will examine the ways in which intersections of geography, politics, and musical style influenced and perpetuated operatic production within specific geographical and chronological boundaries. Periods/countries will vary each semester.
Courses

Mus 5644. Music in 20th-Century American Culture. (3 cr; SP–5601, 5001 or #; A-F only) Stylistic and cultural bases of cultivated and vernacular traditions and their intersections. Topics include folk and ethnic musics, ragtime, city blues and jazz, rock and roll, theater, impact of technology, modernism, nationalism, new accessibility.

Mus 5547. 20th-Century European/American Music. (3 cr; SP–3603 or equiv, 5501 or equiv, 12 undergrad cr in music history) Emphasizes major artistic movements, stylistic turning points, social roles of music. Interactions between high art, popular, ethnic musics; contributions of men and woman as composers and performers.

Mus 5658. History of the Symphony in the 20th Century. (3 cr; SP–3603, 5501 or #; A-F only) History of symphony (and related genres) in Europe and America. ca. 1890 to present. Changing aesthetic concerns, structural, harmonic, and timbral innovations. Sociocultural contexts; analysis and criticism.

Mus 5666. Stravinsky. (3 cr; SP–5502, 12 cr music history; A-F only) Analysis and criticism of representative works; aesthetic concerns as expressed in writings of Stravinsky and others; influence upon European and American composers; biographical issues and contributions to artistic life, particularly the ballet.

Mus 5668. Beethoven’s Symphonies. (3 cr; SP–3603, #; A-F only) Analytical overview of selected movements from Beethoven’s 9 symphonies. Principles of sonata analysis (norm and deformation): introduction to wider contexts of interpretation and understanding (generic, expressive, social).

Mus 5804. Folk and Traditional Musics: Selected Cultures of the World. (3 cr; SP–1801 or 1804 or music grad or #; A-F only) A study of selected music traditions from 5 to 7 world cultures. Genres, social institutions, concepts, styles, instruments, and usages.

Mus 5950. Topics in Music. [1-4 cr (max 15 cr)] Each offering focuses on a single topic. Topics specified in Class Schedule.

Mus 5993. Directed Studies. [1-4 cr (max 12 cr); SP–#; A-F, J, SJ] Guided individual reading or study.

Mus 8110. Sonata Seminar. (2 cr [max 8 cr]; SP–#) Preparation and performance of choral conducting recital, with supporting paper.

Mus 8255. Choral Literature: Baroque Era to the Present. (3 cr; SP–#; A-F only) Seminar in choral and choral/orchestral scores at piano, including scores with C clefs and transposing instrument.

Mus 8550. Composition. (3 cr; SP–#; A-F only) Creation of original musical works in various instrumental and vocal forms; advanced development of writing and realization of musical ideas.

Mus 8560. Readings in Music Theory. (3 cr; SP–#; A-F only) Reading of standard theorectical text or group of intersected texts. Pre-tonal, tonal, post-tonal, or non-Western focus in individual offerings.

Mus 8565. Text Setting. (3 cr; SP–Emphasis in composition or choral conducting or voice or accompanying or music education; A-F only) Techniques for many mediums (from jingle to art song to choral settings) through analysis of repertoire and original compositions. Emphasizes sense and sound aspects of language, nature of specific text, and special considerations in writing creatively for voice.

Mus 8570. Seminar in Composition. (2 cr [max 4 cr]; SP–Composition emphasis or #; A-F only) Aesthetic and professional issues in composition. Survey of professional activities, including r[e]sum[e] and grant writing and concert production.

Mus 8571. Composers’ Laboratory. (3 cr; SP–#; A-F only) Preparing original music composition to specification for possible radio/TV/theatre/film use. Analytic projects based on research into current practice of music criticism/music journalism. Philosophical and sociological research into creative process.

Mus 8575. Women Composers. (3 cr; SP–#; A-F only) Contributions by women composers to development of European-American art music, primarily from 17th through 20th centuries. Historical and current issues affecting women’s access to professional music sphere. Music analysis, listening list, research, and performance components.

Mus 8580. Topics in Tonal Analysis. (3 cr; SP–#; A-F only) Seminar. Sample topics: string quartets of Beethoven, chamber music of Brahms, and significant works by other tonal composers.

Mus 8581. Schenkerian Theory and Analysis. (1-3 cr; SP–#; A-F only) Analysis and critical readings pertaining to theory of tonal music developed by Heinrich Schenker. Application of his method to representative repertoire from 18th and 19th centuries. Contrapuntal writing modeled after presentation in Schenker’s [Counterpoint].

Mus 8582. Schenkerian Theory and Analysis II. (1-3 cr; SP–#; A-F only) Application of Schenkerian theory to 18th-century music, coordinated with critical study of major music treaties from that era.
Mus 8583. Schenkerian Theory and Analysis III: 19th Century. (3 cr; SP–8581 or #; A-F only).
Application of Schenkerian theory to music from 19th century, coordinated with critical study of major music treatises from that era.

Mus 8590. Topics in 20th-Century Analysis. (3 cr [max 12 cr]; SP–Grad music major; #; A-F only)
Seminar explores literatures of 20th-century art music.

Mus 8631. Seminar: Music in Medieval Europe. (3 cr; SP–Undergrad music degree; A-F only)
Selected genres of polyphonic and monophonic music, 9th-14th centuries, for analysis and cultural criticism. Social roles of music and performance traditions; current musicological issues.

Mus 8632. Seminar: Music in Early Modern Europe. (3 cr; SP–Undergrad music degree; A-F only)
Transformation of chanson, madrigal, mass, and motet from 1400 to 1580. Analysis and cultural criticism; social roles of music and performance traditions; current musicological issues.

Mus 8640. Seminar in Musicology. (3 cr [max 12 cr]; SP–Audition, instruction and the prerequisites are (2-4 cr [max 24 cr]; A-F only). Topics vary; readings, research, strategies, and methods.

Mus 8644. Seminar: Advanced Research in Historical Musicology. (3 cr; SP–Audition, instruction and the prerequisites are (2-4 cr [max 24 cr]; A-F only)
Major reference and research materials in musicology and related disciplines, including databases. Historical methods and historiography. Locating and interpreting primary sources of music and archival documents. Developing research strategies for degree papers and theses. Forms of documentation and historical writing.

Mus 8645. Current Musicology: Readings. (3 cr; SP–Audition, instruction and the prerequisites are (2-4 cr [max 48 cr]; A-F only).
Readings and topics in recent scholarly and analytical work.

Mus 8647. Seminar: The Critical Editing of Early Music—Method and Practice. (3 cr; SP–Undergrad music degree; A-F only)
Preparation of critical editions from primary sources of vocal and instrumental music (partbooks and tablatures). Nature of musical sources, both manuscripts and prints. Stemmatic filiation, editorial judgment and method, presentation of text.

Mus 8651. Sonata Theory. (3 cr; SP–Audition, instruction and the prerequisites are (2-4 cr [max 8 cr]; A-F only)
Principles of the classic sonata: norms, types, and deformations. Structural analysis, analytical methodologies, and fundamentals of sonata hermeneutics.

Mus 8666. Doctoral Pre-Thesis Credits. (1-18 cr [max 60 cr]; SP–Grad student who has not passed prelim oral)
Mus 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required (Plan A only))

Mus 8864. Current Issues in Ethnomusicology. (3 cr; SP–Audition, instruction and the prerequisites are (2-4 cr [max 48 cr]; A-F only)

Mus 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required)

Mus 8994. Directed Research. (1-3 cr [max 12 cr]; SP–Audition, instruction and the prerequisites are (2-4 cr [max 20 cr]; A-F only)
Directed research.

Mus 8999. Recital Credits: Doctoral. (4 cr [max 20 cr]; SP–D.M.A. student; A-F only)
Registration for recital credits coincides with performance of D.M.A. recital (five recitals for 20 credits).

Music Applied (MusA)

School of Music

College of Liberal Arts

Note: MusA 5101 through MusA 5123 are private instruction and the prerequisites are (2 cr [max 8 cr]; SP–Audition, A-F only).

MusA 5101. Piano—Elective.
MusA 5102. Harpsichord—Elective.
MusA 5103. Organ—Elective.
MusA 5104. Voice—Elective.
MusA 5105. Violin—Elective.
MusA 5106. Viola—Elective.
MusA 5107. Cello—Elective.
MusA 5109. Flute—Elective.
MusA 5111. Oboe—Elective.
MusA 5112. Clarinet—Elective.
MusA 5113. Saxophone—Elective.
MusA 5114. Bassoon—Elective.
MusA 5115. French Horn—Elective.
MusA 5116. Trumpet—Elective.
MusA 5117. Trombone—Elective.
MusA 5118. Euphonium—Elective.
MusA 5119. Tuba—Elective.
MusA 5121. Percussion—Elective.
MusA 5122. Harp—Elective.
MusA 5123. Guitar—Elective.

Note: MusA 5401 through MusA 5424 are private instruction and the prerequisites are (2-4 cr [max 8 cr]; SP–Audition, A-F only).

MusA 5401. Piano—Beyond Requirement.
MusA 5402. Harpsichord—Beyond Requirement.
MusA 5403. Organ—Beyond Requirement.
MusA 5404. Voice—Beyond Requirement.
MusA 5405. Violin—Beyond Requirement.
MusA 5406. Viola—Beyond Requirement.
MusA 5407. Cello—Beyond Requirement.
MusA 5408. Double Bass—Beyond Requirement.
MusA 5409. Flute—Beyond Requirement.
MusA 5411. Oboe—Beyond Requirement.
MusA 5412. Clarinet—Beyond Requirement.
MusA 5413. Saxophone—Beyond Requirement.
MusA 5414. Bassoon—Beyond Requirement.
MusA 5415. French Horn—Beyond Requirement.
MusA 5416. Trumpet—Beyond Requirement.
MusA 5417. Trombone—Beyond Requirement.
MusA 5418. Baritone—Beyond Requirement.
MusA 5419. Tuba—Beyond Requirement.
MusA 5421. Percussion—Beyond Requirement.
MusA 5422. Harp—Beyond Requirement.
MusA 5423. Guitar—Beyond Requirement.

MusA 8301. Piano—Major.
MusA 8302. Harpsichord—Major.
MusA 8303. Organ—Major.
MusA 8304. Voice—Major.
MusA 8305. Violin—Major.
MusA 8306. Viola—Major.
MusA 8307. Cello—Major.
MusA 8309. Flute—Major.
MusA 8311. Oboe—Major.
MusA 8312. Clarinet—Major.
MusA 8313. Saxophone—Major.
MusA 8314. Bassoon—Major.
MusA 8315. French Horn—Major.
MusA 8316. Trumpet—Major.
MusA 8317. Trombone—Major.
MusA 8318. Euphonium—Major.
MusA 8319. Tuba—Major.
MusA 8321. Percussion—Major.
MusA 8322. Harp—Major.
MusA 8323. Guitar—Major.
MusA 8324. Accompanying/Coaching.

Note: MusA 8501 through MusA 8524 are private instruction and the prerequisites are (2-4 cr [max 8 cr]; SP–Audition, A-F only).

MusA 8501. Piano—Beyond Requirement.
MusA 8502. Harpsichord—Beyond Requirement.
MusA 8503. Organ—Beyond Requirement.
MusA 8501. Piano—Beyond Requirement.
MusA 8502. Harpsichord—Beyond Requirement.
MusA 8503. Organ—Beyond Requirement.
MusA 8504. Voice—Beyond Requirement.
MusA 8505. Violin—Beyond Requirement.
MusA 8506. Viola—Beyond Requirement.
MusA 8507. Cello—Beyond Requirement.
MusA 8508. Double Bass—Beyond Requirement.
MusA 8509. Flute—Beyond Requirement.
MusA 8511. Oboe—Beyond Requirement.
MusA 8512. Clarinet—Beyond Requirement.
MusA 8513. Saxophone—Beyond Requirement.
MusA 8514. Bassoon—Beyond Requirement.
MusA 8515. French Horn—Beyond Requirement.
MusA 8516. Trumpet—Beyond Requirement.
MusA 8517. Trombone—Beyond Requirement.
MusA 8518. Euphonium—Beyond Requirement.
MusA 8519. Tuba—Beyond Requirement.
MusA 8521. Percussion—Beyond Requirement.
MusA 8522. Harp—Beyond Requirement.
MusA 8523. Guitar—Beyond Requirement.
MusA 8524. Accompanying/Coaching—Beyond Requirement.
Music Education (MuEd)

School of Music
College of Liberal Arts

MuEd 5011. Music in the Elementary Classroom Curriculum. (2 cr; SP–Music 1001, elem ed major grad) Overview of the fundamentals of music, methods, and materials for incorporating singing, rhythmic activities, classroom instruments, movement, listening, appreciation, and creation into the context of classroom curriculum.

MuEd 5112. Research in Music Education: Techniques. (3 cr; SP–Grad music ed major or #; A-F only) Methods and techniques employed in investigating and reporting music education problems; proposal development; bibliographic skills involved in conducting a significant review of related research.

MuEd 5115. Research in Music Education: Measurement. (3 cr; A-F only) Assessment of music behaviors, including test design, interpretation of test results, and evaluation and reporting of student achievement; published tests in music as measures of assessment and measurement in the classroom and in research.

MuEd 5211. Foundations of Music Education. (3 cr; A-F only) An overview of the historical, philosophical, and psychological foundations of music education.

MuEd 5313. Youth Music: Preferences, Influences, and Uses. (2 cr; A-F only) Youth music preferences and their determinants; how music influences youth behavior; students’ and teachers’ uses of commercial styles. Particularly appropriate for educators and parents.

MuEd 5433. Techniques and Materials: Choral Ensembles. (2 cr; SP–Music or music ed major or #; A-F only) Research and literature on vocal and choral music education; chorale curriculum issues; repertoire selection; rehearsal techniques.

MuEd 5606. Movement-Based Methods for Music Education. (2 cr; SP–Music or music ed major or #; A-F only) Participation in movement activities; study of Dalcroze philosophy and techniques; applications of movement to music education; examination of research.

MuEd 5611. Teaching Music With Related Arts. (2 cr; A-F only) Methods and materials for teaching music in cultural context including other art forms.

MuEd 5647. Teaching the Percussion Instruments. (2 cr; A-F only) Contemporary approaches for teaching percussion in the schools; development of curricular materials and practice in performance techniques.

MuEd 5655. New Dimensions in Music Education. (2 cr; A-F only) Analysis of recent curricular trends and current issues.

MuEd 5664. Teaching Music on the Internet. (3 cr; A-F only) Home page development techniques, investigation of software and materials, audio and video utilities, and research applications.

MuEd 5667. Computer-Based Music Instruction. (3 cr; SP–Music or music ed major or #; A-F only) Design and development of computer applications for the music classroom. Creating interactive audio and video presentations for music theory, ear training, composition, analysis, music history, and appreciation.

MuEd 5668. Computerized Music Notation. (3 cr [max 6 cr]) Fundamentals of music notation and printing utilizing the computer, MIDI keyboards, and Finale software program. Preparation of instrumental and vocal scores, part extraction and page layout. Basic techniques for sequencing and transcription.

MuEd 5750. Topics in Music Education. (1-4 cr [max 8 cr]; A-F only) Each offering focuses on a single topic. Topics specified in Class Schedule.

MuEd 5991. Independent Study. (1-4 cr [max 8 cr]; SP–Music ed major or #, #; A-F only) Independent study project organized by the student in consultation with the appropriate instructor.

MuEd 8281. Seminar: Philosophical Issues. (3 cr; SP–Master’s degree in music or music ed or #; A-F only) Issues in philosophical foundations of music education. Required for doctoral students with music education emphasis.

MuEd 8282. Seminar: Historical Issues. (3 cr; SP–Master’s degree in music or music ed or #; A-F only) Issues in historical foundations of music education. Required for doctoral students with music education emphasis.

MuEd 8283. Seminar: Psychological Issues. (3 cr; SP–Master’s degree in music or music ed or #; A-F only) Issues in psychological foundations of music education.

MuEd 8284. Seminar: Research and Scholarly Issues. (3 cr; SP–Ph.D student in music ed or #; A-F only) Scholarly and professional expectations of music educators and music therapists in academia and other positions of leadership; writing for a variety of professional purposes and publications.

MuEd 8333. FTE Master’s. (1-2 cr; SP–Master’s student, advisor and DGS consent) Individual Plan B projects.

MuEd 8994. Directed Research. (1-8 cr [max 8 cr]; SP–#; A-F only) One-semester research project directed by a faculty member.

Natural Resources and Environmental Studies (NRES)

NRES 5000. Colloquium: Natural Resources and Environmental Studies. (1 cr [max 6 cr]; A-F only) Lectures from experts. Readings/discussion of current environmental topics/issues. Topics vary. Meets with 3000.

NRES 5001. Colloquium: Perspectives on Treaty Rights. (2 cr [max 4 cr]) Readings, class discussion about treaty rights reserved by indigenous Americans with respect to use of natural resources. Emphasizes Midwest issues. Web-assisted course. Meets with 3001.


NRES 5202. Social Change: Dispute Resolution, Leadership, and Partnerships. (3 cr; SP–Grad student or #; SP–#3011; A-F only) Philosophy, art, science, practice of leadership; its relationship to management, environmental ethics. Leadership models, traits, behaviors, style, group process. Development of personal leadership philosophy.

NRES 5241. Natural Resource Policy and Administration. (3 cr; SP–[APeC 1101 or Econ 1101], grad student or #; SP–#3241; [APeC 1101 or Econ 1101], grad student or #) Basic concepts of political/administrative processes for natural resource policy and program development. Policy process, participants in policy development and in public programs. Case studies.

NRES 5245. Recreation Policy and Landscape-Level Planning. (3 cr; SP–Grad student or #; SP–#3245; grad student or #; A-F only) Broad themes of recreational land-use policy/planning in the United States. Selected historical/contemporary policy issues. Policy as product of social conflict over use of public resources. Landscape-level planning as means to implement policy, resolve social conflict.

NRES 5261. Economics and Natural Resources Management. (3 cr; SP–APeC 1101 or Econ 1101, grad student or #; SP–#3261; APeC 1101 or Econ 1101, grad student or #; A-F only) Economic concepts/tools for natural resources management. Financial/economic valuation, assessment methods, links to planning/management. Cash flow analysis, benefit cost analysis methods/examples.


NRES 5480. Topics in Natural Resources. (1-4 cr [max 6 cr]; SP–Sr or grad student) Lectures by visiting scholar or regular staff member. Topics specified in Class Schedule.

NRES 5575. Wetlands Conservation. (3 cr; SP–Sr or grad student or #; SP–#3575; sr or grad student or #) Freshwater wetland classification, wetland biota, current/historic status of wetlands, value of wetlands. National, regional, Minnesota wetlands conservation strategies. Ecological principles used in wetland management.

NRES 5703. Agroforestry: Role in Watershed Management. (2 cr) Agroforestry practices, what they are, their purpose. Production/watershed protection benefits derived from such practices. Role of agroforestry in sustainable development. Agroforestry examples/case studies presented from North America, developing countries.

Neuroscience (NSc)

College of Biological Sciences

NSc 5031. Perception. (3 cr; SP–Psy 3031 or Psy 3051 or #; SP–Psy 3031 or Psy 3051 or #) Cognitive, computational, and neuroscience perspectives on visual perception. Topics include color vision, pattern vision, image formation in the eye, object recognition, reading, and impaired vision.

NSc 5034. Psychobiology of Vision. (3 cr; SP–Psy 3031 or grad student or #; SP–Psy 3031 or #) Analysis of the properties and biological bases of visual perception in humans and animals. Emphasis on color vision, visual sensitivity and adaptation, nerve cells and circuits in the eye, structure and function of the visual brain.
Courses

Neuroscience (NSc) Department of Neuroscience Medical School

NSc 5110. Dental Neuroscience for Graduate Students. (2 cr; SP–Bio 3021, Biol 4004; #; intended for grad students who require a comprehensive grad-level neuroscience course; A–F only)

Structure/function of human nervous system. Lectures and reading assignments emphasize topics pertinent to dentistry.

NSc 5111. Medical Neuroscience for Graduate Students. (4 cr; SP–Bio 3021, Biol 4004; #; intended for grad students who require a comprehensive medically-oriented neuroscience course; A–F only)

Survey of molecular, cellular, and systems neuroscience as related to medicine. Lecture/lab.

Neurosurgery (NSu) Department of Neurosurgery Medical School

NSu 8305. Neurosurgical Diagnosis. (3 cr; S-N only)

Neurosurgical diagnosis.

NSu 8308. Neurosurgical Problems and Management. (3 cr; S-N only)

Neurosurgical problems and management.

NSu 8311. Operative Neurosurgery. (3 cr; S-N only)

Operative neurosurgery.

NSu 8316. Neurosurgical Research. (4 cr; S-N only)

Neurosurgical research.

NSu 8318. Neuroradiological Conference. (1 cr; S-N only)

Neuroradiological conference.

NSu 8320. Neurosurgical Conference. (1 cr; S-N only)

Neurosurgical conference.

NSu 8324. Readings in Neurosurgery. (1-15 cr; SP–8104, Q)

NSu 8330. Neurosurgery Literature Seminar. (1 cr; S-N only)

Neurosurgery literature seminar.

Nursing (Nurs) School of Nursing

Nurs 5141. Ethical Issues in Health Care of Elders. (3 cr; SP–Grad student or nursing sr or #)

Health care related ethical issues that confront elders, their families, health care providers, and society.

Nurs 5170. Research Topics. (1-16 cr; max 16 cr; CP–A; SP–A)

Exploration of research topic to meet individual student needs.

Nurs 5171. SPSS Programming and Data Analysis. (2 cr; CP–Inferential statistics; [grad or professional] student or #; SP–Inferential statistics; [grad or professional] student or #)

Skills needed to collect/analyze data using SPSS for Windows. Review of statistical methods.

Nurs 5172. Decision Making in Health Care. (2 cr; CP–Grad student, #; SP–Grad student, #)

Selected classical conceptual models of decision making, their particular perspectives/limitations/ usefulness for decision making about health care issues. Models/components used to assess, evaluate, teach, or help healthy people, patients, families, health care professionals, or policy making groups in making health care decisions.

For definitions of course numbers and symbols, see inside back cover.

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Courses

Nurs 5200. Holistic Health Assessment and Therapeutics for Advanced Practice Nurses. (3 cr; SP–#)
Health assessment knowledge/skills for advanced nursing practice with patients across age span, including primary nursing interventions. Philosophical and paradigms of selected complementary therapies and culturally based healing traditions; descriptions of selected interventions.

Nurs 5202. Introduction to Complementary Healing Practices. (3 cr)
Historical and cultural context of the allopathic and complementary healing traditions. Philosophical and paradigms of selected complementary therapies and culturally based healing traditions; descriptions of selected interventions.

Nurs 5204. Population Focused Assessment and Intervention. (2 cr; SP–Grad nursing major, 8242 or #)

Nurs 5222. Advanced Physiology. (3 cr; SP–Grad nursing major or #)
Systems approach to human physiology/pathophysiology. Physiologic changes across life span. Emphasizes clinical application using population-specific content related to various specialty areas in advanced practice nursing.

Nurs 5223. Assessment of Psychopathology for Advanced Practice Psychiatric/Mental Health Nursing. (4 cr; SP–Nurs grad or #)
Advanced concepts from nursing theory and research, social sciences, neuropsychology, and neurophysiology used in the assessment of psychiatric symptoms and disorders across the age continuum. During clinical, develop proficiency in the assessment of psychopathology in clients with psychiatric symptoms.

Nurs 5224. Clinical Pharmacotherapeutics. (3 cr; QP–Grad, #; SP–Grad, #)
Advanced practice nurses in primary care get a foundation in pharmacotherapeutics across the life span. Topics include pharmacodynamics/kinetics/epidemiology, client patterns of medication use, selection of appropriate drugs for selected client conditions, and prescriptive writing privileges for advanced practice nurses.

Nurs 5225. Psychopharmacology for Advanced Practice Psychiatric/Mental Health Nursing. (3 cr; QP–#; SP–Grad or #)
Advanced concepts in neuroscience, psychopharmacology, and clinical management related to psychopharmacologic treatment of psychiatric disorders/symptoms. Application to problems in various clinical settings.

Nurs 5300. Health Behavior Intervention: Theory and Application. (3 cr; SP–Grad or #)
Interdisciplinary course examines theoretical foundations and research base of intervention strategies to promote health behavior acquisition, behavioral change, and maintenance for adults (individuals and groups). Critical examination of health behavior and patterns and health risk assessment approaches to program creation.

Nurs 5340. Group as a Health Care Intervention. (2 cr; SP–Grad or #)
Theoretical concepts and research findings from the areas of group theory and dynamics are applied in the development of a group for using group as an intervention for various client populations.

Nurs 5501. Professional Issues in Nurse-Midwifery. (1-2 cr; QP–Nurs grad major; SP–Nurs grad major, #)
Analysis of professional issues that confront and impact the practice of certified nurse-midwives. History and development of the professional organization including certification, legislation, ethical dimensions, public policy, and clinical practice issues.

Nurs 5520. Women’s Issues: A Health Perspective. (3 cr; QP–Upper div or grad student or #; SP–Upper div or grad student)
Multidisciplinary exploration and analysis of a broad range of women’s health issues: physiological, developmental, societal, historical, sociocultural, feminist, nursing and medical. Topics include health promotion and reproductive health issues across the life span.

Nurs 5601. School Nursing in the Educational System and the Community. (1-3 cr; QP–3 yrs of college level courses; SP–3 yrs of college level courses; A-F only) School health problems, assessment/intervention strategies. Integration of research findings. Applications with individuals, families, communities.

Nurs 5604. Advanced Health Assessment and Interventions with Adolescents. (1-3 cr; QP–#; SP–Cpsy 5303 or equiv or #)
Development of one-on-one health assessment and intervention strategies appropriate for working with teenagers. Integrates knowledge from nursing, public health, health behavior, and adolescent development as a framework for clinical assessment and intervention approaches.

Nurs 5800. Nursing Topics. (1-4 cr; max 8 cr; SP–#)
Course allows students to study a topic not included in regular courses, or for faculty to offer a course to determine interest in a topic.

Nurs 5801. Policymaking, Health Policy, Political Action and Nursing. (3 cr; QP–Nurs grad student)
Analysis of sociocultural values, public policymaking, health care policy, and the relationship to the health care delivery system. The impact of health care policy on the profession and practice of nurses, and on consumers. Enhanced participation of nurses in policymaking and political action.

Nurs 5802. Spirituality and Nursing Practice. (2 cr; QP–For undergrad cr: nurs sr or RN; for grad cr: RN with baccalaureate; SP–For undergrad cr: nurs sr or RN; for grad cr: nurs grad student or #)
Exploration of the concept of spirituality as integral to the whole person. Discussion of spiritual nursing care interventions.

Nurs 5803. Transcultural Nursing: Theories and Issues. (2 cr; QP–Cultural anth course, nurs undergrad or #; SP–Cultural anth course or #)
Study of cultural factors that influence theories, issues, and nursing care practices in diverse cultures and subcultures. Emphasis on nursing within international systems of health care and nursing practices related to various health-illness systems in this country and worldwide.

Nurs 5804. Therapeutic Healing Touch: Research and Practice. (2 cr; QP–Upper div or grad student in [health sciences or health professional]; S-N only) Therapeutic Healing Touch as energetic based, biofield healing modality. Art/science of this modality. Research literature related to Therapeutic Touch/Healing Touch. Explanations for effects. Practice of Therapeutic Touch, intervention techniques.

Nurs 5805. The ‘M’ Technique. (1 cr; QP–Undergrad nursing student or grad student in health sciences or health professional; S-N in diverse cultures and subcultures) Scientific/theoretical foundations/practice of ‘m’ technique, a touch therapy for promoting relaxation by topically administering essential oils. Appropriate applications. Description/practice of technique. Interdisciplinary course.

Nurs 5808. American Indian Health and Health Care. (2 cr; SP–Upper div or grad student or #)
Examines health of native nations in Minnesota within historical/cultural contexts. Epidemiology of major health conditions, 8140 or #. Traditional Indian medicine, health beliefs. Opportunities for contact with Native American community.

Nurs 5809. Seminars in Critical Care. (2 cr)
Analyses current research/developments in treatments, care delivery, and ethical issues affecting critically ill patients and their families. Students participate with team of multidisciplinary faculty from Center for Critical Care in critiquing/presenting literature and discussing applications to clinical practice.

Nurs 5830. Advanced Clinical Nursing. (1-6 cr; SP–Graduate nursing major or #)
Independent study or faculty seminar on special clinical topic.

Nurs 8100. The Discipline of Nursing. (3 cr; SP–Grad nurs major or #)
Knowledge structures used in nursing, theories, models, and conceptual frameworks. Articulation and evaluation of personal conceptual framework for advanced nursing practice.

Nurs 8110. Developing Nursing Knowledge. (2 cr; SP–Nurs Ph.D. student or #; S-N only)
Philosophical perspectives of research and research methodologies for developing nursing knowledge.

Nurs 8112. Theoretical Foundations of the Discipline. (3 cr; QP–8012 or equiv, knowledge of phil of sci; SP–8100 or equiv, knowledge of phil of sci)
Paradigms in nursing and related methods of inquiry, knowledge structures, and projection of needs for further knowledge development and testing.

Nurs 8113. Theory Development in Nursing. (3 cr; QP–#; SP–8110; SP–8100 or equiv, #; S-N only)
Strategies for theory development; synthesis of theoretical formulations in nursing using selected inductive and deductive theory development strategies.

Nurs 8120. Phenomenon of Health. (3 cr; SP–Grad nurs major, #)
Prevaling and emerging views of health from differing belief systems and methods of inquiry. Philosophical, theoretical, and methodological implications for development of a nursing paradigm based on evolving perspectives of “humanness.”

Nurs 8121. Theoretical Foundations of Health-Related Behaviors. (2 cr; QP–Research course; SP–Research course, grad nurs major)
Research and theory related to development and modification of health behaviors and human responses to events disruptive to health; formulation of research hypotheses and selection of appropriate methodologies for studying hypotheses.

Nurs 8122. Stress, Coping, and Health. (2 cr; QP–#; SP–8014 or equiv, psychology or behavioral med course, #; SP–Research course, grad nurs major, #)
Stress and coping theories and related research; adequacy and efficacy of stress-management interventions/programs; directions for future research.

Nurs 8123. Complementary Therapies: Theory and Research. (2 cr; QP–Research course; SP–Research course)
Scientific basis of selected complementary therapies such as therapeutic touch, imagery, music, and massage; hypotheses related to selected interventions; appropriate methodologies.

Nurs 8124. Family Health Theory. (3 cr; QP–#; SP–8100, #)
Emerging theory in family nursing science, related theories, and research on family systems for structuring a systemic framework to examine clinical problems related to family healthcare. Applies family health theories to selected phenomena of interest in healthcare.

Nurs 8140. Moral and Ethical Positions in Nursing. (3 cr; SP–Grad nurs major or #)
Synthesis of ethical positions, from nursing perspective, on health-related issues at individual, group, population, and policy levels. Normative ethics, theoretical basis for positions taken, and contextual implications for subsequent action.

Nurs 8150. Moral and Ethical Development in Nursing. (3 cr; QP–#; QP–8011 or equiv; SP–Grad nurs major or #)
Interactions among research and theory in moral judgment and behavior, applied ethics, and nursing.

Nurs 8170. Research in Nursing. (3 cr; QP–Inferential stat course; SP–Grad descriptive/inferential stat course within past 2 yrs or #)
Research process/methods appropriate for problems relevant to nursing. Critique of research studies, proposal development.
Nurs 8171. Qualitative Research in Nursing and Healthcare. (3-4 cr; SP–8170, 8100 or equiv grad level and research courses or #) Characteristics of key qualitative research methods and nature of knowledge generated. Relevance to healthcare and advancement of nursing discipline; issues related to entry into the field, data collection, and analysis.

Nurs 8173. Principles and Methods of Implementing Research. (3 cr; QP–8114 or equiv, 2 grad stat courses; SP–8114 or other 80xx grad research methods course, 2 grad nat/policy or sta courses) Integrates scientific, statistical, and practical aspects of research. Inter-relationships among design, sample selections, subject access, human subjects requirements, instrument selection and evaluation, data management, analyses plans, grant writing, and research career issues. Field experiences required.

Nurs 8175. Advanced Nursing Research. (3 cr; QP–8014 or equiv, advanced inferential and nonparametric sta, comp sci course; SP–8170 or equiv, advanced inferential and nonparametric comp sta, comp sci course) Interrelationships among types of knowledge and phenomenon, methods of scientific inquiry, generation of research questions, accepted conventions of stating and studying relationships; questions examined by reviewing writings of selected authors.

Nurs 8176. Research on Decision Making in Health Care. (3 cr; QP–One graduate-level research course, SP–One graduate-level research course, #) Conceptual models/studies on decision making about health care. Formulating research proposals to investigate health care decisions by health care professionals, health care policy makers, patients/families, or communities.

Nurs 8177. Advanced Nursing Research Practicum. (1-4 cr; SP–Nurs Ph.D. student, #) Students collaborate as a team in research experience providing opportunities to synthesize knowledge in an area of study and to design and/or implement research.

Nurs 8178. Methods for the Study of Family Health Phenomena. (3 cr; QP–5920, 8114 or equiv; SP–8124, 8100 or equiv or #) Conceptual and methodological approaches in study of family health phenomena from nursing perspective.

Nurs 8193. Special Topics in Nursing Research. (1-6 cr; SP–#) Seminar and/or individual study of research design, methodologies, or instruments.

Nurs 8194. Problems in Nursing. (1-6 cr; SP–Grad nurs major, #) N/S only

Nurs 8240. Advanced Practice Nursing: Roles and Issues. (2 cr; SP–Admission to advanced practice area of study or #) Current most relevant professional/health care issues affecting diverse advanced practice nursing roles. Role theory, practice models, interdisciplinary team function, reimbursement, certification, scope of advanced practice nursing practice.

Nurs 8241. Health Care Leadership for a Changing World. (2 cr; SP–AHC grad student or #) Application of leadership theory/research to strengthen students’ capacity to facilitate change in health care delivery systems, health care development and delivery of health-care services.

Nurs 8242. Population Focused Health Care Delivery Systems. (2 cr; SP–Grad nurs students or #) Health care organizations/delivery systems, their relation to health of diverse populations. Models of population focused care, use of research to improve health care delivery, effect of economic/social factors on health/health services.


Nurs 8301. Oncology Clinical I. (3 cr; QP–5954 or 5954, 5953; SP–83200, grad nurs major, Minnesota RN licensure) Synthesis and clinical application of knowledge of cancer risk factors and advanced practice interventions to modify cancer risk behaviors of individuals, families, and communities. Use of research and clinical models to analyze, manage, and evaluate responses to cancer and treatment.


Nurs 8304. Advanced Practice Nursing for Acute Health Needs II. (3 cr; SP–5200, 8100, [8170 or advanced pharmacology], 8302, [pathophysiology or immunobiology], advanced pharmacology) Synthesis/utilization of knowledge/research in management of acute symptoms. Application of theory/research to support clinical decision making for adults experiencing alterations in metabolic, alimentary, and pulmonary functions.


Nurs 8306. Psychological and Immunological Responses in Cancer and Acute Care. (3 cr; SP–Grad nurs major or #) Research-based evaluation and management of hematological and immunological responses to cancer and acute life-threatening illness. Exploration of theories and models used to explain and predict psychological adaptation in clients and their family members.

Nurs 8307. Oncology Clinical II. (3 cr; SP–8306 or 8306, grad nurs major, Minnesota RN licensure) Synthesis of research and integration of knowledge in clinical management of complex physical and psychosocial care in cancer. Application of advanced practice and theoretical models to guide decision making and coping responses in clients and their families.


Nurs 8311. Specialized Focus in Research-based Clinical Reasoning and Management in Acute Care. (3-4 cr; SP–5200, 5222, 8100, 8140, 8170, 8240, 8303, 8305, advanced pharmacology, [pathophysiology or immunobiology]) Synthesis/utilization of knowledge/research in care of adults with acute/critical illness. Participation in (a clinical area of interest) in advanced decision making and in management of clients requiring restorative care.

Nurs 8320. Multidisciplinary Seminar on Social Perspectives of Aging. (3 cr; SP–#) Literature/policy on key social aspects of aging, emphasizing service, policy, and ethical implications; generation of research questions.

Nurs 8321. Advanced Nursing Care of the Elderly I. (6 cr; SP–Grad nurs major, core courses, #; A-F only) Exploration of functional patterns of health, and evaluation of theories/research as related to physiological, psychological, and sociological aspects of aging. Comprehensive assessment and research-based advanced nursing interventions to promote, maintain, and restore health of the elderly.

Nurs 8322. Primary Health Care for Elders. (6 cr; QP–5940, 5941, 5943, 5810; SP–8321; A-F only) Focuses on data-based primary care management of common acute and chronic conditions of the elderly and on physiological, psychological, and pharmacological interventions. Age-related, cultural, family and community variations will be incorporated into the analysis, implementation, and evaluation of intervention strategies.

Nurs 8323. Advanced Nursing Care of the Elderly II: For Nurse Practitioners. (5 cr; QP–5945, 5944, #; SP–8322, 8xxx advanced gerontological nurs course, grad nurs major, #; A-F only) Synthesis and application of theory and research to effectively implement advanced gerontological nursing practice. Focuses on comprehensive primary care management across settings, evaluation of care, role analysis, and impact of contextual factors on health care services for the elderly.

Nurs 8324. Advanced Nursing Care of the Elderly II: For Clinical Nurse Specialists. (6 cr; QP–8xxx advanced gerontological nurs course, #; SP–Grad nurs major, #; A-F only) Synthesis and application of theory and research to effectively implement as an advanced gerontological nurse. Comprehensive client care management across settings, evaluation of care, role analysis, and impact of contextual factors on health care services for the elderly.

Nurs 8333. FTE: Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)

Nurs 8340. Advanced Practice Psychiatric/Mental Health Nursing with Individuals and Their Families. (7 cr; QP–8011 or 8011, 8102; SP–5200, 5223, 5225, 8100, 8121, 8140, 8170) Evaluation of theory and research; their application to advanced clinical management of biological, psychological, and social responses of individuals and families to psychiatric illness. Developing clinical expertise in assessment, diagnosis, treatment planning, and management of individuals and their families.

Nurs 8341. Advanced Practice Psychiatric/Mental Health Nursing in Groups and Community. (7 cr; SP–5340, 8340, 86240, #) Application of theory and research to advanced practice psychiatric/mental health nursing with groups and community systems, including populations at risk. Clinical practicum provides experiences for developing advanced practice roles in variety of healthcare settings.

Nurs 8360. Advanced Clinical Nursing. (1-6 cr; SP–Grad nurs major, #) Independent study or faculty seminar on special clinical topic when interest exists.

Nurs 8361. Special Topics in Nursing. (1-4 cr; SP–Grad nurs major, #) Students select and study a topic of interest.
Courses

Nurs 8402. Primary Care: Assessment and Management of Patients in Advanced Practice Nurses. (2-8 cr; SP–5810; 5933; SP–Admission to adv pract nurs area of study, 5200, 5222, 5224, 8140, courses in holistic health assessment and therapeutics for adv pract nurs, pharmacotherapeutics, pathophysiology, structure and function of the discipline, moral and ethical positions in nurs) Data-based assessment and management of preventive health services and common acute and chronic conditions of primary care populations. Theoretical and research-based approach to clinical reasoning and decision making emphasized.

Nurs 8404. Family Practice Practicum I. (2 cr; SP–5200, 5222, 5224, 8402, 8601; A-F only)


Nurs 8405. Family Practice Practicum II. (2 cr; SP–5200, 5222, 5224, 8402, 8601; A-F only)


Nurs 8407. Health Care of Children for the Family Nurse Practitioner for the Family Nurse Practitioner. (2 cr; SP–5200, 5222, 5224, 8422, 8452, 8453; SP–#; A-F only)

Focus on age-specific, family-centered nursing assessment and intervention of minor acute and chronic conditions of children within family context. Emphasis on nursing interventions that incorporate diagnostics, therapeutics, education, and follow-up evaluation of outcomes.

Nurs 8452. Primary Care: Common Acute Health Condition Assessment and Care of Well Children. (3 cr; QP–5923, 5924, 5352, #; SP–8401, 8451, 8453, #)

Research-based evaluation and management of common acute conditions affecting children from infancy through adolescence. Exploration of theories and models used to explain and predict physiologic and psychologic adaptation of children and their families.

Nurs 8453. Primary Care Practicum: Common Acute and Chronic Health Conditions Affecting Children. (3 cr; QP–8450, 8451, 8452, 8453; SP–#)

Focus on age-specific, family-centered nursing assessment and intervention of minor acute and chronic conditions of children within family context. Emphasis on nursing interventions that incorporate diagnostics, therapeutics, education, and follow-up evaluation of outcomes.

Nurs 8454. Primary Care Practicum: Synthesis of Advanced Nursing Practice for the Child, Family, Community. (4 cr; QP–5925, 5926; SP–8452, 8453; SP–#)

Research-based knowledge synthesis to effectively intervene with common pediatric physical and psychosocial alternations in health. Role implementation issues and development of an effective theory-based nursing practice model for care of individuals, families, and communities.

Nurs 8455. Health Care for Children and Youth With Special Health-Care Needs. (2 cr; SP–8454)

Primary care of children and youth with special healthcare needs. Focus on development, pathophysiology, specific conditions, and holistic, family-centered, community-based, culturally competent, and coordinated approach to assessment and intervention.

Nurs 8456. Health Care for Children and Youth With Special Health-Care Needs Practicum. (3 cr; QP–5917, 5924, #; SP–8454, 8455, #)


Nurs 8457. Assessment and Intervention Models in Families With Special Health-Care Needs. (4 cr; QP–5917, 5920, #; SP–8124 or equiv; 3 cr, 8100, 8456, #)

In-depth, systemic, and theory-based study of family health assessment methods and intervention models. Practicum to assess, intervene, and evaluate intervention models related to patterns of functioning in families of children with complex health-care needs.

Nurs 8501. Reproductive Health Care for Women. (3-6 cr; QP–5835, 8030; [thesis assessment, reproductive physiology courses]; SP–5200, #)

Theory, current research underlying clinical practice in assessing/managing issues related to women’s reproductive/sexual health throughout life cycle.

Nurs 8502. Reproductive Health Care for Women at Risk. (2-6 cr; QP–Physiology course; SP–5850 or 8520)

Theoretical and research basis for advanced practice nursing care of women and infants at risk for medical and/or psychosocial problems. Selected high-risk, perinatal and complicated gynecologic and neonatal conditions.

Nurs 8503. Nurse-Midwifery Care of the Childbearing Family. (4-10 cr; QP–8384, 8030; SP–8501, #; A-F only)

Theoretical/research-based nurse-midwifery intrapartum care, management, support of women and their families. Labor, birth, immediate postpartum period, and newborn care. Development/implementation of nurse-midwifery care. Draws from research that provides basis for practice.

Nurs 8520. Advanced Concepts in Women’s Health for the Nurse Practitioner. (3-8 cr; QP–8384, 8030; SP–I, 8501, #; A-F only)

Theoretical and research basis for women’s healthcare nurse practitioner practice building on foundations of gynecological and antepartum care. Preparation of childbearing family for birth and selected complex health concerns for women.

Nurs 8600. Advanced Public Health Nursing. (2 cr; SP–Grad nursing major)

Conceptual frameworks for advanced public health nursing practice. Analysis of population-focused nursing research and of public health nursing management strategies.

Nurs 8601. Interventions for Health of Populations. (3 cr; SP–8040 or PubH 5733)

Synthesis of behavior formation/change, public health, and nursing models, theories for critiquing and designing population-focused interventions. Developing, implementing, evaluating, and proposal writing for culturally competent public health interventions in community-based settings.

Nurs 8602. Public Health Nursing Intervention Practicum. (3 cr; SP–8242, 8601; S-N only)

Applying principles, theory, and research about epidemiology/public health/public health nursing interventions to population-focused health issues. Collaborating with community-based preceptors to achieve public health objectives.

Nurs 8603. Public Health Nursing Leadership Practicum. (3 cr; QP–5960, 5963, 8010, 8040, 8042; SP–8100, 8170, 8241, 8242, 8600; S-N only)

Synthesis of leadership and advanced public health nursing theories and research; their applicability within public health nursing leadership situations.

Nurs 8666. Doctoral Pre-Thesis Credits. (1-18 cr; max 60 cr; SP–Max 18 cr per sem/summer; doc student who has not passed prelim oral)

Nurs 8701. Nursing and Health Care Systems Administration I. (4 cr; SP–#; A-F only)

Intensive study of nursing and healthcare administration and leadership. Application of nursing, organization, care delivery, and population health improvement theories to systems/administrative practice. Planning, organizing care systems, assembling, and developing material and human resources.

Nurs 8702. Nursing and Health Care Systems Administration II. (4 cr; QP–8701, #; SP–8701; A-F only)

Intensive development of competencies associated with skilled administration of healthcare services. Application of organization, nursing, political, and economic theories in operationalizing and evaluating administrative and leadership practice of nurses in healthcare delivery systems.

Nurs 8720. Teaching and Learning Nursing. (3 cr; QP–8010, 8011, 8012, [EpSy 5112 or EpSy 5114 or EpSy 5115 or EpSy 5012 or Psy 5013 or Psy 5014 or Psy 5015]; SP–5204, 8100, 8140, learning theory course)

Theories of curriculum, teaching, learning, nursing used to develop conceptual framework for teaching nursing. Framework is used as model for teaching students in simulated classroom situations.

Nurs 8721. The Nurse Educator in Higher Education. (4 cr; QP–8720; educational measurement class [e.g. EpSy 5220 or 5221]; SP–8241, 8242, 8270, educational measurement course, nurs Ph.D. student)

Teaching practicum: comprehensive implementation and evaluation of effectiveness of personal teaching models in classroom and clinical settings in an academic environment. Roles and responsibilities of faculty; issues affecting curriculum design and development.

Nurs 8777. Thesis Credits: Master’.s. (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Nurs 8800. Methods for the Study of Family Health Phenomena. (2 cr; QP–5920, 8114 or equiv or #; SP–8124, 8175 or equiv or #)

Exploration of conceptual and methodological approaches in study of family health phenomena from a nursing perspective. Formulation of research design to study questions in family health.
Nutrition (Nutr)

College of Agricultural, Food, and Environmental Sciences and College of Human Ecology

Nutr 8333. FTE: Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)
Nutr 8444. FTE: Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)
Nutr 8610. Nutrition Graduate Seminar. (1 cr; SP–Nutr grad student, #; S-N only)

Presentation of thesis (M.S. or Ph.D.) or plan B project work in public seminar.

Nutr 8612. Advances in Nutrition: Diet and Chronic Disease. (2 cr [max 4 cr])
Recent research on relationship of diet to development/treatment of chronic diseases, including cancer, diabetes, and osteoporosis. Clinical, animal, and cell culture studies examined epidemiologically.

Nutr 8613. Advances in Nutrition: Lipoproteins, Cholesterol, and Atherosclerosis. (2 cr; SP–Grad student in nutrit or related field)
Lipoprotein biochemistry and physiology, environmental and genetic factors influencing cholesterol metabolism, efficacy of diet therapy and lipid lowering in heart disease prevention, use of drugs in atherosclerosis, putative role of lipoprotein oxidation in atherosclerosis. Human studies and animal models in atherosclerosis research.

Nutr 8614. Advances in Nutrition: Advanced Energy Balance. (2 cr; SP–Grad student in nutrit or related field)
Recent literature on energy balance and body composition in animals and humans.

Nutr 8615. Advances in Nutrition: Exercise Metabolism. (2 cr; SP–Grad student in nutrit or related field)
Review of research on effects of diet on exercise metabolism.

Nutr 8616. Advances in Nutrition: Free Radicals, Trace Elements, and Other Micronutrients. (2 cr; SP–Grad student in nutrit or related field)
Free radical chemistry, cellular biology, and micronutrient nutrition considered in roles of pro-oxidants and antioxidants in human diseases and aging. Current understanding of biological action of free radicals and role of micronutrients in antioxidant protection in humans and animals.

Nutr 8617. Chemical Carcinogenesis and Chemoprevention. (3 cr; QP–[BioC 3021, BioC 5331] or equiv; Chem 3302 or equiv; SP– [BioC 3001, BioC 3021, BioC 4331] or equiv; Chem 2302 or equiv; A-F only)
Fundamental background in chemical carcinogenesis, carcinogen activation/detoxification, carcinogen-DNA adduct formation, cellular oncogenesis, cancer chemoprevention, nutrition/cancer. Topics integrated/interrelated.

Nutr 8620. Advances in Nutrition. (2-3 cr [max 6 cr]; SP–#)
Recent research or special topics (e.g., obesity, vitamin biochemistry, nutrition education).

Nutr 8621. Presentation Skills. (1 cr; SP–Δ; S-N only)
Orientation to nutrition graduate program. Presenting scientific seminars, using electronic presentation programs/ equipment.

Nutr 8666. Doctoral Pre-Thesis Credits. (1-18 cr [max 60 cr]; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

Nutr 8695. Independent Study: Nutrition. (1-4 cr [max 6 cr]; SP–#)
Written report for master’s plan B project.

Nutr 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Nutr 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required)

Nutr 8900. Advances in Nutrition: Advanced Lifestyle Nutrition. (2 cr; SP–Nut grad major or Pub hth nutrit or Epi MPH or Epi or Food sci grad major)
Evaluation and discussion of research and research issues in nutrition during various stages of the life cycle. Methodological issues of applied human nutrition investigation, current status of knowledge, and implication of research results to public health policies, programs, and future research.

Occupational Therapy (OT)

Department of Physical Medicine and Rehabilitation

Medical School

OT 8333. FTE: Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)
OT 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Operations and Management Science (OMS)

Department of Operations and Management Science

Curtis L. Carlson School of Management

OMS 5170. Simulation Modeling and Analysis. (4 cr; SP–MBA 6120 or BA 1550 or A-F only)
Techniques and application of computer simulation modeling and analysis. Includes animations of existing or proposed real-world facilities and processes. Experiments in simulation programming language and the environment. Simulation models and animations demonstrating actual operation of models. Planning, analysis, and interpretation of simulation experiment results.

OMS 8651. Experimental Design. (3 cr; QP–8650 or MBA 8120 or equiv; SP–MBA 6120 or equiv or business admin Ph.D.student or #; offered alt yrs; A-F only)
Analysis of variance for one-way, two-way, and multi-way data. Basic concepts of statistical design and analysis of results. Randomized block, Latin square, cross-over, factorial designs, confounding, estimation and comparison of effects, response surfaces, and applications to management.

OMS 8652. Regression Analysis. (3 cr; QP–MBA 8120 or equiv; SP–MBA 6120 or equiv; business admin Ph.D. student or #; offered alt yrs; A-F only)
Regression and correlation models, inferences in simple and multiple regression, multicolinearity, indicator variables, variable selection techniques, treatment of assumption violations, applications to management problems, basic concepts of experimental design.

OMS 8661. Linear Programming. (3 cr; QP–5160 or equiv; SP–Business admin Ph.D. student or #; A-F only)
Revised simplex, primal-dual, and large-scale methods, including decomposition and partitioning and methods for bounded variables.

OMS 8671. Simulation Analysis. (3 cr; SP–Business admin Ph.D. student or #; offered alt yrs; A-F only)
A treatment of underlying probabilistic and statistical aspects of computer simulation. Random number generators, variate and process generation, statistical analysis of simulation output, ranking and selection of simulation models, and variance reduction techniques.

OMS 8672. Stochastic Modeling and Analysis. (3 cr; QA–Stat 5122; SP–Business admin Ph.D. student or #; offered alt yrs; A-F only)
Probabilistic modeling of dynamic processes, including Markov chains; Possion, renewal, continuous-time Markov processes, and queuing models. Statistical estimation of selected models; applications to managerial problems, such as brand shift, industrial inventory, manufacturing, and computer/communications networks.

OMS 8681. Queuing Theory: A Computational Approach. (3 cr; SP–8670; SP–8672, business admin Ph.D. student or #; A-F only)
Theory of Stochastic Service Systems (theory of queues) from an algorithmic point of view. Prepare students to model and analyze complex stochastic service systems via classical methods and algorithmic methods and approximations.

OMS 8711. Research in Operations Strategy. (3 cr; SP–Business admin Ph.D. student or #; offered alt yrs; A-F only)
Operations performance; competitive advantage; focused factory, product, and process innovation; and operations strategy implementation. Research results and methods.

OMS 8721. Management of Technological Operations. (3 cr; SP–Business admin Ph.D. student or #; offered alt yrs; A-F only)
Theories and models used to address problems of managing technological operations and operations in manufacturing and service firms. Technology strategy, economic/organizational perspectives on technology, productivity analysis, technology evaluation, project selection and evaluation, learning, etc.

OMS 8735. Operations Forecasting and Inventory Research. (3 cr; SP–Business admin Ph.D. student or #; offered alt yrs; A-F only)
Research on forecasting, inventory control, materials requirements planning, just-in-time manufacturing, aggregate planning, scheduling, routing, sequencing, and dispatching in manufacturing and service industries. Research papers and methods are discussed.

OMS 8745. Research on Quality Management. (3 cr; SP–Business admin Ph.D. student or #; offered alt yrs; A-F only)
Research literature, methods, and results. Research on quality strategy, economics of quality, statistical process control, vendor management, off-line quality, and quality practice.

OMS 8892. Readings in Operations and Management Science. (1-8 cr [max 16 cr]; SP–Business admin Ph.D. student or #)
Readings useful to student’s individual program and objectives that are not available in regular courses.

OMS 8894. Graduate Research in Operations and Management Science. (1-8 cr [max 16 cr]; SP–Business admin Ph.D. student or #)
Individual research on an approved topic appropriate to student’s program and objectives.

For definitions of course numbers and symbols, see inside back cover. 253
**Oral Biology (OBio)**

**Department of Oral Sciences**

**School of Dentistry**

**OBio 5001. Methods in Research and Writing.** (2 cr)
Skills necessary to begin a research project, including literature review, hypothesis formation, research design, and writing. Each student develops a research protocol.

**OBio 8011. Oral Biology.** (2 cr; SP–Dental specialist or oral research trainee; A-F only)
Salivary secretions, composition and function; orofacial development, anatomy and genetics; oral aspects of inflammation, wound healing, and immunoregulation and control of oral bacterial flora; and clinical control; biochemistry of connective and mineralized tissues; neurobiology and pathophysiology of orofacial pain and sensations.

**OBio 8021. Oral Microbiology.** (2 cr; SP–Dental specialist or oral research trainee or #)

**OBio 8022. Oral Neuroscience.** (2 cr; SP–Dental specialist or oral research trainee or #)
Background lectures and student presentations on current research topics to evaluate questions in general motor and sensory function related to oral and nasal structures. Taste, smell, and other chemical senses as they relate to those structures.

**OBio 8023. Physical Biology of the Oral Cavity.** (2 cr; SP–Dental specialist or oral research trainee or #; A-F only)
Structure and function of load-bearing components of human musculoskeletal system from biophysical point of view. Mandibular form and movement; infrastructure of hard tissues as related to occlusal wear and masticatory efficiency; role of saliva and salivary pellicle in reduction of interocclusal friction; and computer simulation of jaw mechanics.

**OBio 8024. Genetics and Human Disease.** (1 cr; SP–Dental specialist or oral research trainee or #; A-F only)
Principles of medical genetics with emphasis on oral diseases. Twins, chromosomes, recombinant DNA, major gene traits, genes in populations, chromosomal abnormalities, complex traits, facial clefts, dental caries, periodontal diseases.

**OBio 8025. Topics in Cariology.** (2 cr; SP–Dental specialist or oral research trainee or #; A-F only)
Lectures, assigned readings, and discussions of basic epidemiological, biological, and chemical aspects of dental caries. Etiology, epidemiology, and pathogenesis of dental caries, and influence of dietary, salivary, plaque, and microbial factors on the caries process.

**OBio 8026. Salivary Glands, Secretions, and the Secretory Immune System.** (2 cr; SP–Dental specialist or oral research trainee or #; A-F only)
Salivary gland structure and development; mechanisms and control of macromolecule and electrolyte secretion; protein structure and function, interactions with bacteria, salivary pellicle, clinical studies, salivary gland disease. Secretory IgA origin, structure, and function; secretory IgA induction and biological activity; role of sIgA in oral health.

**OBio 8027. Structural and Biological Aspects of Dental Biomaterials.** (1 cr; SP–Dental specialist or oral research trainee or #)
Relates composition and structure of dental biomaterials to their behavior in a biological environment. Fundamental questions: What is the effect of a material on the oral environment? What is the cause and mechanism of each such effect? What materials can be used that have beneficial effects? Dental implantology and guided tissue regeneration.

**OBio 8028. Molecular Basis of Cellular and Microbial Adhesion.** (2 cr; SP–Dental specialist or oral research trainee or #; A-F only)
Biological basis of adhesion phenomena, focusing on cells of immune system, development of organs and tissue formation, and bacterial colonization of the human.

**OBio 8030. Seminar.** (1 cr; max 10 cr; SP–Dental specialist or oral research trainee or #; S-N only)
Faculty and student discussion of current topics in oral biology.

**OBio 8093. Tutorial in Oral Biology.** (1-2 cr; SP–#; S-N only)
Semester-long apprenticeship with faculty members to familiarize students with faculty research interests. Individual study of selected topics.

**OBio 8094. Directed Research.** (1-10 cr; SP–#; S-N only)

**OBio 8333. FTE Master’s.** (1 cr; SP–Master’s student, adviser and DGS consent)

**OBio 8444. FTE Doctoral.** (1 cr; SP–Doctoral student, adviser and DGS consent)

**OBio 8666. Doctoral Pre-Thesis Credits.** (1-18 cr; max 60 cr; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

**OBio 8777. Thesis Credits: Master’s.** (1-18 cr; max 50 cr; SP–Max 18 cr per semester or summer; total required [Plan A only])

**OBio 8888. Thesis Credits: Doctoral.** (1-24 cr; max 100 cr; SP–Max 18 cr per semester or summer; 24 cr required)

**Otology (Otol)**

**Department of Otolaryngology**

**Medical School**

**Otol 5101. Introduction to the Basic Sciences in Otolaryngology I: Ear.** (2 cr; SP–Otolaryngology major or #)
Multidisciplinary introduction to the basic sciences of the ear. Audiology and hearing conservation, temporal bone anatomy, external and middle ear mechanisms, cochlear physiology, auditory neurophysiology, ear anatomy, ear immunology, line structures, vestibular mechanisms and measurement. S-N grading option for nonmajors only.

**Otol 5102. Introduction to the Basic Sciences in Otolaryngology II: Head and Neck.** (2 cr; SP–Otolaryngology major or #)
Multidisciplinary introduction to the basic sciences of the head and neck. Laryngeal anatomy and physiology, nasoanatomy and physiology, immune biology, embryology of head and neck. S-N grading option for nonmajors only.

**Otol 5993. Directed Studies.** (1-12 cr; max 12 cr; SP–#)
Directed readings and preparation of reports on selected topics.

**Otol 8230. Clinical Otolaryngology.** (4 cr; SP–Grad otol major; A-F only)
Diagnostic and management instruction and experience in all phases of clinical otolaryngology. Both inpatient and outpatient services are provided at Fairview–University Medical Center, St. Paul. Ramsey Medical Center, Veterans Administration Medical Center, and Hennepin County Medical Center. Clinical practica and weekly special group conferences.

**Otol 8231. Surgery of the Ear, Nose, and Throat.** (3 cr; SP–Grad otol major; A-F only)
Surgical training and experience with broad scope of surgical problems encountered in otolaryngology provided at Fairview–University Medical Center, St. Paul Ramsey Medical Center, Veterans Administration Medical Center, and Hennepin County Medical Center. Clinical practica and weekly special group conferences.
Courses

Pharmacy (Phm)

Department of Pharmacy

Phm 8100. Seminar: Pharmaceutics. (1 cr; SP–Grad Pharm major; S-N only)

Phm 8110. Readings in Pharmaceutics. (1 cr; SP–Grad Pharm major; S-N only)

Phm 8150. Pharmaceutics Research Seminar. (1 cr; SP–Grad Pharm major; S-N only)

Phm 8295. Research Problems in Pharmaceutics. (1 cr; SP–Grad Pharm major; S-N only)

Phm 8333. FTE: Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)

Phm 8411. Stabilization of Pharmaceuticals. (3 cr; SP–Physical and organic chem survey courses; SP–Physical and organic chem survey courses; Application of physical and chemical principles to drug stabilization)

Phm 8421. Advanced Pharmaceutics. (4 cr; SP–#; A-F only)

Phm 8441. Solid-State Properties of Drugs. (2 cr; SP–Physical and organic chem survey courses; SP–Physical and organic chem survey courses; Application of physical and chemical principles to drug stabilization)

Phm 8444. FTE: Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)

Phm 8451. Industrial Pharmacy. (2 cr; SP–#)

Phm 8461. Solubility Behavior of Drugs and Other Organic Compounds. (3 cr; QP–Physical chem course; SP–Physical chem survey course or #; A-F only)

Phm 8471. Biological Approaches to Drug Targeting and Mechanisms of Drug Transport. (4 cr; SP–Survey courses in biochem, physical chem, cell biol, differential equations; SP–Survey courses in biochem, physical chem, cell biol, differential equations; A-F only)

Phm 8666. Doctoral Pre-Thesis Credits. (1-18 cr; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

Phm 8777. Thesis Credits: Master’s. (1-18 cr; SP–Max 18 cr per semester or summer; 10 cr total required (Plan A only))

Phm 8888. Thesis Credits: Doctoral. (1-24 cr; SP–Max 18 cr per semester or summer; 24 cr required)

Pharmacology (Phil)

Department of Pharmacology

Medical School

Phcl 5100. Pharmacology for Nursing Students. (3 cr; SP–Biochemistry, human physiology or #; A-F only)

Phcl 5101. Pharmacology for Pharmacy Students. (3 cr; SP–Regis 2nd yr pharmacy student or #; A-F only)

Phcl 5102. Pharmacology for Pharmacy Students. (2 cr; SP–#; A-F only)

Phcl 5103. Pharmacology for Dental Students. (3 cr; SP–Regis dental student or #; SP–Regis dental student or #)

Phcl 5109. Problems in Pharmacology. (1-18 cr; SP–Upper div or grad student or #; SP–Upper div or grad student or #)

Phcl 5110. Introduction to Pharmacology. (2 cr; SP–Grad student or #; A-F only)

Phcl 5111. Pharmacogenomics. (3 cr; SP–Grad student or #; A-F only)

Philosophy (Phil)

Department of Philosophy

College of Liberal Arts

Phil 5201. Symbolic Logic I. (4 cr; SP–1001 or #)

Phil 5202. Symbolic Logic II. (4 cr; SP–5201 or #)

Phil 5211. Modal Logic. (3 cr; SP–5201 or #)

Phil 5222. Philosophy of Mathematics. (3 cr; SP–5202 or #)
Courses

Phil 5325. Biomedical Ethics. (3 cr; SP—4 for undergrads)
A survey of major topics and issues in biomedical ethics, including patients' rights and duties, informed consent, confidentiality, ethical issues in medical research, the initiation and termination of medical treatment, euthanasia, abortion, and the allocation of medical resources.

Phil 5415. Philosophy of Law. (3 cr; SP—1003 or 1004 or 3302 or social science major or #)
Analytical accounts of law and legal obligation.

Phil 5606. Philosophy of Quantum Mechanics. (3 cr)
Philosophy of interpretations of quantum mechanics. Two-slit experiment, Schrödinger cat paradox (measurement problem), Einstein-Podolsky-Rosen paradox. Leading approaches to interpretation (Copenhagen, hidden variables, universal wave function) and their connections with philosophical issues.

Phil 5760. Selected Topics in Philosophy. (3 cr; SP–3 cr [3xxx-5xxx] in phil or #)
Topics specified in Class Schedule.

Phil 5993. Directed Studies. (1-3 cr; SP—4, 5, 7)
Guided individual reading or study.

Phil 8010. Workshop in History of Philosophy. (1 cr; SP—4xxx hist of phil course)

Phil 8081. Seminar: History of Philosophy—Ancient Philosophers. (3 cr; SP—5)
Major developments in ancient Greek philosophic thought; methods and role of history of philosophy in discipline of philosophy.

Phil 8085. Seminar: History of Philosophy—Modern Philosophers. (3 cr; SP—5)
Major developments in modern philosophic thought; methods and role of history of philosophy in discipline of philosophy.

Phil 8090. Seminar: History of Philosophy. (3 cr)
Topics specified in Class Schedule.

Phil 8100. Workshop in Epistemology and Metaphysics. (1 cr; SP—4xxx epistemology or metaphysics course, #)

Phil 8110. Seminar: Metaphysics. (3 cr; SP—4101 or #)
Topics specified in Class Schedule.

Phil 8130. Seminar: Epistemology. (3 cr; SP—4105 or #)
Topics specified in Class Schedule.

Phil 8131. Epistemology Survey. (3 cr)

Phil 8180. Seminar: Philosophy of Language. (3 cr; SP—4219 or #)
Topics specified in Class Schedule.

Phil 8182. Formal Semantics of Natural Language. (3 cr; SP—Phil 5201; SP—Phil 5201 or #; A-F only)
Truth-conditional model-theoretic semantics applied to treatment of opacity, intensionality, quantification, and related phenomena in natural language.

Phil 8200. Workshop in Logic and Philosophy of Mathematics. (1 cr; SP—5xxx or 5xxx course in logic or phil of math, #)

Phil 8210. Seminar: Logical Theory. (3 cr; SP—5201; 5205 or #)
Topics specified in Class Schedule.

Phil 8220. Seminar: Philosophy of Mathematics. (3 cr; SP—5202 or [4xxx or 5xxx math course] or #)
Topics such as the significance of limiting metamathematics (Gödel, et al.), assessment of major foundational programs (set theoretic, modern Hilbertian, constructive), modal and naturalist alternative to standard platonism.

Phil 8300. Workshop in Moral and Political Philosophy. (1 cr; SP—4xxx moral or poli phil course, #)

Phil 8310. Seminar: Moral Philosophy. (3 cr; SP—4320 or 4330 or 4340 or #)
Systematic study of concepts and problems relating to ethical discourse.

Phil 8320. Seminar on Medical Ethics. (3 cr; SP—4xxx or 5xxx ethics course or #)
Patients' rights and duties, informed consent, confidentiality, ethical issues in medical research, initiation and termination of medical treatment, euthanasia, abortion, mutual beneficial conflicts, allocation of medical resources.

Phil 8333. FTE: Master's. (1 cr; SP—Master's student, adviser and DGS consent)

Phil 8410. Seminar: Philosophy of Law. (3 cr; SP—5415 or #)
Primarily for law students and interested political science, history, sociology majors or minors.

Phil 8420. Seminar: Political Philosophy. (3 cr; SP—4414 or 4321 or #)

Phil 8444. FTE: Doctoral. (1 cr; SP—Doctoral student, adviser and DGS consent)

Phil 8500. Workshop in Aesthetics. (1 cr; SP—4xxx aesthetics course, #)

Phil 8510. Seminar: Aesthetics Studies. (3 cr)
Topics specified in Class Schedule.

Phil 8550. Seminar: Philosophy of Religion. (3 cr; SP—4xxx or 5xxx phil of sci course, #)

Phil 8601. Seminar: Scientific Inquiry. (3 cr; SP—4)
Philosophical theories of scientific methods for evaluating scientific hypotheses, of role of experimentation in science, and of how hypotheses come to be accepted within a scientific community.

Phil 8602. Seminar: Scientific Representation and Explanation. (3 cr; SP—4)
Contemporary issues concerning representation and explanation of scientific facts.

Phil 8605. Seminar: History of the Philosophy of Science. (3 cr; SP—4)
Historical development of logical empiricism from its European origins in first half of 20th century to its emergence as nearly universal account of science in post-war Anglo-American philosophy.

Phil 8606. Seminar: Philosophy of Medicine and the Biomedical Sciences. (3 cr; SP—4)
Aims and goals of medicine; concepts of health, illness, and disease nature of reasoning in clinical medicine; theoretical evolution of medicine; and role of values in practice of medicine and healthcare.

Phil 8610. Seminar: Philosophy of the Physical Sciences. (3 cr; SP—4)
Topics specified in Class Schedule.

Phil 8620. Seminar: Philosophy of the Biological Sciences. (3 cr; SP—4)
Topics specified in Class Schedule.

Phil 8640. Seminar: Philosophy of the Cognitive Sciences. (3 cr; SP—4)

Phil 8660. Seminar: Social and Cultural Studies of Science. (3 cr; SP—4)
Review of recent work; analyses of theoretical and methodological differences among practitioners; selected responses from historians and philosophers of science.

Phil 8666. Doctoral Pre-Thesis Credits. (1-18 cr; max 60 cr; SP—Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

Phil 8670. Seminar: Philosophy of Science. (3 cr; SP—4)
Topics specified in Class Schedule.

Phil 8777. Thesis Credits: Master's. (1-18 cr; max 50 cr; SP—Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Phil 8888. Thesis Credits: Doctoral. (1-24 cr; max 100 cr; SP—Max 18 cr per semester or summer; 24 cr required)

Phil 8993. Directed Study. (1-3 cr; SP—4)

Phil 8994. Directed Research. (1-3 cr; SP—4)

Physical Medicine and Rehabilitation (PMed)

Department of Physical Medicine and Rehabilitation

Medical School

PMed 5058. Anatomy for Physical Therapy. (5 cr; A-F only)
Study of gross human anatomy, and surface anatomy, for purposes of physical therapy. Cadaver dissection of extremities, head, neck, back, abdomen, thoracic, and pelvic regions. Evaluation of clinical conditions. Lecture, laboratory.

PMed 5100. Seminar I: Overview of Rehabilitation Science. (2 cr; SP—A, F only)
Major developments in physical rehabilitation, healthcare models, epidemiology of physical disorders, research treatment outcomes, measurement issues, clinical evaluation of functional vs. nonfunctional rehabilitation strategies.

PMed 5121. Issues in Mental Health. (1 cr; SP—One course gen psych, one course abnorm psych; SP—One course gen psych, one course abnorm psych; S-N only)
Psychiatric and psychological assessment and treatment. Issues related to mental health in medical and surgical care, with a focus on the role of OT/PT in the overall care of psychiatric patients.

PMed 5132. Descriptive Neurology. (1 cr [max 2 cr]; SP—PT or OT or #; SP—PT or OT or #; A-F only)
Relates neuroanatomical and neurophysiological principles to neurological conditions commonly seen in occupational and physical therapy practice.

PMed 5135. Pathobiology. (2 cr; SP—A, F only)
Lecture and lab emphasizing anatomical, physiological, and pathobiological aspects of normal and pathological human motion, including analysis techniques.

PMed 5161. Theory of Physical Medicine and Rehabilitation Applied to Medical Sciences. (3 cr [max 3 cr]; SP—Regis OT or PT student or #; SP—Regis OT or PT student or #; A-F only)
Clinical medicine lectures focusing on diagnostic procedures and medical, surgical, and rehabilitation management of patient problems in orthopedics, pediatrics, dermatology, medicine, cancer, and speech. Includes correlation to current practice and presentation of patients.

PMed 5182. Functional Neuroanatomy/Neuropathology. (4 cr; SP—Regis OT or PT student or #; SP—Regis OT or PT student or #; A-F only)
Neuronal structures as functional systems and basic neuropsychological concepts with emphasis on applications for understanding and treating physical disabilities.

PMed 5215. Clinical Practice of Physical Therapy I. (2 cr; SP—Regis PT student; S-N only)
First of three-course sequence. Emphasizes sensitivity to needs of patients, families, and healthcare workers. Patient handling techniques, communication skills, awareness of cultural differences, psychological aspect of disability, and use of community resources.

PMed 5216. Clinical Practice of Physical Therapy II. (1 cr; SP—Regis PT student; S-N only)
Second of three-course sequence. Emphasizes sensitivity to needs of patients, families, and healthcare workers. Patient handling techniques, communication skills, awareness of cultural differences, psychological aspect of disability, and use of community resources.

PMed 5217. Clinical Practice of Physical Therapy III. (2 cr; SP—Regis PT student; S-N only)
Third of three-course sequence. Emphasizes sensitivity to needs of patients, families, and healthcare workers. Patient handling techniques.
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<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
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<tbody>
<tr>
<td>PMed 5221</td>
<td>Therapeutic Procedures</td>
<td>(3 cr; SP–Regis PT student; A-F only)</td>
<td>Theory and techniques, therapeutic massage, ultraviolet radiation, medical and athletic bandaging, aspersion and isolation therapy, hydrotherapy, positive pressure devices, volumetric measurements.</td>
</tr>
<tr>
<td>PMed 5223</td>
<td>Electrotherapy and Electrophysiological Testing</td>
<td>(2 cr; SP–Regis PT student; A-F only)</td>
<td>Theory and techniques of movement analysis and treatment using electrophysiological testing and therapeutic devices.</td>
</tr>
<tr>
<td>PMed 5231</td>
<td>Biomechanics</td>
<td>(3 cr; SP–Regis PT student; A-F only)</td>
<td>Forces and motions internal and external to the body responsible for both normal and abnormal human movement, including analysis of techniques and independent assignments.</td>
</tr>
<tr>
<td>PMed 5250</td>
<td>Professional Issues in Physical Therapy</td>
<td>(5 cr; SP–Regis PT student; A-F only)</td>
<td>Current professional issues, dilemmas, and trends in healthcare. Evaluation and treatment of physical therapy special areas.</td>
</tr>
<tr>
<td>PMed 5281</td>
<td>Therapeutic Exercise I</td>
<td>(3 cr; SP–Regis PT student; A-F only)</td>
<td>Principles of skeletal muscle, connective tissue, and myology in normal and abnormal states for therapeutic exercise.</td>
</tr>
<tr>
<td>PMed 5283</td>
<td>Musculoskeletal I</td>
<td>(4 cr; SP–Regis PT student; A-F only)</td>
<td>First of two-course sequence: Problem-solving approach to evaluating, treating, and preventing selected musculoskeletal conditions across the life span.</td>
</tr>
<tr>
<td>PMed 5284</td>
<td>Musculoskeletal II</td>
<td>(4 cr; SP–Regis PT student; A-F only)</td>
<td>Problem-solving approach to evaluating, treating, and preventing selected musculoskeletal conditions across the life span.</td>
</tr>
<tr>
<td>PMed 5287</td>
<td>Neurorehabilitation I</td>
<td>(4 cr; SP–Regis PT student; A-F only)</td>
<td>Assessment and rehabilitation of patients with neurological conditions, e.g., central nervous system trauma, intracranial trauma, multiple sclerosis, Parkinson’s disease, and other neurological diseases. Using treatment procedures, orthotics, and equipment to improve function and prevent, stabilize, or decrease impairments.</td>
</tr>
<tr>
<td>PMed 5288</td>
<td>Neurorehabilitation II</td>
<td>(4 cr; SP–Regis PT student; A-F only)</td>
<td>Assessment and rehabilitation of patients with neurological, immunological, and vascular conditions.</td>
</tr>
<tr>
<td>PMed 5290</td>
<td>Administration and Teaching Practicum</td>
<td>(4 cr; SP–Regis PT student; A-F only)</td>
<td>Learning experiences and special assignments related to physical therapy administration.</td>
</tr>
<tr>
<td>PMed 5293</td>
<td>Research Design in Physical Therapy</td>
<td>(3 cr; SP–Regis PT student; A-F only)</td>
<td>Predictive research and statistical concepts, analysis of scientific literature, research proposal.</td>
</tr>
<tr>
<td>PMed 5294</td>
<td>Independent Study in Physical Therapy</td>
<td>(1-3 cr; SP–Regis PT student; A-F only)</td>
<td>Students must demonstrate proficiency in communication skills, team participation, and evaluation and treatment skills; predict outcomes and manage a variety of patient diagnoses/systems consistently with good and safe judgment, and have successfully completed all previous clinical education experiences.</td>
</tr>
<tr>
<td>PMed 5300</td>
<td>Concepts for Occupational Therapy Practice</td>
<td>(4 cr; QP–Regis OT student or SP–Regis OT student; A-F only)</td>
<td>Critical thinking, ethics, professional resources/organizations, patient-therapist relationship. Level I fieldwork experience.</td>
</tr>
<tr>
<td>PMed 5313</td>
<td>Therapeutic Occupation</td>
<td>(4 cr; QP–Regis OT student or SP–Regis OT student; A-F only)</td>
<td>Occupational therapy philosophy, history, and frames of reference. Activity analysis applied to purpose-full, therapeutic activities for individuals and groups.</td>
</tr>
<tr>
<td>PMed 5340</td>
<td>Human Growth and Development</td>
<td>(2 cr; SP–Regis PT student; A-F only)</td>
<td>Development process throughout the life span, including physical, social, cognitive, and personality development and how they may be influenced by genetic and environmental factors.</td>
</tr>
<tr>
<td>PMed 5341</td>
<td>Introduction: Evaluation and Intervention I</td>
<td>(4 cr; QP–Regis OT student or SP–Regis OT student; A-F only)</td>
<td>Critical thinking, ethics, professional resources/organizations, patient-therapist relationship. Level I fieldwork experience.</td>
</tr>
<tr>
<td>PMed 5342</td>
<td>Compensatory Rehabilitation</td>
<td>(4 cr; QP–Regis OT student or SP–Regis OT student; A-F only)</td>
<td>Assessment and intervention of selected patient populations with mental or physical problems. Adaptation techniques to compensate for performance deficits. Level I fieldwork experience.</td>
</tr>
<tr>
<td>PMed 5343</td>
<td>Specialty Topics: Evaluation and Intervention II</td>
<td>(2 cr; SP–Regis PT student; A-F only)</td>
<td>Applies critical thinking model to assessment/ intervention of selected patient populations with mental or physical problems. Specialized approaches for rehabilitation of populations with multiple performance component deficits. Fieldwork.</td>
</tr>
<tr>
<td>PMed 5344</td>
<td>Neurorehabilitation: Evaluation and Intervention IV</td>
<td>(4 cr; QP–Regis OT student or SP–Regis OT student; A-F only)</td>
<td>Assessment and intervention related to perception, cognition, reflexes, sensory integration, and motor control. Application to individuals with multiple performance component deficits.</td>
</tr>
<tr>
<td>PMed 5360</td>
<td>Dynamics of Group Models</td>
<td>(2 cr; QP–Regis OT student or SP–Regis OT student; A-F only)</td>
<td>Application of group theory and group analysis in diverse professional settings.</td>
</tr>
<tr>
<td>PMed 5370</td>
<td>Therapy of Occupation</td>
<td>(1 cr; Regis PT student; A-F only)</td>
<td>Occupational therapy frames of reference, role of activity, and historical development of profession.</td>
</tr>
<tr>
<td>PMed 5375</td>
<td>Community Resources and Health-Care Issues</td>
<td>(2 cr; SP–(PT300, 342), A-F only)</td>
<td>Analysis of community health-care systems, including health-care financing, insurance, and decision making. Students identify current trends in health care and determine responses to them at a social, political, and legislative level.</td>
</tr>
<tr>
<td>PMed 5376</td>
<td>Adult Education and Planning</td>
<td>(1 cr; QP–5311, 5312 or SP–5313; A-F only)</td>
<td>Skills needed to plan, implement, and evaluate adult educational programs and materials for patient-family education, peer professional education, and education of others involved in therapeutic interventions. Student teaching unit, community based.</td>
</tr>
<tr>
<td>PMed 5380</td>
<td>Management of Occupational Therapy Services</td>
<td>(3 cr; SP–Regis 5360, 5375, 5376 or SP–Regis 5360, 5375, 5376 or A-F only)</td>
<td>Administration/management of occupational therapy services within managed care environment. Issues in Medicare, HMOs, TQM, consultation, human resources, promotion of professions, and related microanatomy of the musculoskeletal and respiratory systems and their relation to rehabilitation problems.</td>
</tr>
<tr>
<td>PMed 5391</td>
<td>Occupation Across the Life Span</td>
<td>(3 cr; QP–5375, 5376 or SP–5375, 5376 or A-F only)</td>
<td>The workplace, school/work, work-related injuries, and industrial rehabilitation. Fieldwork.</td>
</tr>
<tr>
<td>PMed 5392</td>
<td>Research in Occupational Therapy</td>
<td>(2 cr; QP–Regis 5370 or SP–Regis OT student or A-F only)</td>
<td>Analysis of scientific literature, development of research proposals.</td>
</tr>
<tr>
<td>PMed 5393</td>
<td>Functional Anatomy and Kinesiology</td>
<td>(4 cr; QP–Regis OT student or SP–Regis OT student or A-F only)</td>
<td>Gross anatomical and physiological concepts, including muscles, tendons, and ligaments. Includes cadaver lab experiences. Analyzing functional human movement from a biomechanical perspective.</td>
</tr>
<tr>
<td>PMed 5394</td>
<td>Orthotics</td>
<td>(3 cr; SP–Regis 5341 or SP–5341 or A-F only)</td>
<td>Design, analysis, and construction of orthotic devices.</td>
</tr>
<tr>
<td>PMed 5395</td>
<td>Independent Study in Occupational Therapy</td>
<td>(1-4 cr; max 16 cr; QP–Regis OT student or SP–Regis OT student or A-F only)</td>
<td>Analysis of scientific literature, development of research proposals.</td>
</tr>
<tr>
<td>PMed 5813</td>
<td>Cardiopulmonary Physical Therapy</td>
<td>(2 cr; Regis PT student; A-F only)</td>
<td>Theory and techniques of cardiopulmonary evaluation and treatment. Principles of exercise response and adaptations to training.</td>
</tr>
<tr>
<td>PMed 5814</td>
<td>Age, Exercise, and Rehabilitation</td>
<td>(2 cr; SP–Regis PT student; A-F only)</td>
<td>Theory and application of kinesiological EMG and other common instruments used to measure human motion.</td>
</tr>
<tr>
<td>PMed 5810</td>
<td>Seminar II: Issues in Musculoskeletal Rehabilitation</td>
<td>(2 cr; SP–PT student; A-F only)</td>
<td>Science of musculoskeletal rehabilitation: associated research and methodologies.</td>
</tr>
<tr>
<td>PMed 5812</td>
<td>Seminar III: Issues in Neurorehabilitation</td>
<td>(2 cr; SP–PT student; A-F only)</td>
<td>Problems in neurorehabilitation: associated research and methodologies.</td>
</tr>
<tr>
<td>PMed 5810</td>
<td>Physical Therapy Clinic</td>
<td>(1-4 cr; SP–Physical Therapy student; A-F only)</td>
<td>Fieldwork experiences.</td>
</tr>
<tr>
<td>PMed 5810</td>
<td>Current Literature Seminar</td>
<td>(1 cr; SP–Grad PT major or A-F only)</td>
<td>Critical review of the literature on evaluation of selected physical therapy interventions.</td>
</tr>
</tbody>
</table>
Courses

PMed 8311. Research Seminar in Physical Therapy I. (1 cr; SP–Grad PT major; A-F only) Introduction to scientific thinking in physical therapy and to preparation needed to execute a research project. Comprehension and critical analysis of current literature on physical rehabilitation.

PMed 8312. Research Seminar in Physical Therapy II. (1 cr; SP–Grad PT major; A-F only) Small group discussions of journal readings focused in selected research area. Demonstration of and experience with experimental procedures. Development of research proposal.

PMed 8315. Advanced Kinesiology. (2 cr; SP–; A-F only) Functional anatomy emphasizing anatomical, physiological, and biomechanical aspects of normal and pathological human motion. Lecture with lab to include various techniques for analysis.

PMed 8170. Special Topics in Physical Therapy. (1 cr; SP–Grad PT major; A-F only) Topics vary by semester. Paper required.

PMed 8185. Problems in Physical Therapy. (1-3 cr; SP–5293 or 8192 or #; A-F only) Research practices on one selected topic designed to make student familiar with systematic literature search, critical analysis of scientific literature, specific measurement systems, data collection and data reduction methods. Methods of ongoing or new research projects, preparing and defending research reports.

PMed 8188. Teaching Practicum. (1-5 cr; SP–; A-F only) Supervised practical experience in classroom/ laboratory teaching.

PMed 8192. Research Design in Physical Therapy. (3 cr; SP–Grad PT major; A-F only) Critical appraisal of current medical literature. Fundamentals of research design, data analysis, and medical writing.

PMed 8193. Research Problems in Physical Therapy. (1-4 cr [max 4 cr]; SP–Grad PT major or #; A-F only) Designing research projects to answer scientific questions in physical therapy, collecting data, analyzing data, interpreting results, and defending the work to an examining committee.

PMed 8200. Physical Medicine and Rehabilitation Service. (1-15 cr; SP–Enrolled in PMed residency training program)

PMed 8207. Basic and Applied Psychiatry. (1 cr; SP–Enrolled in PMed residency training program)


PMed 8212. Electromyography. (1-15 cr; SP–Enrolled in PMed residency training program)

PMed 8214. Readings in Electromyography. (1-3 cr; SP–Enrolled in PMed residency training program)


PMed 8282. Problems in Human Movement. (4 cr; SP–Registered Ph.D. grad student in rehabilitation science or field related to rehabilitation; #; A-F only) Mechanisms of pathology/recovery associated with neurologically based problems in human movement (e.g., paralysis, spasticity, tremor).

PMed 8300. Research Seminar in Occupational Therapy. (1 cr; QP–5392 or #; SP–5392 or #; S-N only) Critical reviews of research literature in occupational therapy. Issues related to the successful conduct/ publication of research. Development of Plan B project outline.

PMed 8310. Research Problems in Occupational Therapy. (1-4 cr [max 4 cr]; QP–5392; SP–Plan B student, 5392 or #; S-N only) Individual, concentrated study of a problem in occupational therapy. Completion of Plan B project. Note: Students register for PMed 8310 for 2 credits in fall and 2 credits in spring for a total of 4 credits.

PMed 8320. Fieldwork Education in Occupational Therapy I. (4 cr; QP–5343, 5344, 5380 or #; SP–5343, 5344, 5380 or #; S-N only) Supervised clinical practice in affiliated hospitals and community agencies. Students apply critical thinking through supervised application of theory and skills.

PMed 8321. Fieldwork Education in Occupational Therapy II. (4 cr; QP–quantum mechanics, 5344, 5380 or #; SP–5343, 5344, 5380 or #; S-N only) Supervised clinical practice in affiliated hospitals and community agencies. Students apply critical thinking through supervised application of theory and skills.

PMed 8322. Fieldwork Education in Occupational Therapy III: Optional. (1-6 cr; QP–5343, 5344 or #; SP–5343, 5344 or #; S-N only) Optional fieldwork experience involving supervised practice in clinic or community agency with specialty focus. Sample topics: hand therapy, school therapy, clinical research. Students apply critical thinking through supervised application of theory and skills.

Physical Therapy (PT)

Department of Physical Medicine and Rehabilitation

Medical School

PT 8333. FTE: Master’s. (1 cr; SP–Master’s student, advisor and DGS consent)
PT 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

School of Physics and Astronomy

Institute of Technology

Phys 5001. Quantum Mechanics I. (4 cr; QP–[[5102 or equiv]], adv calc [or #]; SP–# or adv) Schroedinger equation; bound state and scattering problems in one dimension. Spherically symmetric problems in three dimensions, angular momentum and the hydrogen atom. Approximation methods for stationary states. Time-dependent perturbation theory. Operators and states vectors; general formalism of quantum theory.

Phys 5002. Quantum Mechanics II. (4 cr; QP–5151 or equiv, SP–5001 or equiv) Symmetry in quantum mechanics, space-time symmetries and the rotation group, Clebsch-Gordan coefficients and the Wigner-Eckart theorem. Scattering theory. Method of second quantization with elementary applications. Relativistic wave equations including Dirac equation.

Phys 5011. Classical Physics I. (4 cr; QP–5022, 5024, adv calc [or #]; SP–# or 4001, 4002 or #) Classical mechanics: Lagrangian and Hamiltonian mechanics, orbital dynamics, rigid body motion, special relativity.

Phys 5012. Classical Physics II. (4 cr; QP–5051; SP–5011 or #) Classical electrodynamics, magnetostatics, Maxwell’s equations, electromagnetic waves, radiation, interaction of charged particles with matter.

Phys 5041. Analytical and Numerical Methods of Physics I. (4 cr; QP–two 5000 Math courses; SP–Grad or #) Survey of mathematical techniques, both analytic and numerical, needed for physics. Application to physical problems.

Phys 5042. Analytical and Numerical Methods of Physics II. (4 cr; QP–# or #; SP–# or #) Survey of mathematical techniques, both analytic and numerical, needed for physics. Application to physical problems.

Phys 5071. Physics for High School Teachers: Experimental Foundations and Historical Perspectives. (3 cr; QP–Gen physics, #; for physics grad or grad physics minor; SP–Gen physics, #; no cr for physics grad or grad physics minor) In-depth examination of conceptual theme in physics, its experimental foundations and historical perspectives. Kinematics and dynamics from Aristotle through Einstein; nature of charge and light; energy and thermodynamics; electricity; magnetism, and quantized fields; structure of matter.

Phys 5401. Physical Pharmacology. (4 cr; QP–General phys, calculus; SP–1301 or 1401) Musculoskeletal system, circulatory system, immune system, transport, biological controls systems, propagation and action potential in nervous system, biomagnetics, electromagnetism and ultrasound.

Phys 5402. Radiological Physics. (4 cr; QP–General phys, calculus; SP–1302 or 1402) Signal analysis, medical imaging, medical X-rays, tomography, radiation therapy, nuclear medicine, MRI and similar topics.

Phys 5701. Solid State Physics for Engineers and Scientists. (4 cr; QP–1254, 3512, grad or advanced undergrad in physics or engineering or the sciences or #; SP–Grad or advanced undergrad in physics or engineering or the sciences) Crystal structure and bonding; diffraction; phonons; thermal and dielectric properties of insulators/ferrimagnets; semiconductors.

Phys 5702. Solid State Physics for Engineers and Scientists. (4 cr; QP–5231 or #; SP–5701 or #) Quantum mechanics and paramagnetism; ferromagnetism and antiferromagnetism; optical phenomena; lasers; superconductivity and superconducting properties.

Phys 5950. Colloquium Seminar. (1 cr; SP–Grad–advanced undergrad in physics, #; SP–Grad or advanced undergrad in physics, #) Advanced undergraduates give talks on advanced topics.

Phys 5980. Introduction to Research Seminar. (1 cr [max 3 cr]; SP–Grad or upper div phj major; SP–Grad or upper div phj major; S-N only) Introduction to the research activities of the School of Physics and Astronomy.

Phys 5993. Directed Studies. (1-5 cr [max 15 cr]; QP–#; SP–# or advanced undergrad; SP–# or advanced undergrad; #) Independent, directed study in physics in areas arranged by the student and a faculty member.

Phys 5994. Directed Research. (1-5 cr [max 15 cr]; QP–#; SP–# or advanced undergrad in physics, #; SP–# or advanced undergrad in physics, #) Problems, experimental or theoretical, of special interest to student. Written report.

Phys 8001. Advanced Quantum Mechanics. (3 cr; QP–Phys 5153, SP–Phys 5002 or #) Topics in non-relativistic quantum mechanics; second quantization. Introduction to Dirac and Green’s function techniques and relativistic wave equations. Application of relativistic perturbation theory to particle interactions with electromagnetic field; various interactions of elementary particles.


Phys 8012. Quantum Field Theory II. (3 cr; QP–#; SP–8381; SP–# or #) Aspects of general theory of quantized fields, including space-time and discrete transformation properties, the CPT theorem, and the spin-statistics connection. Introduction to functional and path-integral methods. Renormalization group and asymptotic freedom. Semi-classical methods and invariance in gauge theories.
Phys 8013. Special Topics in Quantum Field Theory. (3 cr; QP–8370 or #; SP–8300 or #) Includes non-perturbative methods in quantum field theory, supersymmetry, two-dimensional quantum field theories and their applications, lattice simulations of quantum field theories, topological quantum field theories, quantum field theory methods applied to condensed matter physics, and string theory.

Phys 8100. Seminar: Problems of Physics Teaching and Higher Education. (1 cr [max 3 cr]; SP–#) Lectures and informal discussions of courses and curricula, techniques, and materials important in college undergraduate physics instruction, relation to general problems of higher education.

Phys 8301. Symmetry and Its Application to Physical Problems. (3 cr; QP–5153; SP–5002 or #) Fundamental invariance principles obeyed by laws of physics. Group theory as a tool for understanding symmetry and invariance to help understand behavior of physical systems. Applications made to condensed-matter physics, astrophysics, biophysics, and physical chemistry.

Phys 8333. FTE: Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)

Phys 8401. Atomic and Molecular Structure. (3 cr; QP–5153; SP–5002 or #) Understanding behavior of atoms and molecules in terms of basic interactions between electrons and nuclear and electromagnetic radiation. Applications made to condensed-matter physics, astrophysics, biophysics, and physical chemistry.

Phys 8444. FTE: Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)

Phys 8500. Plan B Project. (4 cr; SP–#; may be taken once to satisfy Plan B master’s project requirement; no cr toward PhD) Project topic assigned between student and instructor. Written report required.


Phys 8600. Seminar: Space Physics. (1 cr; max 6 cr; SP–#; 5-S Only) Current topics in space physics and plasma physics.


Phys 8662. Plasma Physics II. (3 cr; QP–5168; SP–4621, 5012 or #; SP–#) Theory of plasma waves and instabilities, collisions, radiation, transport, nonlinear wave particle and wave-diffusion interactions, instabilities in inhomogeneous plasmas.


Phys 8666. Doctoral Pre-Thesis Credits. (1-18 cr; max 60 cr) (Doctoral student who has not passed prelim oral)

Phys 8700. Seminar: Condensed Matter Physics. (1 cr; max 6 cr; SP–#; 5-S Only) Current research.


Phys 8750. Advanced Topics in Condensed Matter Physics. (3 cr; max 9 cr; SP–8222; SP–8712 or #) Sample research topics: magnetism, superconductivity, low-temperature physics, superfluid helium.

Phys 8777. Thesis Credits: Master’s. (1-18 cr; max 50 cr; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Phys 8800. Seminar: Nuclear Physics. (1 cr; max 6 cr; SP–#; 5-S Only) Current research topics.

Phys 8801. Nuclear Physics I. (3 cr; QP–5151 or #; 5151; SP–5001 or #) Properties of nuclei based on hadronic and quark-gluon degrees of freedom. Relativistic field theory at finite temperature and density applied to many-body problems, especially nuclear matter and quark-gluon plasma. Applications to lepton and hadron scattering, nuclear-matter collisions, astrophysics, and cosmology.

Phys 8802. Nuclear Physics II. (3 cr; QP–5152 or #; 5152; SP–8801 or #) Properties of nuclei based on hadronic and quark-gluon degrees of freedom. Relativistic field theory at finite temperature and density applied to many-body problems, especially nuclear matter and quark-gluon plasma. Applications to lepton and hadron scattering, nuclear-matter collisions, astrophysics, and cosmology.

Phys 8805. Advanced Topics in Nuclear Physics. (3 cr; max 9 cr; SP–8800 or #) Research topics.

Phys 8888. Thesis Credits: Doctoral. (1-24 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 24 cr required)

Phys 8900. Seminar: Elementary Particle Physics. (1 cr; max 6 cr; SP–#) Elementary particle physics, high-energy physics, particle astrophysics and cosmology.

Phys 8901. Elementary Particle Physics I. (3 cr; QP–8122 or #; SP–8900 or #) Types of fundamental interactions. Exact and approximate symmetries and conservation laws. Gauge quantum gravitons, photons, and Z bosons, gluons, fundamental fermions, leptons and quarks. Isotopic and flavor SU(3) symmetries of strong interaction. Heavy hadrons. Amplitudes and probabilities. Quantum chromodynamics.


Phys 8950. Advanced Topics in Elementary Particle Physics. (3 cr; max 9 cr; SP–8902 or #) Research topics.

Phys 8994. Research in Physics. (1-12 cr [max 24 cr]; SP–#) Research under faculty direction.
Courses

Phlb 5510. Advanced Cardiovascular Physiology and Anatomy. [2-3 cr; SP–]

Phlb 5511. Advanced Neuromuscular Junction Physiology. [2-3 cr; SP–]

Phlb 8294. Research in Physiology. (1-18 cr; SP–Grad cellular and integrative phlb major, #)

Phlb 8310. Advanced Topics in Cellular Physiology. (1 cr [max 4 cr]; SP–)

Phlb 8333, FTE: Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)

Phlb 8444, FTE: Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)

Phlb 8666. Doctoral Pre-Thesis Credits. (1-18 cr [max 60 cr]; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

Phlb 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Phlb 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required)

Plant Biology (PBio)

College of Biological Sciences

PBio 5109. Current Questions in Fungal Biology. (2 cr; QP–Biol 5003 or GCB 3022; SP–Biol 4003 or GCB 3022; A-F only)

PBio 5221. Molecular Evolution. (2 cr; QP–Biol 5003 or GCB 3022; SP–Biol 4003 or GCB 3022; A-F only)

PBio 5301. Plant Genomics. (3 cr; SP–Intro course in genetics, intro course in biochemistry or #)

PBio 5412. Plant Physiology. (3 cr; QP–Biol 1103 or Biol 3012 or Biol 3812; Biol 5001 or Biol 3021 or Biol 5331; SP–Biol 2022 or Biol 3002 or Biol 3007 or Biol/BioC 3021 or Biol 4331)

PBio 5414. Plant Cell and Molecular Biology. (3 cr; QP–Biol 1103 or Biol 3012 or Biol 3812; Biol 5002 or Biol 5003 or GCB 3022; SP–Biol 2022 or Biol 3002 or Biol 3007 or Biol/BioC 3021 or Biol 4003 or GCB 3022)

Plant Pathology (PlPa)

College of Agricultural, Food, and Environmental Sciences

PlPa 5003. Diseases of Forest and Shade Trees. (3 cr; QP–Biol 1009 or equiv; SP–Biol 3012 or Biol 3812; Biol 5001 or Biol 3021 or Biol 5331; SP–Biol 2022 or Biol 3002 or Biol 3007 or Biol/BioC 3021 or Biol 4331)

PlPa 5103. Physiological and Molecular Plant-Microbe Interactions. (3 cr; QP–Biol 1009 or equiv; SP–Biol 3012 or Biol 3812; Biol 5001 or Biol 3021 or Biol 5331; SP–Biol 2022 or Biol 3002 or Biol 3007 or Biol/BioC 3021 or Biol 4331)
Courses

Pol 5275. Contemporary Political Thought. (3-4 cr; SP–§4427; grad student) 20th-century political thought. The rise and fall of radical ideologies. Critical analysis of key Marxist and critical thinking.

Pol 5441. Environmental Policy. (3 cr; SP–§4431; non-pol sci grad student or #) How political and social system deals with environmental issues. How third world countries deal with environmental protection/economic growth. How international communities must deal with global environmental problems.

Pol 5461W. European Government and Politics. (4 cr; SP–§4461W; 1054 or 3051 or non-political science grad student or #) Political institutions in their social settings. Power and responsibility. How to deal with them. Political decision making. Government and economic order.

Pol 5467. Politics and Market in Contemporary Japan. (3-4 cr; SP–§4467, 9EAS 4467; 1054 or 3051 or non-pol sci grad student or #) How Japan combined rapid economic development and social stability in post-war period. Strengths/weaknesses of Japanese model of capitalism, particularly not very "globalized" world.

Pol 5471. After Communism: Russia and the Commonwealth of Independent States. (3-4 cr; SP–§4471; 1054 or 3051 or non-pol sci grad student or #) Politics of newly independent states of former Soviet Union, particularly Russia. Political transformation, sources of political stability/unstability. How to deal with them. Political decision making. Government and economic order.

Pol 5481. Governors and Markets. (3-4 cr; SP–§4481; 1054 or 3051 or non-pol sci grad student or #) Connection between democracy and market. Focuses on countries in North America, Europe.

Pol 5483. Grassroots Politics. (3-4 cr; SP–§4483; grad student) How political and social system deals with environmental issues. How third world countries deal with environmental protection/economic growth. How international communities must deal with global environmental problems.

Pol 5485. Human Rights and Democracy in the World. (3-4 cr; SP–§4485; at least one 1xxx or 2xxx course in pol sci, non-pol sci grad student or #) History of ideas about human rights and democracy. Economic, political, psychological, and ideological explanations for repression.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Requirements</th>
<th>Description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pol 5487</td>
<td>Struggle for Democratization and Citizenship (3 cr; Pol sci grad student)</td>
<td></td>
<td></td>
<td>History of democratic movement from its earliest moments in history to present. Attemps to draw balance sheet. Emphasizes how disenfranchised fought to become included.</td>
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<tr>
<td>Pol 5501</td>
<td>Supreme Court and Constitutional Interpretation (3 cr; SP–§4501; 1001 or 1002 or equiv or non-pol sci grad student or #)</td>
<td></td>
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<td>Historical approach to Court's landmark decisions. Techniques of judicial review. Court's role as the final arbiter of constitutional issues. Major federal Indian policy. Major federal Indian policies. Views attitudes of policy-makers, reactions of indigenous nations to policies. Effect of bodies of literature on policies.</td>
<td></td>
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<tr>
<td>Pol 5736</td>
<td>American Political Parties (3-4 cr; SP–§4767; [1001 or equiv] or non-pol sci grad student)</td>
<td></td>
<td></td>
<td>Study of the major parties as political organizations and political institutions.</td>
<td></td>
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<tr>
<td>Pol 5766</td>
<td>American Political Culture and Values. (3-4 cr; SP–§4766; 1001 or equiv or non-pol sci grad student or #)</td>
<td></td>
<td></td>
<td>Consultation between common law and civil law traditions.</td>
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<tr>
<td>Pol 5767</td>
<td>Public Opinion and Voting Behavior. (3-4 cr; SP–§4767; [1001 or equiv], grad student or #)</td>
<td></td>
<td></td>
<td>Major factor influencing elections. Political attitude formation and change. Data analysis unprepared.</td>
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<tr>
<td>Pol 5810</td>
<td>Topics in International Politics and Foreign Policy. (3-4 cr; SP–§4832; 1001 or equiv or non-pol sci grad student)</td>
<td></td>
<td></td>
<td>Selected issues in contemporary international relations. Topics: vary.</td>
<td>Class Schedule</td>
</tr>
<tr>
<td>Pol 5822</td>
<td>Economics. (3 cr; SP–§4833; 1001 or equiv) or non-pol sci grad student)</td>
<td></td>
<td></td>
<td>History of economic thought. Major areas in present U.S. economy policy (e., future of NATO, nuclear strategy in balance of power, nuclear deterrence, nuclear disarmament, arms control).</td>
<td>Research ethics. Study of economic theory, international economics and monetary policies. Economic systems. Contrast between common law and civil law traditions.</td>
</tr>
<tr>
<td>Pol 5823</td>
<td>The United States in the Global Economy. (3-4 cr; SP–§4835 recommended; SP–§4833; 3835 recommended)</td>
<td></td>
<td></td>
<td>Study of foreign relations of the United States. Foreign economic policy (trade, aid, investment, monetary, migration policies). Effects of policies and international economic relations on U.S. economy/politics.</td>
<td>Study of foreign relations of the United States. Foreign economic policy (trade, aid, investment, monetary, migration policies). Effects of policies and international economic relations on U.S. economy/politics.</td>
</tr>
<tr>
<td>Pol 5836</td>
<td>Making Foreign Policy: Perceptions and Decisions. (3 cr; SP–§4836; non-pol sci grad student)</td>
<td></td>
<td></td>
<td>Undergraduate course in foreign policy. Decision making in the foreign policy process. View of the foreign policy process at the State Department.</td>
<td>Study of foreign policy. Decision making in the foreign policy process. View of the foreign policy process at the State Department.</td>
</tr>
<tr>
<td>Pol 5872</td>
<td>Global Environmental Politics. (3 cr; SP–§4872; non-pol sci grad student)</td>
<td></td>
<td></td>
<td>Environment as a key aspect of the global political agenda. Non-governmental and governmental international organizations. Political solutions to the environment. Law of the sea and others selected issues. International security and the environment.</td>
<td>Study of environmental politics and their impact on foreign policy.</td>
</tr>
<tr>
<td>Pol 5881</td>
<td>International Law. (3-4 cr; SP–§4881; 3835 or non-pol sci grad student or #)</td>
<td></td>
<td></td>
<td>How international law matters for world politics, War crimes, human rights, Law of the sea and others selected issues. International security and the environment.</td>
<td>Study of international law and its impact on foreign policy.</td>
</tr>
<tr>
<td>Pol 5885</td>
<td>International Conflict and Security (3-4 cr; SP–§5885; grad student)</td>
<td></td>
<td></td>
<td>Application of game theory to international politics. Conflict and cooperation, global environmental commons, deterrence and reputation.</td>
<td>Study of conflict and security in international politics.</td>
</tr>
<tr>
<td>Pol 5889</td>
<td>Governments and Global Trade and Money. (3-4 cr; SP–§4883; 3835 or non-pol sci grad student or #)</td>
<td></td>
<td></td>
<td>Study of international trade and monetary issues including north-south and east-west relations.</td>
<td>Study of international trade and monetary issues including north-south and east-west relations.</td>
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<tr>
<td>Pol 5970</td>
<td>Individual Research and Research (1-4 cr; SP–§4887; [max 3 cr]; SP–A, A, Q)</td>
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<td>Guided individual reading or study.</td>
<td>Guided individual reading or study.</td>
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<tr>
<td>Pol 8101</td>
<td>Introduction to Political Science. (3 cr; SP–§4810; grad student)</td>
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<td></td>
<td>History, scope, and methods of political science as a discipline; current applied major research programs (including statistics, pluralism, institutionalism, realism, behavioralism, rational choice, and critical theory).</td>
<td>Study of the major areas of political science: history, scope, and methods.</td>
</tr>
<tr>
<td>Pol 8122</td>
<td>Positive Theory. (3 cr; SP–Grad pol sci major or #)</td>
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<td>Survey of positive political theory and rational-choice model in political science.</td>
<td>Survey of positive political theory and rational-choice model in political science.</td>
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<tr>
<td>Pol 8126</td>
<td>Qualitative Methods. (3 cr; SP–Grad pol sci major or #)</td>
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<td></td>
<td>Introduction to qualitative methods in social science. Practical, hands-on training through fieldwork projects devised and carried out during the semester. Research involving observation, narrative interpretation, ethical problems, and issues of gender and race in fieldwork.</td>
<td>Introduction to qualitative methods in social science. Practical, hands-on training through fieldwork projects devised and carried out during the semester. Research involving observation, narrative interpretation, ethical problems, and issues of gender and race in fieldwork.</td>
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<tr>
<td>Pol 8131</td>
<td>Advanced Methods and Models. (3 cr; SP–Grad pol sci major, 6 cr 81xx seminars or #)</td>
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<td>Intersection of statistical methodology and deductive modeling; issues in merging inductive and deductive research. Sample topics: parties and elections, probabilistic voting, strategic modeling of international relations.</td>
<td>Intersection of statistical methodology and deductive modeling; issues in merging inductive and deductive research. Sample topics: parties and elections, probabilistic voting, strategic modeling of international relations.</td>
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<tr>
<td>Pol 8160</td>
<td>Topics in Models and Methods. (3 cr; SP–Grad pol sci major or #)</td>
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<td>Seminars on selected topics.</td>
<td>Seminars on selected topics.</td>
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<tr>
<td>Pol 8201</td>
<td>Understanding Political Theory. (3 cr; SP–Grad pol sci major or A)</td>
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<td>Key concepts and major approaches.</td>
<td>Key concepts and major approaches.</td>
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<tr>
<td>Pol 8215</td>
<td>Philosophy of Political Inquiry. (3 cr; SP–Grad pol sci major or #)</td>
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<td></td>
<td>Major schools in philosophy of science as applied to political inquiry: pragmatism, positivism, hermeneutics, critical rationalism, critical theory, realism. Themes of political inquiry: explanation, interpretation, theory, criticism. Political assumptions by philosophers of science; liberalism, democracy, control, relativism.</td>
<td>Major schools in philosophy of science as applied to political inquiry: pragmatism, positivism, hermeneutics, critical rationalism, critical theory, realism. Themes of political inquiry: explanation, interpretation, theory, criticism. Political assumptions by philosophers of science; liberalism, democracy, control, relativism.</td>
</tr>
<tr>
<td>Pol 8225</td>
<td>American Political Thought. (3 cr; SP–Grad pol sci major or #)</td>
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<td>Colonial era to present: Puritans, American Revolution, Constitution, origins of individualism, anti-slavery arguments, civil war and reconstruction, industrialization, westward expansion, Native Americans, immigration, populism, socialism, social Darwinism, growth of corporations and unions; Civil War, Great Depression, growth of American power at home and abroad.</td>
<td>Colonial era to present: Puritans, American Revolution, Constitution, origins of individualism, anti-slavery arguments, civil war and reconstruction, industrialization, westward expansion, Native Americans, immigration, populism, socialism, social Darwinism, growth of corporations and unions; Civil War, Great Depression, growth of American power at home and abroad.</td>
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<tr>
<td>Pol 8225</td>
<td>Democratic Theory. (3 cr; SP–Grad pol sci major or #)</td>
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<td>Computing models of democracy; classical, republican, liberal, radical, Marxist, neo-Marxist, pragmatist, populist, pluralist, postmodern, participatory. Domestic and international struggles over meaning of “democracy”; social science models of and findings on democracy.</td>
<td>Computing models of democracy; classical, republican, liberal, radical, Marxist, neo-Marxist, pragmatist, populist, pluralist, postmodern, participatory. Domestic and international struggles over meaning of “democracy”; social science models of and findings on democracy.</td>
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<tr>
<td>Pol 8225</td>
<td>Late Modern Political Thought. (3 cr; SP–Grad pol sci major or #)</td>
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<td></td>
<td>Theoretical responses and rival interpretations of Western economy, society, politics, and democratic culture in the modern age; theories of history; class struggle; the end of metaphysics and the death of God; technology and bureaucracy; political psychology of culture; in Hegel, Marx, Toqueville, Mill, Nietzsche, Weber, Foucault.</td>
<td>Theoretical responses and rival interpretations of Western economy, society, politics, and democratic culture in the modern age; theories of history; class struggle; the end of metaphysics and the death of God; technology and bureaucracy; political psychology of culture; in Hegel, Marx, Toqueville, Mill, Nietzsche, Weber, Foucault.</td>
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<tr>
<td>Pol 8260</td>
<td>Topics in Political Theory. (3 cr; max 6 cr)</td>
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<td>SP–Grad pol sci major or #)</td>
<td>SP–Grad pol sci major or #)</td>
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<tr>
<td>Pol 8275</td>
<td>Contemporary Political Thought. (3 cr; SP–Grad pol sci major or #)</td>
<td></td>
<td></td>
<td>From approximately World War II to the present.</td>
<td>From approximately World War II to the present.</td>
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</table>

262
Pol 8301. American Politics. (3 cr; SP–Grad pol sci major or #)
Seminar on main themes of theory and research in American politics, institutions, law, and policy. Major works on individual, mass, elite, and institutional behavior and their relationship to each other. Foundation for advanced seminars in American politics.

Pol 8302. Public Opinion and Political Participation. (3 cr; SP–Grad pol sci major or #)
Major theoretical perspectives on research on political participation, voting behavior, and public opinion. Voter turnout, importance of party identification, effects of campaigns, long-term change in public opinion, and designing and conducting research.

Pol 8303. Political Parties. (3 cr; SP–Grad pol sci major or #)
Party systems and sub-systems, party organizational characteristics, goals, and incentives: distribution of power and authority within the party; chief party functions; party as an organizer of governmental power; determinants of party structure and role.

Pol 8305. Interest Groups. (3 cr; SP–Grad pol sci major or #)
Theoretical approaches to study of interest groups, scope of group universe, lobbying, role of interest groups in advocacy.

Pol 8307. Proseminar in Political Psychology I. (1 cr; SP–Grad pol sci major or pol psych minor or #; S–N only)
Readings, discussion, and guest speakers. Topics vary by semester.

Pol 8308. Proseminar in Political Psychology II. (1 cr; SP–Grad pol sci major or pol psych minor or #; S–N only)
Readings, discussion, and guest speakers. Topics vary by semester.

Pol 8311. Political Psychology and Socialization. (3 cr; SP–Grad pol sci major or pol psych minor or #; A–F only)
Introduction to political psychology. Personality and politics, political cognition, emotion, and political behavior; political expertise; media and politics; aggression, authoritarianism, and political behavior; altruism and politics.

Pol 8312. Legislative Process. (3 cr; SP–Grad pol sci major or #)
Introduction to legislative politics: theories of legislative institutions and individual behavior; congressional elections; congressional committees; parties and leaders.

Pol 8313. Executive Process. (3 cr; SP–Grad pol sci major or #)
Tension between leadership and democracy in context of American presidency in terms of President’s relationship with federal bureaucracy, Congress, and making of diplomatic and military policy.

Pol 8314. Judicial Process. (3 cr; SP–Grad pol sci major or #)
Judicial systems and roles: selection of judges; organizing and supporting litigation; influences on judicial decisions; impact and enforcement of judicial decisions; courts and other institutions of government.

Pol 8321. Urban Politics. (3 cr; SP–Grad pol sci major or #; A–F only)
Selections of local leadership, relationship of political systems to governmental forms and social institutions; role and impact of political institutions; policy-making at local level; studies of policy problems; the emerging metropolises.

Pol 8325. State Politics and Intergovernmental Relations. (3 cr; SP–Grad pol sci major or #)
Theoretical approaches to comparative study of state politics, study of political culture and behavior, governmental institutions, and public policy at state level, federalism.

Pol 8331. Constitutional Law. (3 cr; SP–Grad pol sci major or #)
Overview of substantive and theoretical debates in American constitutional law; role of law and constitutional interpretation in shaping American political institutions and American politics.

Pol 8333. FTE: Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)

Pol 8335. Public Policy. (3 cr; SP–Grad pol sci major or #)
Theoretical approaches to study of state and local governmental innovation and policy learning, comparative policy outputs, policy process models, interest groups, and selected areas of public policy.

Pol 8337. Welfare State Theories and American Social Policy. (3 cr; SP–Grad pol sci major or #)
Rival theoretical explanations for causes and nature of welfare state development in context of four American social policy areas: social security, welfare, education, and health care.

Pol 8360. Topics in American Politics. (1–3 cr; max 3 cr; SP–Pol sci graduate student or #)
Readings/research in special topics or problems.

Pol 8401. International Relations. (3 cr; SP–Pol sci graduate student or A)
Basic theoretical approaches to study of international politics, and representative world-wide issues of six decades.

Pol 8402. Conflict Dynamics and Security. (3 cr; SP–Grad pol sci major or #)
Introduction to contending theories of international conflict and international security.

Pol 8403. International Norms and Institutions. (3 cr; SP–Grad pol sci major or #)
Origins, roles, and effectiveness of international norms and institutions; theoretical explanations and debates. Institutions of sovereignty, national legal systems, and the role of international law, international organizations, and non-governmental organizations; and interaction between state and international norms.

Pol 8404. International Hierarchy. (3 cr; SP–Grad pol sci major or #)
Anomalous structures and processes of international relations; systemic conditions and implications of informal empire and structures of hegemony; cultural productions of differences and inequality.

Pol 8405. International Political Economy. (3 cr; SP–Grad pol sci major or #; A–F only)
Theoretical and policy issues in international economic relations. Different approaches for understanding outcomes in international economy. Trade, finance, labor markets, creation and maintenance of international regimes, and globalization of economic liberalism.

Pol 8406. Politics of International Finance. (3 cr; SP–Grad pol sci major or #)
Relationship between workings of the international political system and international markets for finance and capital.

Pol 8407. Morality in World Politics. (3 cr; SP–Grad pol sci major or #)
Approaches to normative theorizing on and empirical research on moral norms in world politics. Theoretical topics: realism, communitarianism, consequentialism, postmodernism, and cultural relativism. Substantive issues: ethics of war, peace, and moral implications of technology, and new war (Gulf War).

Pol 8408. International Relations of the Environment. (3 cr; SP–Grad pol sci major or #)
Origins, roles, and effectiveness of international norms and institutions; theoretical explanations and debates. Institutions of sovereignty, national legal systems, and the role of international law, international organizations, and non-governmental organizations; and interaction between state and international norms.

Pol 8633. Comparative Sociopolitical Change. (3 cr; SP–Grad pol sci major or #)
Theoretical and methodological approaches to study of comparative politics, focusing on processes of democratization and modernization, political development and decay, social movements, and prospects for democracy.

Pol 8641. American Foreign Policy. (3 cr; SP–Grad pol sci major or #)

Pol 8844. FTE: Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)

Pol 8846. Topics in International Relations. (3 cr; max 6 cr; SP–Grad pol sci major or #)
Readings and research in advanced topics or problems. Recent topics: global environmental issues, morality in world politics, and norms and institutions in world politics.

Pol 8601. Introduction to Comparative Politics. (3 cr; SP–Grad pol sci major)
Methodological approaches and issues in comparative politics, development, democratization, national choice, social movements.

Pol 8603. European Government and Politics. (3 cr; SP–Grad pol sci major or #; A–F only)
Theoretical and methodological approaches focused on European politics. Many of these theories have broad relevance for comparative politics, for example, theories about the fate of cultural and national bases, parties and social movements, and constitutional structures and institutions have broad relevance for the field of comparative politics.

Pol 8605. Government and Politics in Africa. (3 cr; SP–Grad pol sci major or #; A–F only)
Theoretical and methodological approaches to study of African politics, focusing on processes of democratization and modernization, political development and decay, social movements, and prospects for democracy.

Pol 8606. Government and Politics of Russia and the Commonwealth of Independent States. (3 cr; SP–Grad pol sci major or #; A–F only)
Current topics: the transformation underway in the former Soviet Union. Roots of current transformation, including causes and legacy of the Russian revolution and creation of the Soviet Union. Issues in current transformation, including nationalism, economic reform, and democratization. Professional knowledge of basic Soviet politics is assumed.

Pol 8611. Chinese Politics. (3 cr; SP–Grad pol sci major or #)

Pol 8615. The Political Economy of Contemporary Japan. (3 cr; SP–Grad pol sci major or #)

Pol 8619. Latin American Politics. (3 cr; SP–Grad pol sci major or #)
Major political and economic issues confronting Latin American states and their relationships with the United States; U.S. policy toward Latin America; and Latin American political development.

Pol 8633. Comparative Sociopolitical Change. (3 cr; SP–Grad pol sci major or #)
Major bodies of theory on development, democracy and modernization, social movements, civil society, the state, and transnational linkages.

Pol 8633. Comparative Sociopolitical Change. (3 cr; SP–Grad pol sci major or #)
Major bodies of theory on development, democracy and modernization, social movements, civil society, the state, and transnational linkages.
Courses

Pol 8637. Comparative Political Economy. (3 cr; SP–Grad pol sci major or #; A-F only) Connections between democracy and markets, emphasizing experiences of countries in North America and Europe.

Pol 8641. Comparative Mass Political Behavior. (3 cr; SP–Grad pol sci major or #; A-F only) Examined from cross-national perspective, development of political participation, mobilization and its effects, development of political cleavages and political parties as vehicles of conflict, modes of political competition and modern political parties, and representation and vote-weighing systems.

Pol 8643. Comparative Political Institutions. (3 cr; SP–Pol sci grad student or #; A-F only) Structure, evolution, and dynamics of various political institutions in different settings. Theoretical approaches, comparative frameworks. Introduction to literature on political institutions. Preparation for comparative research on political institutions.

Pol 8660. Topics in Comparative Politics. (1-3 cr [max 6 cr]; SP–Grad pol sci major or #) Readings in advanced topics or problems; supervised research and teaching.

Pol 8666. Doctoral Pre-Thesis Credits. (1-18 cr [max 60 cr]; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral) Supervised research and teaching.

Pol 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required: Plan A only)

Pol 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required)

Psychology (Psy)

Department of Psychology
College of Liberal Arts

Psy 5012W. Psychology of Conditioning and Learning. (4 cr; QP–[3011 or 4011] or grad student or #; SP–3011 or 4011 or grad student or #) Review/evaluation of key questions, methods, theories, data about classical conditioning, instrumental learning, elementary cognitive processes. Emphasizes animal models.

Psy 5013. Laboratory in Conditioning and Learning. (4 cr; QP–[3010 or grad student], [3011 or 3012] or #; SP–[3005 or grad student], [4011 or 4012] or #) Exercises exploring forms of animal conditioned learning. Combines prepared/experimental exercises.

Psy 5014. Psychology of Human Learning and Memory. (3 cr; SP–3011 or 3015, except honors, grad) Survey of basic methods and findings of research on human learning, memory, and cognition. Emphasis on major factors influencing human encoding or acquisition of information and skill, retention, and retrieval. Theoretical perspectives on underlying processes of encoding, retention, and retrieval.

Psy 5015. Cognition, Computation, and Brain. (3 cr; QP; [3051 or 3051] or #; SP–[3005 or grad student], [4011 or 4012] or #) Human cognitive abilities (perception, memory, attention) from different perspectives (e.g., cognitive psychological approaches, cognitive neuroscience approaches).

Psy 5031W. Perception. (3 cr; SP–3031 or 3051 or #) Cognitive, computational, and neuroscience perspectives on visual perception. Topics include color vision, pattern vision, image formation in the eye, object recognition, reading, and impaired vision.

Psy 5034. Psychobiology of Vision. (3 cr; SP–3031 or #) Analysis of the properties and biological basis of visual perception in humans and animals. Emphasis on color vision, visual sensitivity and adaptation, nerve cells and circuits in the eye, structure and function of the visual brain.

Psy 5036. Computational Vision. (3 cr; QP–[3031 or 3051], [Math 1272 or equiv] or #; SP–[3031 or 3051], [Math 1272 or equiv] or #) Applications of psychology, neuroscience, computer science, database and computer science, computer science to design principles underlying visual perception, visual cognition, and action. Emphasizes biological/physical processing of images with respect to image formation, perceptual organization, object recognition, navigation, motor control.

Psy 5036W. Computational Vision. (3 cr; QP–[3031 or 3051], Math 1272 or #; SP–[3031 or 3051], Math 1272 or #) Applications of psychology, neuroscience, computer science to design principles underlying visual perception, visual cognition, action. Emphasizes biological/physical processing of images with respect to image formation, perceptual organization, object recognition, navigation, motor control.

Psy 5037. Psychology of Hearing. (3 cr; SP–3031 or #) Biological and physical aspects of hearing: auditory psychophysics, theories and models of hearing, perception of complex sounds including music and speech, clinical, and other applications.

Psy 5038W. Introduction to Neural Networks. (3 cr; QP–[3061 or Nsc 3102, Math 2243] or SP; SP–[3061 or Nsc 3102, Math 2243] or #) Parallel distributed processing models in neural cognitive science. Linear models, Hebbian rules, self-organization, non-linear networks, optimization, representation of information. Applications to sensory processing, perception, learning, memory.

Psy 5051W. Psychology of Human-Machine Interaction. (3 cr; SP–3031 or 3051 or #) Psychological perspectives on human-machine interaction, knowledge and limit performances. Cognitive and perceptual aspects of computer use, telepresence, and design and evaluation of sensory aids.

Psy 5054. Psychology of Language. (3 cr; QP–3011 [except for honors/graduate students]; SP–3005 or # [except for honors/graduate students]) Theories/experimental evidence in past/present conceptions of psychology of language.

Psy 5061. Biological Psychology. (3 cr; QP–3061; 1005 or Biol 1009 or #; SP–3061; 3005 or Biol 1009 or #) Physiological and neurophysiological processes underlying behavior of animals, including humans. Neural basis of learning/memory, sleep, wakefulness, and attention/alienation. Effects of drugs on behavior.


Psy 5064. Brain and Emotion. (3 cr; SP–3061 or 3061 or #; SP–3061 or 3061 or A-F only) Introduction to affective neuroscience. Focuses on how brain promotes emotional behavior in animals/humans. Biological theories of emotion reviewed in historical, current, theoretical contexts. Research related to specific "basic" emotions, including brain substrates for fear, sadness, pleasure, attachment. Implications for understanding emotional development, vulnerability to psychiatric disorders.

Psy 5101. Personality Psychology. (3 cr; QP–3101; 5862 or honors or grad student; SP–3101; 3010; 3005, [honors or grad student]) Theories and major issues/findings on personality functioning, personality structure, and personality assessment. Historically important and currently influential perspectives.
Courses

Psy 5121. History and Systems of Psychology. (3 cr; QP–8 of 5xxx courses in psychology or equiv or grad or; SP–6 of 5xxx courses in psychology or equiv). Survey of the history, methods, and content of modern psychological theory, research, and application. Schools of psychology (e.g., structuralism, functionalism, behaviorism, Gestalt psychology) and central theories of psychology reviewed in their historical and philosophical context.

Psy 5135. Psychological Differential. (3 cr; QP–5135; SP–3135 or 5135 or equiv; SP–4801 or equiv or, 5862 or equiv). Differential methods in student of human behavior. Overview of nature of psychological traits. Influence of age, sex, heredity, and environment in individual/group differences in ability, personality, interests, and social attitudes.

Psy 5136. Human Abilities. (3 cr; QP–3135 or 5135, 5862 or equiv or SP–3135 or 5135, 5862 or equiv or). Theory, methods, and applications of research in human abilities. Topics include intelligence, aptitude, achievement, specific abilities, information processing/learning and intelligence, aptitude/treatment interactions, and quantitative measurement issues.

Psy 5137. Introduction to Behavioral Genetics. (3 cr; QP–3135 or 5135 or SP–4801 or equiv or). Overview of genetic methods for studying human and animal behavior. Emphasis on the nature and origins of individual differences in behavior. Twin and adoption methods as well as modern methods like cytogenetics, molecular genetics, and linkage and association studies.

Psy 5138. Psychology of Aging. (3 cr; QP–3801; SP–3005 or equiv). Theories/findings concerning age-related changes in mental health, personality, cognitive functioning, productivity are reviewed and interpreted within context of multiple biological/social psychological changes that accompany age.

Psy 5202. Attitudes and Social Behavior. (3 cr; QP–3201 or SP–3201 or). Theory research in social psychology, other fields in psychology of attitudes, beliefs, values. These fields' relationship to social behavior. Principles of theories of persuasion.

Psy 5204. Psychology of Interpersonal Relationships. (3 cr; QP–3201 or # except for students in honors sequence and grad; SP–3201 or A-F only). Introduction to interpersonal relationship theory and research, with emphasis on conceptual and methodological issues in relationships research.

Psy 5205. Applied Social Psychology. (3 cr; QP–3201 or grad student or SP–3201 or grad student or A-F only). Application of social psychology to problems in domains such as physical/mental health, education, the media, desegregation, the legal system, energy conservation, public policy.

Psy 5206. Social Psychology and Health Behavior. (3 cr; QP–3201 or grad student or SP–3201 or grad student or A-F only). Survey of social psychological theory and research pertaining to processes by which people develop beliefs about healthfulness, relationship between these beliefs, adoption of health-related behavior. Effects of psychological factors on physical health.

Psy 5207. Personality and Social Behavior. (3 cr; QP–3101 or 3201 or honors or grad student or SP–3101 or 3201 or honors or grad student or A-F only). Conceptual and methodological strategies for scientific study of individuals and their social worlds. Applications of theory to research on issues of self, identity, and social interaction.

Psy 5501. Vocational and Occupational Health Psychology. (3 cr; QP–3801 or 3005 or SP–3005 or SP–5001). Survey of concepts, theories, methods, findings of vocational psychology/history, individual differences, vocational development, device adjustment, vocational assessment/counseling.

Psy 5604H. Abnormal Psychology. (3 cr; QP–3604; honors or grad student or SP–3504; honors or grad student or A-F only). Comprehensive review of psychological disorders. Etiology, diagnostic criteria, clinical research findings.

Psy 5606. Clinical Psychophysiology. (3 cr; SP–3005 or equiv; 5601 or 5604 or 5606 or SP–3001; 5862 or equiv). How psychophysiological methods such as autonomic and central nervous system recording are used in the study of major psychopathological disorders.

Psy 5701. Organizational Staffing and Decision Making. (3 cr; QP–3801, 8 cr in psy; SP–3001 or 4801 or equiv, 3711 or equiv). Application of psychological research to issues in personnel recruitment and selection and to measurement of job performance. Application of principles of decision making to human behavior. Survey of current research in employee selection.

Psy 5702. Psychological Foundations of Individual Behavior in Organizations. (3 cr; QP–3801, 8 cr in psychology; SP–5601 or 4801 or equiv). Theory research on human behavior performance in organizations. Organizational socialization processes across career spans, leadership style processes, work team structural characteristics, problem solving, decision-making processes. Group dynamics, interpersonal group processes.

Psy 5703. Psychology of Organizational Development and Change. (3 cr; SP–3711, 4801 or equiv or SP–3711). Theory and methods of improving performance of individuals at work through learning and instruction. Training needs analysis, models of instructional design, aptitude-treatment interactions, measurement of training outcomes, training evaluation, knowledge structures, specific training programs designed for critical training problems.

Psy 5705. Psychology of Work Motivation. (3 cr; QP–3801 or equiv; 3711 or SP–4801 or equiv, 3711 or equiv). Motivation as related to behavior and performance of individuals in organizational settings. Contemporary work motivation theories and practices that deal with determinants and environmental factors to skill acquisition, job performance, organizational citizenship behavior, and job satisfaction.


Psy 5960. Topics in Psychology. (1-4 cr; QP–5001, 5012 or 5061 or 5062 or 5064 or 5066 or 8010 or #; 5862 or 4801 or 5862 or #; SP–5012 or # or 5061 or 5062 or 5064 or 5066 or 8010 or 5862 or 4801 or #; S–N only). Contemporary topics in psychology office. Recommended)

Psy 5961. Psychological Assessment. (3 cr; QP–5865; SP–Grad psych major or A-F only). Selected topics in psychological assessment.
Courses

Psy 8207. Social Psychology History and Systems. (3 cr; SP–Psych Ph.D. candidate in soc psych or #; A-F only) Classic theories and research that have shaped contemporary social psychology.

Psy 8208. Social Psychology: The Self. (3 cr; SP–Psych background especially in personality and soc psych; A-F only) Social psychological theory and research concerning self and social behavior.

Psy 8209. Research Methods in Social Psychology. (3 cr; QP–5202 or 8201; SP–Grad psych major; A-F only) Experimental and quasi-experimental methods suitable for research in psychology. Stirps, interpretive, operational, and ethical issues.

Psy 8211. Proseminar in Political Psychology I. (1 cr; SP–Grad pol psych minor; S-N only) Readings, discussion, and guest speakers. Topics vary each semester.

Psy 8212. Proseminar in Political Psychology II. (1 cr; SP–Grad pol psych minor; S-N only) Readings, discussion, and guest speakers. Topics vary each semester.

Psy 8333. FTE: Master's. (1 cr; SP–Master's student, adviser and DGS consent)

Psy 8410. Perspectives in Learning, Perception, and Cognition. (1 cr [max 12 cr]; SP–#) Lectures and discussions on cognitive sciences by local and visiting faculty.

Psy 8444. FTE: Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)

Psy 8501. Counseling Psychology: History and Theories. (3 cr; SP–Counseling psych grad student or #) Introduction to history of counseling psychology and to primary theoretical orientations used by counseling psychologists. For graduate basic principles, application in counseling practice, and research support.

Psy 8502. Assessment in Counseling Psychology. (3 cr; SP–Counseling psych grad student or #) Principles and practice. Emphasizes psychometric assessment. History, foundations in measurement, basic methods, survey of instruments, test interpretation, evaluation, ethics.

Psy 8503. Interviewing and Intervention. (3 cr; QP–5851, 8502; SP–5851, 8502 or #) Skills-based course conceptualization of counseling process, stages of counseling, development of counseling skills, and strategies for behavior change.

Psy 8510. Counseling Psychology Beginning Practicum: General. (1-6 cr; SP–Counseling psych grad student, 8501, 8502 or equiv; S-N only) Beginning applied experiences in counseling psychology settings.

Psy 8511. Counseling Psychology Beginning Practicum: Specific. (1-6 cr; max 18 cr; QP–[8501, 8502, 8503] or SP–[5851, 8502, 8503] or equiv; counseling psych grad student; #; S-N only) Beginning applied experiences in counseling psychology settings.

Psy 8512. Counseling Psychology Beginning Practicum: Specific. (1-6 cr; max 18 cr; SP–Counseling psychology grad student, 8501, 8502, 8503 or equiv; #; S-N only) Beginning applied experiences in counseling psychology settings.

Psy 8514. University Counseling Practicum I. (4-6 cr; QP–8501, 8502, 8503 or equiv; SP–Counseling psychology grad student, 8501, 8502, 8503 or equiv; #; SP–5851 or #) Integrates science with supervised practice in University Counseling and Consulting Services (UCCS) involving career, academic, and personal counseling clientele.

Psy 8515. University Counseling Practicum II. (4-6 cr; QP–8501, 8502, 8503 or equiv; SP–Counseling psychology grad student, 8501, 8502, 8503 or equiv; 8514, 8515, 8516; S-N only) Integrates science with supervised practice in University Counseling and Consulting Services (UCCS) involving career, academic, and personal counseling clientele.

Psy 8541. Seminar: Multicultural Issues in Counseling Psychology. (2 cr; SP–Counseling psychology grad student or #; S-N only) Increases counselors' sensitivity to cultural issues by bringing to them work, including those that derive from professional training. Counseling strategies for diverse populations. Lectures, guest speakers, videos, group discussions, oral and written presentation; includes professional development action plan.

Psy 8542. Ethics in Psychology. (3 cr; SP–Counseling or clinical psychology grad student or #; S-N only) Ethical principles and codes for conduct. Ethical dilemmas faced by researchers, practitioners, and teachers.

Psy 8544. Counseling Psychology: Research Seminar I. (1 cr; SP–Counseling psychology grad student, 8501, 8502, 8503 or equiv; #; S-N only) Research problems specific to special populations, vocational research, assessment, and testing, and findings in these areas useful to counseling psychology practice.

Psy 8545. Counseling Psychology: Research Seminar II. (3 cr; QP–8544; SP–Counseling psychology grad student, 8501, 8502, 8503 or equiv; 8514, 8515, 8516; S-N only) Introduction to methods and content domains, including research design, methodological issues, analogue research, and process and outcome research.

Psy 8550. Assessment: WAIS-III. (2 cr; SP–Counseling psychology grad student or #; S-N only) Skills acquisition for administering, scoring, summarizing results of Wechsler Adult Intelligence Scale—Revised (WAIS-R).

Psy 8554. Assessment: Vocational Interest and Career Instruments. (3 cr; SP–Counseling psychology grad student, #; S-N only) History and development of vocational interest inventories and measures related to career development, scale construction methodology, research applications, interpretation, and use of instruments.

Psy 8560. Counseling Psychology Advanced Practicum I: General. (1-6 cr; SP–Counseling psychology grad student, 8501, 8502, 8503 or equiv; [8511, 85111] or [8515, 85151] or equiv), counseling psychology grad student [or #; S-N only]) Applied practice experience in counseling psychology settings and seminars that may include guest speakers, readings, and student presentations.

Psy 8561. Counseling Psychology Advanced Practicum II: General. (1-6 cr; SP–Counseling psychology grad student, 8501, 8502-8503 or equiv, 8510-8511 or 8514-8515 or equiv; #; S-N only) Applied practice experience in counseling psychology settings and seminars that may include guest speakers, readings, and student presentations on topics relevant to clients and settings of practice experiences.

Psy 8562. Counseling Psychology Advanced Practicum III: General. (1-6 cr; SP–Counseling psychology grad student, 8501, 8502-8503 or equiv, 8510-8511 or 8514-8515 or equiv; #; S-N only) Applied practice experience in counseling psychology settings and seminars that present topics relevant to clients and settings of practice experiences.

Psy 8564. Vocational Counseling for Work Adjustment. (3 cr; SP–Counseling psychology grad student or #; S-N only) Topics and problems. Research, operationalization, and applications of theory of work adjustment to vocational counseling.

Psy 8565. Counseling Psychology Advanced Practicum I: Vocational Assessment Clinic. (1-6 cr; SP–Counseling psychology grad student or #; S-N only) Applied practice experience in vocational assessment clinic of Department of Psychology. Career/vocational testing, assessment, decision making.

Psy 8566. Counseling Psychology Advanced Practicum II: Vocational Assessment Clinic. (1-6 cr; QP–8501, 8502, [8503 or equiv], 8514, [8515 or equiv], counseling psychology grad student; #; S-N only) Applied practice experience in Vocational Assessment Clinic of Department of Psychology. Career/vocational testing, assessment, decision making.

Psy 8567. Counseling Psychology Advanced Practicum III: Vocational Assessment Clinic. (1-6 cr; SP–Counseling psychology grad student, 8501, 8502, 8503 or equiv, 8514, 8515 or equiv; #; S-N only) Applied practice experience in Vocational Assessment Clinic of Department of Psychology. Career/vocational testing, assessment, decision making.

Psy 8570. Counseling Psychology Internship I. (1-12 cr [max 36 cr]; SP–Counseling psych Ph.D. candidate, #; S-N only) First part of counseling psychology internship.

Psy 8571. Counseling Psychology Internship II. (1-12 cr [max 36 cr]; SP–Counseling psych Ph.D. candidate, #; S-N only) Second part of counseling psychology internship.

Psy 8572. Counseling Psychology Internship III. (1-12 cr [max 36 cr]; SP–Counseling psych Ph.D. candidate, #; S-N only) Third part of counseling psychology internship.

Psy 8611. Assessment I. (5 cr; SP–Clinical psych grad student; A-F only) Theory and practice in clinical applications of assessment techniques and interviewing. Lab: observations, administration, scoring, interpretation.

Psy 8612. Assessment II. (5 cr; SP–8611, clinical psych grad student; A-F only) Theory and practice in clinical applications of assessment techniques and interviewing. Lab: observations, administration, scoring, interpretation.

Psy 8620. Clinical Psychology Practicum. (1-6 cr [max 36 cr]; SP–Clinical psych graduate student; S-N only) Field experience in professional work in clinical settings.

Psy 8621. Clinical Internship I. (1-3 cr; SP–Clinical psych grad student; A-F only) Professional methods in clinical psychology. Individual and group treatment techniques. Lectures and demonstrations of contemporary theories of methods of intervention with adults and children.

Psy 8622. Treatment I. (3 cr; QP–8621; SP–8621, clinical psych grad student; A-F only) Theory of intervention, applications of clinical methods.

Psy 8640. Research Seminar. (2 cr; SP–Clinical psychology grad student; S-N only) Current topics in first year clinical psychology graduate student seminar.

Psy 8660. The Psychopathic Personality: Theory and Research. (1 cr; SP–#) Research-oriented consideration of nature and etiology of psychopathic behavior.

Psy 8664. Personality Assessment. (3 cr; SP–#) Concepts and issues concerning individual differences in personality and their assessment: content, reality, and significance of personality traits; alternative classifications of personality traits; major alternative approaches to personality scale development.

Psy 8666. Doctoral Pre-thesis Credits. (1-18 cr; max 60 cr; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)
Psy 8701. Seminar in Industrial and Organizational Psychology I. (3 cr; SP–5011 or equiv, major in publ aff or sci and tech policy or publ hlth or #; SP–5021 or equiv, major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only) Determinants of behavior, performance, job satisfaction that can be influenced after an individual enters an organization. Application of research in motivation, social psychology, human factors, and implementation practices. Recent important and controversial developments.

Psy 8777. Thesis Credits: Master's. (1.18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required (Plan A only))

Psy 8881. Seminar: Psychometric Methods. (1 cr; SP–F) Reviews and individual research on current topics in psychological measurement and statistics.


Psy 8886. Hierarchical Models. (3 cr; SP–Q; SP–F) Methods for repeated measures and longitudinal data. Linear mixed-effects model. Treatment of missing data and unbalanced designs. Extensions to conditionally linear/nonlinear models. Exercises with software such as HLM and SAS PROC MIXED.

Psy 8888. Thesis Credits: Doctoral. (1.24 cr [max 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required)

Psy 8935. Readings in Behavioral Genetics and Individual Differences Psychology. (1 cr [max 100 cr]; SP–5135, 5137 or #; N-N only) Each week participants read and discuss one or two primary research articles.

Psy 8937. Seminar in Human Behavioral Genetics. (3 cr [max 6 cr]; SP–5137 or #) Advanced topics vary with each offering. Sample topics: gene identification in complex human traits, behavioral genetics of alcoholism, twin-family methodology.


Psy 8993. Directed Studies: Special Areas of Psychology and Related Sciences. (1-6 cr [max 6 cr]; GP–F, #) Special area of psychology or related science.

Psy 8995. Research Problems. (1-6 cr [max 36 cr]) Research problems.

Public Affairs (PA)

Hubert H. Humphrey Institute of Public Affairs

PA 5001. Intellectual Foundations of Public Action. (1.5 cr; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only) Evolution of fundamental approaches that underlie public planning, management, and policy analysis as strategies for public action. How public decision making is shaped by knowledge and values; role of rationality, conceptual approaches to public action along descriptive/normative lines and structural process lines.

PA 5002. Introduction to Policy Analysis. (1.5 cr; SP–Major in publ aff or publ policy or sci, tech, and environ pol or urban and regional planning or publ hlth or #; A-F only) Process of public policy analysis from problem structuring to communication of findings. Commonly used analytical methods. Alternative models of analytical problem solution.

PA 5003. Introduction to Financial Analysis and Management. (1.5 cr; SP–Major in publ aff or publ policy or sci, tech, and environ pol or urban and regional planning or publ hlth or #; A-F only) Basic finance and accounting concepts and tools used in public and nonprofit organizations. Fund accounting, balance sheet and income statement analysis, cash flow analysis, and public and nonprofit sector budgeting processes. Lectures and discussions, as well as cases and examples from nonprofit and public sector organizations.

PA 5004. Introduction to Planning. (3 cr; SP–Major in [publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only) History, institutional development of urban planning as a profession, intellectual foundations, planning theory, Roles of urban planners in U.S. International settings. Scope, legitimacy, limitations of planning and of planning process. Issues in planning ethics and in planning in settings of diverse populations/stakeholders.

PA 5011. Organizational Analysis, Management, and Design. (3 cr; SP–Major in [publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only) Survey course examines challenges facing higher-level managers in public and nonprofit organizations in mixed economy and democratic republic. Uses lectures and case studies to explore distinctive features of public and nonprofit management, skills necessary for effective management, and manager’s role in internal/external public policy making. Studied topics are covered in depth.

PA 5012. The Politics of Public Affairs. (3 cr; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only) Stages of policy making from agenda setting to implementation. Role and behavior of political institutions (courts, legislatures, executives, and bureaucracies) and citizens, social movements, and interest groups. Conceptual models of how democracy. Theories of the state. Team taught interdisciplinary course with small class sections.

PA 5013. Law and Urban Land Use. (1.5 cr; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only) Role of law in regulating and shaping urban development, land use, environmental quality, and local and regional governmental services. Interface between public and private sector.

PA 5021. Economics for Policy Analysis and Planning I. (3 cr; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only) Introduction to selected tools useful for public policy: intermediate microeconomics, rudiments of macroeconomics, and central concepts of international trade.

PA 5022. Economics for Policy Analysis and Planning II. (3 cr; QP–5011 or equiv, major in publ aff or sci and tech policy or publ hlth or #; SP–5021 or equiv, major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only) Application of economic reasoning to a variety of public policy issues that may vary by section. Includes cost/benefit analysis, public market valuation, and tax analysis.

PA 5031. Empirical Analysis I. (3 cr; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only) Basic statistical tools from probability and public policy analysis, frequency distributions, descriptive statistics, elementary probability and probability distributions, statistical inference, estimation and hypothesis testing, cross-tabulation and chi-squared distribution, analysis of variance, correlation, simple and multiple regression analysis.

PA 5032. Intermediate Regression Analysis. (1.5 cr; SP–5021 or equiv, major in publ aff or planning or sci and tech policy or publ hlth or #; SP–5031 or equiv, major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only) Basic statistical tools for probability and public policy analysis, family of regression models, alternative models of policy analysis, assumptions behind them. Problems using these models when such assumptions are not met.

PA 5033. Multivariate Techniques. (1.5 cr; SP–5021 or equiv, major in publ aff or planning or sci and tech policy or publ hlth or #; SP–5031 or equiv, major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only) Examinations of tools for understanding public affairs topics using maximum likelihood estimation approaches.

PA 5034. Community Analysis and Planning Techniques. (1.5 cr; SP–5021 or equiv, major in publ aff or planning or sci and tech policy or publ hlth or #; SP–5031 or equiv, major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only) Data analysis techniques for practitioners in fields of planning, management, and policy analysis who work at community and regional levels. Population analysis and forecasting techniques relevant for small geographic areas. Techniques for regional and local economic analysis, such as index analysis, economic base, and location quotient analysis.

PA 5035. Survey Research and Data Collection. (1.5 cr; SP–5021 or equiv, major in publ aff or planning or sci and tech policy or publ hlth or #; SP–5031 or equiv, major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hlth or #; A-F only) Introduction to research methods emphasizing applications to policy and applied research. Research design choices (e.g., descriptive, experimental, case studies), sampling, variable specification and measurement, conducting interviews, mailed questionnaires, qualitative techniques.

PA 5010. Management and Governance of Nonprofit Organizations. (1.5 cr; SP–Grad or #) Evolution of institutional approaches that underlie public planning, management, and policy analysis who work at community and regional levels. Population analysis and forecasting techniques relevant for small geographic areas. Techniques for regional and local economic analysis, such as index analysis, economic base, and location quotient analysis.

PA 5012. Organization Design and Change. (1.5 cr; SP–Grad or #) Basic concepts related to organizational design decisions. Management challenges associated with organizational change in context of public sector agencies and nonprofit organizations. Major forces for change, kinds of change, management of change. Case-based analysis and discussion.
PA 5111. Financial Management in Public and Nonprofit Organizations. (3 cr; SP–Grad student or #) Nonprofit/public sector financial development strategies, political strategies used to obtain funding, philanthropy, traditional public sector finance. Guest speakers.

PA 5131. Conflict Management: Readings in Theory and Practice. (3 cr; SP–Grad student or #) Current theory, Review of conflict resolution strategies, Aspects of interpersonal, group, organizational, and systemic conflict.

PA 5132. Mediation Training. (3 cr; SP–Grad student or #) Creating an arena for mediation, Skill expectations needed to mediate disputes between individuals, Among groups: balanced (peer or colleague), unbalanced (power differentials). Role playing, Group debriefing, critique, Cases.


PA 5190. Topics in Public and Nonprofit Leadership and Management. (1-3 cr [max 9 cr]; SP–Grad student or #) Selected topics.
Courses

PA 5442. Policy Design for Education and Human Development. (3 cr; SP—Grad student or #) Designing effective educational policies. Using interdisciplinary approaches to identify and understand core variables (economic, psychological, etc.). Work on policy design.

PA 5490. Topics in Social Policy. (1-4 cr [max 9 cr]; SP—Grad student or #) Selected topics.


PA 5502. Economic Development II. (2 cr; OP—[5502 or equiv], grad student or publ thirh student or adult spe student or #; SP—[5501 or equiv], grad student or 4-5 only) Economic development from macroeconomic/open-economy perspective. Sources of economic growth, agricultural development, Import-substitution industrialization, Endogenous growth models. Population, migration, and human development. Policy reform/implementation.

PA 5511. Community Economic Development. (3 cr; SP—Grad student or #) Context/motivations behind community economic development activities. Alternative strategies for organizing/implementing economic development projects. Tools/techniques for economic development analysis/planning (market analysis, feasibility studies, development plans). Implementation at local level.

PA 5521. Development Planning and Policy Analysis. (3 cr; SP—[5501 or equiv], [5502 or equiv], grad student or publ thirh student or adult spe student or #) Planning and policy analysis at national/regional/project levels. Direct/indirect effects of external shocks and government interventions on national/regional economies. Microeconomic modeling, input-output analysis, social accounting matrix/multipliers, project appraisal/evaluation techniques.

PA 5522. Economic Development Policies in Latin America. (3 cr; OP—[5011, 5502 or equiv], [grad student or publ thirh student or adult spe student] or #; SP—[5501 or equiv], [5502 or equiv], grad student or #) Evolution of economic development policies from import-substitution industrialization policies of 1950s/1960s through beginning of reform in 1970s, economic crisis of 1980s, and reform into 1990s. Emphasizes privatization, economic integration, exchange rate/trade, and domestic/adjustment policies.

PA 5531. Strategies for Sustainable Development: Theory and Practice. (1.5-5 cr; SP—[Microecon course, grad student or #]) Economic, environmental, and social aspects of sustainable development. Strategies, methods of implementation, and applications of sustainable development in different economic systems of industrialized/developing countries. Special attention to countries in transition.

PA 5590. Topics in Economic and Community Development. (1-3 cr [max 9 cr]; SP—Grad student or #) Selected topics.


PA 5611. Feminist Economics. (3 cr; OP—[5010, (grad student or adult spe student)] or #; SP—[5021, 5022 or equiv], grad student or #) Feminist philosophy, methodology, and economic practice. Feminist perspectives on development and the global economy, the family. Heterodox traditions in economics.

PA 5690. Topics in Women and Public Policy. (1-3 cr [max 9 cr]; SP—Grad student or #) Selected topics.


PA 5711. Science and Technology Policy. (3 cr; SP—Grad student or #) Effect of science/technology on global economy, politics, environment, energy. Role of national science/technology policies in development, diffusion, and adoption of technologies nationally/internationally. Issues related to technology policy, technological development, impact of technology, international cooperation.

PA 5721. Energy and Environmental Policy. (3 cr; SP—Grad student or #) Impact of energy production/consumption choices on environmental quality, sustainable development, and other economic/social goals. Emphasizes public policy choices for energy/environment, linkages between them.


PA 5790. Topics in Science, Technology, and Environmental Policy. (1-3 cr [max 9 cr]; SP—Grad student or #) Selected topics.


PA 5811. Public Policy Problems of Globalization. (3 cr; SP—Grad student or #) Policy problems facing national/subnational decision makers. Problems caused by increasing international mobility of goods, services, capital, persons, and ideas.

PA 5812. Open Economy Models: an Assessment. (3 cr; SP—[Intermediate macroeconomics, trade theory, grad student or #]) Open economies, implications for policy making/implementation. Issues at levels of international/domestic economies.

PA 5890. Topics in Foreign Policy and International Affairs. (1-3 cr [max 9 cr]; SP—Grad student or #) Selected topics.

PA 5901. Computer Applications in Public Affairs. (0.5-3 cr [max 6 cr]; SP—#; A-F only) Introduction to computer systems/applications in public affairs practice.

PA 5902. Computer Applications in Public Affairs. (0.5-3 cr [max 6 cr]; SP—#; A-F only) Introduction to computer systems/applications in public affairs practice.

PA 5903. Introduction to Computers and Applications at the Humphrey Institute. (2 cr; SP—International HHF fellow; S-N only) Computers, applications, basic skills, software such as MS Word, Excel, PowerPoint, Access. Using Internet, e-mail, search engines for research, HTML (through Web page creation software).

PA 5931. Role of the Media in Public Affairs. (3 cr; SP—Grad student or #) Historical/contemporary role of news media in defining/shaping public opinion/policy, primarily in the United States. Emphasizes critical research, professional skills in forms such as journalists hard news coverage, investigative reporting, documentaries, field experience, practice in governmental/public affairs.

PA 5941. Leadership for the Common Good. (4 cr; SP—#) Personal, team, organizational, visionary, political, and ethical aspects of leadership. Emphasizes building/experiencing a learning community.

PA 5951. Global Commons Seminar. (3 cr [max 6 cr]; SP—International Hubert H. Humphrey Fellows; SP—International Hubert H. Humphrey Fellows; S-N only) Meets specific needs of International Humphrey Fellows. Topics vary each year depending on the interests and needs of the fellows.

PA 5990. Topics: Public Affairs—General Topics. (1-3 cr [max 9 cr]; SP—Grad student or #) General topics in public policy.

PA 8001. Synthesis Seminar. (4 cr; SP—Grad PA major or #; A-F only) Development of interdisciplinary understanding of one or more policy areas through analysis of theory, readings, cases, and model-building exercises. This understanding is then used to articulate possible policy or system improvements, along with leadership implications for formulating and implementing them.

PA 8002. Synthesis Workshop. (4 cr; SP—[8001, grad PA major or #; A-F only] Development of public policy to advance public interest, common good. Recommendations flow from interdisciplinary understanding of problems, stakeholder analysis, modeling/analysis, Political feasibility, marketing, entrepreneurship, advocacy.

PA 8081. Capstone Workshop. (3 cr; SP—[Grad major in [public policy or [urban and regional planning] or [science, technology, and environment policy]] completion of core courses] or #; A-F only) Project external client issues addressed by student, client, and instructor. Students apply interdisciplinary methods, approaches, and perspectives studied in core courses to the issue. Written report includes analysis of issue and policy recommendations. Oral presentation of major findings. Concluding topic vary term-to-term.

PA 8082. Capstone Seminar. (3 cr; SP—[Grad major in [public policy or [urban and regional planning] or [science, technology, and environment policy]] completion of core courses] or #; A-F only) Facilitates completion of research paper. Focus on specific research. Student applies interdisciplinary methods, approaches, and perspectives studied in core courses to the issue. Written report includes analysis of issue and policy recommendations. Oral presentation of major findings. Concluding topic vary term-to-term.

PA 8105. Human Resources and Organizational Performance. (2 cr; OP—[5002, 5012 or equiv; SP—5032, 5022 or equiv] Impact of human resource policies and practices on organizational productivity and effectiveness. Role of government unions, and private sector institutions on organizational effectiveness.

For definitions of course numbers and symbols, see inside back cover. 269
PA 8183. Managing Collaborations. (3 cr; A-F only) Management challenges of operating within multiparty (combination of nonprofit, for-profit, and public enterprise) collaborations formed to deal with a societal problem. Combines in-class discussions of conceptual materials with applications in community. Student teams work for half a semester with local collaborations on management problems.

PA 8186. Public Services Redesign. (3 cr; A-F only) Theory, strategy, politics, and some practical mechanics required to adapt public service systems given constraints on resources and continuing pressure for efficiency and equity. In-class and out-of-class interaction with persons involved in redesign. Student papers on current redesign issues.

PA 8187. Leadership for Public Policy and Planning. (3 cr; A-F only) Introduction to major theoretical perspectives on leadership in public affairs. Role of leadership in policy change, governance, planning, and management. Personal, team, organizational, visionary, political, and ethical aspects of leadership. Students develop their own theory of leadership-in-action. Cases employed.

PA 8190. Advanced Topics in Public and Nonprofit Leadership and Management. (1-3 cr; max 6 cr) Selected topics.

PA 8201. Environment and Infrastructure Planning. (4 cr; SP–[Urban and regional planning] grad student or #; A-F only) Relationship between infrastructure, human settlement design. Natural resource systems as foundation of infrastructure provision. Environmental basis of, and political/legal institutional frameworks for land-use planning. Parallel computer lab, practicum assignment.

PA 8202. Networks and Places: Transportation, Land Use, and Design. (4 cr; SP–[Urban and regional planning] grad student or #; A-F only) Relationship between land use, transportation, development. Synthetic design skills for linking land-use transportation in urban settlements. Economic, political, legal, institutional frameworks for planning. Parallel computer lab, practicum assignment.

PA 8203. Neighborhood Revitalization Strategies and Theories. (4 cr; SP–[Urban and regional planning] grad student or #; A-F only) Policy-making, politics of planning in housing, community development, social policy. Connecting policy to local governmental planning. Use of current decision-making structures on policy outcomes. Importance of citizens, social movements, interest groups in policymaking process.

PA 8204. Regional, Economic, and Workforce Development Planning. (4 cr; SP–5021 or 5020, 5030; 150 only) Provides a rigorous foundation in the evolution and current state of regional development planning in the United States and abroad, in theories of regional and local economic development, linked to various techniques of analysis and implementation; and in workforce development planning at the regional and local level.

PA 8286. International Urban Planning. (3 cr; A-F only) Urbanization process and planning responses in cities of developing world. Urban sustainability, migration, housing, transportation, employment, and urban service delivery. Phenomena such as squatter settlement and informal economy that normally proceed unplanned and without formal government control.

PA 8290. Advanced Topics in Planning. (1-3 cr max 6 cr) Selected topics.


PA 8312. Analysis of Discrimination. (3 cr) Introduces students to policy analysis and other applied social science tools for measuring and detecting discrimination in market and nonmarket contexts. Applications of modern tools of labor economics and descriptive research to specific problems of market and nonmarket discrimination.

PA 8333. FTE: Masters. (1 cr; SP–Master's student, adviser and DGS consent)

PA 8386. Research Methods in Social and Labor Policy. (3 cr; SP–5032 or 5033, 5022 or equiv; A-F only) Use of social science research methods in analyzing and developing public policies.

PA 8390. Advanced Topics in Applied Policy Analysis Methods. (1-3 cr max 6 cr) Selected topics.

PA 8409. Advanced Topics in Social Policy. (1-3 cr max 6 cr) Selected topics.

PA 8583. Capstone Workshop on Economic and Community Development. (3 cr; A-F only) Comprehensive overview of state, local, community-based economic development strategies. Processes involved in producing broadly conceived economic development strategy. Institutional structures/processes to deal with economic change, new political realities.

PA 8590. Advanced Topics in Economic and Community Development. (1-3 cr max 6 cr) Selected topics.

PA 8686. Feminist Organizations. (3 cr; A-F only) Uses social movement literature and histories of U.S. second-wave feminism to study feminist organizations. Examining issues and conflicts within organizations and movements examined through comparative studies of feminism in Latin America, Eastern Europe, Britain, and Italy. Methods and sources for studying feminism.

PA 8690. Advanced Topics in Women and Public Policy. (1-3 cr max 6 cr) Selected topics.

PA 8777. Thesis Credits: Masters. (1-18 cr max 50 cr; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

PA 8790. Advanced Topics in Science, Technology, and Environmental Policy. (1-3 cr max 6 cr) Selected topics.

PA 8811. Strategic Issues in International Economic Policy. (3 cr) Compares experiences of industrial-developing countries in trade, investment, exchange rates, and immigration.

PA 8821. National Security Policy. (3 cr) Politics and economics of national security policy, defense policy, military strategy, and weapons procurement. Emphasis on the United States, other countries also discussed.

PA 8890. Advanced Topics in Foreign Policy and International Affairs. (1-3 cr max 6 cr) Selected topics.

PA 8991. Independent Study. (1-3 cr max 6 cr; SP–#)

Public Health (PubH)

School of Public Health

PubH 5003. Fundamentals of Alcohol and Drug Abuse. (1.5 cr; QP–55023; ed student or SP–55023; ed student or #) Lecture, discussion, and special readings on scientific, sociocultural, and attitudinal aspects of alcohol and other drug abuse problems. Emphasizes incidence, high risk populations, prevention, and intervention.

PubH 5004. Field Instruction in Public Health. (1-15 cr; QP–#) Directed instruction, including discussion on selected readings.

PubH 5005. Topics in Public Health. (1-10 cr; max 20 cr; QP–Advanced proposal; #) Directed instruction, including discussion on selected readings.

PubH 5010. Public Health Interventions for AIDS. (3 cr; QP–Upper div or grad student or professional school student or #; SP–Upper div or grad student or professional school student or #) Survey of HIV infection from public health perspective. Emphasizes intervention.


PubH 5020. Fundamentals of Social and Behavioral Science. (3 cr; SP–Public health or #) Four major approaches to public health problems: psychosocial, economic, community, policy. Lectures provide overview of theory and implementation. Small groups provide opportunity to practice skills.

PubH 5030. Prevention of High-Risk Behavior Among Adolescents. (2 cr; QP–Grad-level behavioral sci course [5050 preferred], [CHE or MCH or PubH Nutr or Epi MPH or Epi grad] or #; or 2nd-yr master's student recommended; [Grad-level behavioral sci course [5050 preferred], [CHE or MCH or PubH Nutr or Epi MPH or Epi grad] or #; or 2nd-yr master's student recommended; A-F only) Definitions of high-risk behaviors among adolescents. Intervention programs. Review of current literature. Students design prevention program overview based on theoretical or epidemiological database, use of health education/behavior change methods.

PubH 5034. Program Evaluation for Public Health Practice. (3 cr; QP–Che major or #; SP–Che or MCH major or #) Developing useful program evaluations. Emphasizes key skills for program administrators, planners, Needs assessment, evaluation, analyses, formative evaluation, implementation studies, outcome evaluations. Quantitative/qualitative data collection methods. Overall considerations.

PubH 5035. Applied Research Methods. (3 cr; QP–[5414 or 5450 or equiv], [5906 or 5852 or equiv], [che or pub hlth nutr major or #]; SP–5420 recommended; SP–5414 or 5450 or equiv, [5050 preferred], [CHE or MCH or PubH Nutr or Epi MPH or Epi grad] or #; or 2nd-yr master's student recommended; 4 cr recommended) Compares/contrasts experiences of industrial-developing countries in trade, investment, exchange rates, and immigration.

PubH 5050. Independent Study. (1-3 cr max 6 cr; SP–#) Use of computer software package to develop questionnaire and analyze data.
PubH 5040. Dying and Death in Contemporary Society: Implications for Intervention. (2 cr; QP–Upper div or grad student or professional school student or #; SP–Upper div or grad student or professional school student or #)

Concepts, attitudes, ethics, and lifestyle management related to dying, death, grief, and bereavement. Emphasizes preparing community health and helping professionals for educational activities in this arena.

PubH 5049. Legislative Advocacy Skills for Public Health. (3 cr; QP–5398, #; SP–5398, #; A-F only)
Legislative arenas and public health practice; develops skills necessary to participate in arenas. Analyzes emergence, development, and resolution of legislative issues of public health importance.

PubH 5050. Community Health Theory and Practice I. (3 cr; QP–Che major or #; SP–Che major or #)
Socioenvironmental factors influencing health-related behavior. Role of groups, institutions, social structures in encouraging healthy, unhealthy behavior. Role of interventions affecting social environment; barriers to effective interventions. Individual/behavior change theories, models, targeting psychosocial approaches; application of theories in practice.

PubH 5051. Community Health Theory and Practice II. (3 cr; QP–Che major or #; SP–Che major or #)
Conceptualizing, planning, and implementing community health education programs and interventions. Examines health education/promotion organizations; how organizational factors shape health education practice. Focuses on planning health education/promotion efforts. Students gain experience in developing a hypothetical community health intervention.

PubH 5055. Social Inequalities in Health. (2 cr; SP–Hlth sci professional school student or hltsc or soc work or pub affairs grad student or #)
Extent and causes of social inequalities in health; degree to which our understanding of these inequalities is hampered by methodological limitations in health research. Focuses on individual, community, and policy approaches to reducing social inequalities in health.

PubH 5061. Community Health Education in Health Care Settings. (2 cr; SP–Public health student or #)

PubH 5084. Internship in Health Education Practice I. (1-10 cr; QP–Che major or #; SP–Che major, #)
Supervised health education internship in a health or public health setting under academic professional supervision. Applying community health education knowledge to health issues/situations.

PubH 5085. Internship in Health Education Practice II. (1-10 cr; QP–Che major or #; SP–Che major, #)
Supervised health education internship in a health or public health setting under academic professional supervision. Applying community health education knowledge to health issues/situations.

PubH 5090. Research Topics in Health Education. (2-8 cr; QP–Che major or #; SP–Che major, #)
Review of health education research/experience in selected area.

PubH 5096. Community Health Education Master's Research Project. (1-10 cr; QP–Che major or #; SP–Che major, #)
Original research; secondary analysis of data related to health education.

PubH 5100. Topics in Environmental and Occupational Health. (1-4 cr; max 999 cr; QP–Eh major or #; SP–Eh major or #; may be repeated for cr)
Selected readings. Discussion of problems.

PubH 5101. Environmental and Occupational Health Master's Project. (1-3 cr; QP–Eh major; SP–Eh major; S-N only)
Directed projects or examination.

PubH 5102. Field Experience in Environmental and Occupational Health. (1-5 cr; QP–Eh major; SP–Eh major; S-N only)
Directed practicum.

PubH 5103. Exposure to Environmental Hazards. (3 cr; QP–Eh major or #; SP–Eh major or #; A-F only)
Nature, effects, regulations of exposure to biological, physical, chemical hazards in the environment; in context of inter-related disciplinary scientific field of environmental health as essential component of public health.

PubH 5104. Environmental Health Effects: Introduction to Toxicology. (2 cr; QP–Eh or #; SP–Eh or #; A-F only)
Identifying mechanisms/effects on human health of environmental agents. Chemical, biological, physical, psychological agents.

PubH 5105. Environmental and Occupational Health Policy. (3 cr; QP–Eh major or #; SP–Eh major or #; A-F only)
Students develop an understanding of environmental and occupational health policies, laws, key concepts and principles, programs and approaches for regulatory reform, approaches to policy analysis, and overall policies using in the policy-making process.

PubH 5110. Environmental and Worker Protection Law. (4 cr)
Law protecting public health and conserving the environment. Common law that evolved as courts settled private disputes; public law made by legislatures and administrative agencies. Students research legal issues underlying public health and environmental policies, analyze court opinions, review statutes, and participate in negotiation exercise.

PubH 5111. Preventing Pollution: Innovative Approaches to Environmental Management. (3 cr; QP–Pub hltsc or grad student or #)
SP–Pub hltsc or grad student or honors undergrad student or #)
Interdisciplinary approaches to pollution problems, including sustainability, pollution prevention, risk assessment, regulatory reform, and strategies for environmental management.

PubH 5112. Risk Analysis: Application to Risk-Based Decision Making. (3 cr; QP–Pub hltsc or grad student or #; SP–Pub hltsc or grad student or #)
Introduction to risk in context of regulatory decision making.

PubH 5113. Public Policy and Risk: Strategies for Effective Decisions and Discourse. (3 cr; QP–Pub hltsc or grad student or #; SP–Pub hltsc or grad student or #)
Introduction to policy making in public health, environmental and occupational health and safety. Students develop an understanding of environmental and occupational health policies, laws, key concepts and principles, programs and approaches for regulatory reform, approaches to policy analysis, and overall policies using in the policy-making process.

PubH 5120. Injury Prevention in the Workplace, Community, and Home. (2 cr)
Injury epidemiology; analysis of major injury problems affecting the public in the workplace, community, and home using epidemiologic model and conceptual framework. bushes strategies for program development for prevention and control.

PubH 5121. Topics: Injury Prevention in the Workplace, Community, and Home. (1-2 cr; max 2 cr; SP–5194 or 5120, 5320, #; SP–5194 or 5120, 5320, #)
Selected projects.

PubH 5122. Seminar: Safety in the Workplace. (1 cr)
Real and potential risk factors for occupational safety problems; strategies for prevention and control.

PubH 5123. Violence Prevention and Control: Theory, Research, and Application. (2 cr)
Analysis of theories and research about major violence theories and epidemiological research pertinent to violence, including characteristics of violence and control factors, reporting/treatment protocols, and current potential intervention efforts and prevention initiatives. Emphasizes interdisciplinary contributions to violence prevention/control.

PubH 5130. Occupational Medicine: Principles and Practice. (3 cr; QP–Eh major or #; SP–Eh major or #)
Pathogenesis of diseases caused by occupational hazards; evaluating worker and illness cases; regulatory framework governing occupational health and safety.

PubH 5140. Occupational and Environmental Epidemiology. (2 cr; QP–Basic course in [epi, biostats]; SP–Basic course in [epi, biostats])
Principles, concepts in identifying health effects in workplace, strategies for identifying exposure risk, evaluating strengths and weaknesses of research techniques, assessing bias/confounding.

PubH 5150. Interdisciplinary Evaluation of Occupational Health and Safety Field Problems. (3 cr; QP–Eh major or #; SP–Eh major or #)
Guided evaluation of potential health and safety problems at the work site, recommendations and design criteria for correction, and evaluation of occupational health and safety programs.

PubH 5160. Physiological Disposition of Xenobiotics. (3 cr; QP–1 course in biochem, mol biol, org chem or #; SP–1 course each in biochem, mol biol, org chem or #)
Pharmokinetics/toxicokinetics and xenobiotic metabolism. Mechanisms by which phase I and phase II enzymes biotransform and detoxify xenobiotics. Implications of these biochemical reactions for human health.

PubH 5161. Regulatory Toxicology. (2 cr; QP–General environ toxicology course; SP–General environ toxicology course; A-F only)
In-depth introduction to toxicology and associated regulations of U.S. federal regulatory agencies, such as CPSC, EPA, FDA, OSHA, and DOT, that both require and use toxicological data/information in their mission of protecting human and environmental health.

PubH 5170. Introduction to Occupational Health and Safety. (3 cr; QP–Eh or #; SP–Eh or #)
Introduction to major concepts in occupational health and safety. Application of public health principles to decision making process in preventing injury/illness, promoting health of adults, and protecting worker populations from environmental hazards. Observational visits manufacturing facility.

PubH 5171. Properties, Behavior, and Measurement of Airborne Contaminants. (3 cr; QP–Eh major, [industrial hygiene specialty or equiv] or #; SP–Eh major, [industrial hygiene specialty or equiv] or #; A-F only)

PubH 5172. Industrial Hygiene Applications. (2 cr; QP–Eh major, 5170 or #; SP–Eh major, 5170 or #)
Recognition, evaluation, and control of occupational health and safety hazards. Practical application to specific industrial hygiene problems related to gases, vapors, aerosols, and physical agents.

PubH 5173. Hazard-Related Exposure to Physical Agents in the Environment. (3 cr; QP–Eh major, industrial hygiene specialty or equiv or #; SP–Eh major, industrial hygiene specialty or equiv or #)
Nature, health effects, monitoring, and control of physical agents in working/living environments, ionizing/non-ionizing radiations (e.g., laser/ultraviolet, visible, infrared light), noise/vibration, heat/cold stress, dose response, and engineering interventions.

PubH 5174. Control of Exposure to Physical and Chemical Hazards. (3 cr; QP–Eh major, [industrial hygiene specialty or equiv] or #; SP–Eh major, [industrial hygiene specialty or equiv] or #)
Hierarchy of options for controlling human exposure to airborne and dermal hazards, both gaseous and aerosol.
Courses

Science, practice of process control and exhaust ventilation in workplaces and other indoor spaces and in air cleaning. Control of emissions to ambient environment.

PubH 5175. Industrial Hygiene Measurements Laboratory. (2 cr; SP–5171 or #)
Broad treatment of occupational health. Role of industrial hygiene. Emphasizes practical application of industrial hygiene concept, methods. Lectures, demonstrations, laboratory, project.

PubH 5176. Hazardous Materials and Wastes Management. (3 cr; SP–5170, courses in chemistry (including organic or equiv); 2 cr; SP–5171 or equiv or #)
Generation, control, disposal of hazardous materials. Recognizing, evaluating, controlling, preventing hazards from chemicals that threaten occupational health. Lectures, case studies, worksheets, field trips.

PubH 5180. Environmental Microbiology. (4 cr; QP–MICB 3103 or equiv or #; SP–MICB 3103 or equiv or #)
Survival, dissemination, significance, and monitoring of microbes in the human environment. Principles of biological safety, including air filtration, lab design and operation, lab animals, shipping, and transport, and sterilization, disinfection, and decontamination.

PubH 5190. Environmental Chemistry. (3 cr; QP–1 course each in gen chem, org chem or #; SP–1 course each in gen chem, org chem or #; QP–Grad; SP–Grad)
Overview, air, water, and soil chemistry; pertinent environmental problems; human and ecological multimedia exposure to chemicals in the environment.

PubH 5200. Environmental Health. (2 cr)
Principles of environmental health relating to micro- and macro-environments and to products consumed or used by people.

PubH 5201. Issues in Environmental and Occupational Health. (2 cr; QP–Pub hllth student or #; SP–Pub hllth student or #)
The field, current issues, and principles and methods of environmental and occupational health practice.

PubH 5202. Special Topics in Environmental and Occupational Health. (1–2 cr)
Selected readings and discussion of problems in environmental and occupational health taught through the Midwest Center for Occupational Health & Safety Institute.

PubH 5220. Introduction to Occupational Safety. (1 cr)
Emphasis on developing a practical foundation in industrial safety. Safety program development and management; roles of OSHA/Workers’ Compensation.

PubH 5240. Introduction to Occupational Epidemiology. (2 cr)
Basic epidemiologic principles and methods; emphasis on evaluations of health effects of occupational exposures. Exposure assessment, study design and application, measures of disease occurrence and association, sources of bias in studies, and causal inference.

PubH 5250. Survey of Industrial Hygiene. (2 cr)
For non-industrial hygienists. Overview of science and art of recognizing, evaluating, and controlling health hazards in the workplace.

PubH 5272. Introduction to Health Risk Assessment. (1 cr)
Fundamental steps in risk assessment; emerging trends and advances in the field.

PubH 5273. Ventilation Control of Occupational Hazards. (2 cr; S-N only)
Designing, modifying, testing, and troubleshooting local ventilation systems.

PubH 5301. Perspectives: Interrelationships of People and Animals in Society Today. (2 cr; SP–5301, SUC 4301, SUCV 6050)

PubH 5320. Fundamentals of Epidemiology. (3 cr; QP–Pub hllth or grad student or #; SP–Pub hllth or grad student or #)
Basic concepts and knowledge of epidemiology, methodology used to study the etiology, distribution, and control of diseases in human populations.

PubH 5330. Epidemiology I. (4 cr; QP–Epi major or #; SP–Epi major or #)
Basic epidemiologic principles applicable to infectious and noninfectious disease; host-agent environment complex; factors underlying spread of infectious disease; laboratory applications of statistical and epidemiologic methods.

PubH 5333. Principles of Human Behavior I. (2 cr; QP–Che or epi major or #; SP–Che or epi major or #; A-F only)
Theoretical perspective on etiology/modification of health behavior in individual communities.

PubH 5334. Human Behavior II. (2 cr; SP–5333, Epi grad student in behavioral track) (or A-F only)
Critical evaluation of educational public health intervention research. Experience in research designs/methods in health behavior intervention.

PubH 5335. Epidemiology and Control of Infectious Diseases. (3 cr; QP–Epi major or #; SP–Epi major or #; Principles and methods. Strategies for disease control and prevention, including immunization. Relevance of modes of transmissions of specific agents for disease spread and prevention. Public health consequences of infectious diseases at a national, international, or local level.

PubH 5336. Advanced Seminar in Infectious Disease Epidemiology. (1 cr; max 2 cr; QP–5330, 5335, 5335, 5335, 5335; S-N only)
How infectious diseases epidemiologic principles are applied in laboratory and public health decision-making contexts; various issues of control, prevention and control strategies.

PubH 5337. Analysis of Infectious Disease Data. (2 cr; SP–5330, 5340, 5335, [EPI or MPH or EPI] grad student; A-F only)
Methods for analyzing model infectious disease data. Emphasizes critical understanding of methods, statistical analysis and specification in infectious disease areas.

PubH 5340. Epidemiology II. (4 cr; QP–5330, 1 biostats course or #; SP–5330, 1 biostats course or #)
Measures of disease occurrence; strategies and design principles for etiologic and evaluative studies.

PubH 5345. Epi Methods: Data Collection. (2 cr; QP–5340, 5330, 5450, epi MPH major or #; SP–5330, 5450, [EPI or MPH or EPI] grad student; A-F only)
Methods for collecting/analyzing epidemiologic research data. Practical aspects of sampling, response rates, bias, forms design, selection/training interviewers. Data preparation, entry, cleaning, management.

PubH 5348. Writing Research Grants. (2 cr; QP–Epi grad student or postdoc student or #; SP–Epi grad student or postdoc student or #; SP–Grad or grad student or #; S-N only)
Focuses on NIH-type grants. Mechanics of grant preparation, review process, identifying funding sources.

PubH 5351. Molecular Epidemiology. (2 cr; SP–Pub hllth student or #; at least one college-level general biology course, [EPI MPH or Epi grad student or #; A-F only]
Introduction to molecular epidemiology. Sample collection, processing, methodology. Biomarkers used in cancer, cardiovascular disease, and infectious epidemiologic studies.

PubH 5365. Epidemiology of Aging. (2 cr; SP–Grad or professional school student, 5330 or equiv or #)
Major concepts and issues. Emphasizes methodological issues unique to studies of older populations with measurement of epidemiologic characteristics as specialty important. Application of epidemiologic studies of older populations; most prevalent health conditions.

PubH 5370. Alcohol and Other Drugs; Epidemiology, Prevention, and Control. (3 cr; QP–Epi grad major or pub hllth or biol or dent or nurs or grad or med school or pharm student or #; SP–Epi grad major or pub hllth or biol or dent or nurs or grad or med school or pharm student or #)
Population patterns regarding who uses which drugs, why they use them, and health consequences of alcohol and other drug use. Does not focus on treatments, care, rehabilitation, or exploration of personal attitudes, practices regarding alcohol or other drug use.

PubH 5379. Epidemiology Major's Project Seminar. (1 cr; QP–Epi major or #; SP–Epi major or #; S-N only)
Students present their MPH major's projects and give and receive feedback. Projects should neither undercover nor concept driven.

PubH 5381. Genetic Epidemiology. (3 cr; QP–5330, 5450 or equiv, college coursework in genetics, hlth sci grad or professional school student or #; SP–5330, 5450 or equiv, college coursework in genetics, hlth sci grad or professional school student or #)
Epidemiology, distribution, and control of diseases in groups of relatives; inherited causes of disease in populations. Associations (case-control family based studies) (toxicology, twins study); disease transmission (cohort analysis of gene localization (gene mapping), and applications in studies of disease etiology.

PubH 5383. Pathobiology of Human Diseases. (3 cr; QP–Pub hllth or biol or dent or eh or epi or nurs or pharm or med school or grad student or #; SP–Pub hllth or biol or dent or eh or epi or nurs or pharm or med school or grad student or #)
Basic cell biology and pathology of human diseases, including cardiovascular, cancer, neurodegenerative, immunologic, and infectious diseases. Current concepts of pathobiology, risk factors, and markers described for each disease.

PubH 5384. Human Physiology. (3 cr; QP–Epi major or pub hllth nutr major or #; SP–Epi major or #)

PubH 5386. Public Health Aspects of Cardiovascular Disease. (2 cr; QP–5330, 5450 or equiv; SP–5330, 5450 or equiv; students in 2-yr program take course in yr 2)
Detailed perspective on cardiovascular risk factors for CVD, prevention of CVD, and national recommendations for treatment/prevention. Introduces emerging risk factors and current controversies in CVD.

PubH 5387. Cancer Epidemiology. (2 cr; QP–5330, 5340, hlth sci grad and professional school student or #; SP–5330, 5340, hlth sci grad and professional school student or #)
Epidemiologic aspects of cancer, including theories of carcinogenesis, incidence, site-specific risk factors, and issues of cancer control and prevention.

PubH 5389. Nutritional Epidemiology. (2 cr; QP–5330 or #; SP–5330 or #)
Study of nutritional disease relationships through application of epidemiologic methods. Characterization of various exposures to food and nutrient intakes, biological basis for nutritional disease relationships, studies of specific chronic diseases and nutritional intake; design and interpretation of studies using nutritional methods.

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Courses

PubH 5390. Smoking Intervention. (2 cr; QP–[Che or epi MPH] or epi grad student or #; SP–[Che or MCH or epi MPH] or epi grad student or #)


PubH 5393. Design and Analysis of Group-Randomized Trials in Epidemiology. (3 cr; QP–5340, 5432, epi MPH or epi grad major; SP–5340, 5432, epi MPH or epi grad major)

Community, school-based, and worksite and trials involving randomization of different identifiable groups to study conditions. Experimental and quasi-experimental designs, randomization, and threats to validity.

PubH 5394. Mass Communication and Public Health. (2 cr; SP–Pub hlth or Jour grad student or # or #; background or coursework) in [social or behavioral] science recommended

Role, function, effects of mass media on public health. Planned/unplanned effects. Review of literature on how theories, models, assumptions of mass communications relate to the public health.

PubH 5395. Obesity and Eating Disorders. (2 cr; QP–Grad or professional school student or #; SP–Grad or professional school student or #)

Definition, measurement, and prevalence; social, behavioral, physiological causes; health consequences; treatment; prevention.

PubH 5398. Public Health Policy as a Prevention Strategy. (2 cr; QP–Epi or che or pub hlth nutr MPH or epi grad student or #; SP–[Che or MCH or Pub Nutr or Epi MPH or Epi grad student or #]

Philosophical, ethical, economic, public policy, and political rationales for policy approaches to prevention. Historical current application of prevention policy to public health problems.

PubH 5399. Seminar: Topics in Epidemiology. (1-4 cr; QP–Epi MPH or epi grad major or #)

One or more topics of current interest.

PubH 5414. Biostatistical Methods I. (3 cr; QP–5450, 5452, pub hth or epi MPH grad student or #; SP–5450, pub hth or epi MPH grad student or #)


PubH 5415. Biostatistical Methods II. (3 cr; SP–PubH 5414)


PubH 5420. Statistical Computing I: Using Statistical Packages. (1 cr; QP–[5450 or 5452], hth grad student or # or #; SP–Health science grad student or # or #)

Use of SAS for analysis of biomedical data. Data manipulation, description. Basic statistical analyses (t-tests, chi-square, simple regression).

PubH 5421. Statistical Computing II: Advanced Computational and Graphical Methods. (2 cr; QP–5465, C or FORTRAN or #; SP–5465, C or FORTRAN or # or UNIX–workstation-based computing and graphical methods for biostatistical analysis. Linear systems, numerical integration and differentiation, optimization, Monte Carlo methods, design and analysis of simulation studies. Familiarity with a programming language (preferably C or FORTRAN) is assumed.

PubH 5450. Biostatistics I. (4 cr; QP–[[Math 1111 or Math 1201, hth sci grad student or #] or #; [[Math 1111 or Math 1201, hth sci grad student or #]

Basic descriptive statistics/graphics. SAS computing, normal distribution. Correlation and simple linear regression. Inference based on observational studies versus experiments, Central Limit Theorem, confidence intervals, hypothesis testing. Two-way tables and odds ratios. Type I and Type II errors. Multiple regression. One-way ANOVA and nonparametric tests.

PubH 5452. Biostatistics II. (4 cr; QP–[[Math 5400, competence in SAS through 5420] or [equiv or grade of at least B in (5414, 5415); SP–[5450, competence in SAS through 5420] or [equiv or grade of at least B in (5414, 5415)]

Two-way ANOVA/OVA, interactions, repeated measures, general linear models, Logistic regression for cohort and case-control studies. Linear models, contingency tables, Poisson regression, survival data, Kaplan-Meier methods, proportional hazards models.

PubH 5456. Proseminar for the Biostatistician. (2 cr; QP–5465, biostats major or #; SP–5465, biostats major or #)

Professional roles and responsibilities of the practicing biostatistician and collaborative health research scientists.

PubH 5462. Clinical Trials: Design, Implementation, and Analysis. (3 cr; QP–5446 or 5466 or #; SP–5446 or 5466 or #)

Introduction to and methodology of randomized clinical trials: study designs, sample size calculations, interim monitoring, data analysis issues, and overviews.

PubH 5465. Biostatistics: Regression. (4 cr; QP–5450, 5452; [[Stat 5101 or [[Stat 5101, biostats major]] or [#; Stat 5102 or Stat 5101, biostats major]] or [#; Stat 5101 or Stat 5102, biostats major])

T-tests, confidence intervals, power, type I errors. Exploratory data analysis. Simple linear regression, regression in matrix notation, multiple regression, diagnostics. Ordinary least squares, violations, generalized least squares, non-linear least squares. Introduction to General linear model. SAS and S-Plus used.

PubH 5466. Biostatistics: ANOVA and Design. (4 cr; QP–5450, 5452; [[Stat 5101 or [[Stat 5101, biostats major]] or [#; Stat 5102 or Stat 5101, biostats major]] or [#; Stat 5101 or Stat 5102, biostats major])

Single-factor ANOVA, diagnostics, classical non-parametric, multiple comparisons, power and sample size determination, calculating expected mean squares, random/mixed effects models. ANOVA in regression notation. Randomized block designs, nested designs, repeated measures designs, cross-over designs. SAS and S-Plus used.

PubH 5467. Analysis of Categorical Data. (3 cr; QP–[5456 or 5466 or equiv]; Stat 5101; SP–[5466 or 5466 or equiv], Stat 5102)

Contingency tables, odds ratios, relative risk, chi-square tests, log-linear models, logistic regression, conditional logistic regression, Poisson regression, matching, generalized linear models for independent data, SAS and S-Plus used throughout.

PubH 5470. Topics in Biostatistics. (1-4 cr; QP–#; SP–#)

Special topics for graduate students.

PubH 5494. Biostatistics Master’s Project. (1-3 cr; max 3 cr; QP–#; SP–#)

Directed study toward completion of a master’s or PhD project in biostatistics.

PubH 5501. Fundamentals of Clinical Research. (3 cr; SP–Clinical research student or #)

Concepts of clinical research design and implementation. Concepts and design and application in investigation in epidemiology and biostatistics.

PubH 5502. Clinical Research Literature Review Seminar. (1 cr; SP–Clinical research grad student or #)

Students receive feedback.

PubH 5503. Clinical Research Project Seminar. (2 cr; SP–5502, clinical research grad student, master’s project/thesis paper [underway or near completion]) or #)

Students present their master’s project/thesis gives/receive feedback.

PubH 5510. Topics in Clinical Research. (1-8 cr; max 8 cr; SP–Clinical research masters or #)

Topics in clinical research.

PubH 5515. Directed Study in Clinical Research. (1-8 cr; max 8 cr; SP–Clinical research grad student, #)

Directed research or independent study and field practice in clinical research.

PubH 5517. Readings in Clinical Research. (1-8 cr; max 8 cr; SP–Clinical Research grad student, #)

Current readings in clinical research.

PubH 5605. Reproductive and Perinatal Health. (2 cr; QP–Pub hlth hth grad student or #; SP–Pub hlth grad student or #; A-F only)

Issues, programs, services, and policies. Social, cultural, psychological, physiological, environmental, economic, and political factors that affect reproductive health, pregnancy, and childbearing.

PubH 5606. Health of Children. (2 cr; QP–Pub hlth grad student or #; SP–Pub hlth grad student or #)

Overview of public health issues related to children in the United States. Focus on identifying and planning effective public health strategies, policies, and programs to improve the health of infants and children.

PubH 5607. Adolescent Health: Issues, Programs, and Policies. (2 cr; QP–Pub hlth grad student or #; SP–Pub hlth grad student or #)

Principles, policies, programs, and practices for identifying and meeting the needs of children and adolescents with chronic health conditions and of their families. Skills emphasized: needs assessment, program development/evaluation, family empowerment, interdisciplinary team building, integrated and coordinated service delivery, advocacy.

PubH 5614. Field Experience in Maternal and Child Health. (2-4 cr; QP–MCH major; SP–MCH major; S-N only)

Field experiences selected by student to meet career goals.

PubH 5622. Women’s Health: Issues and Controversies. (3 cr; QP–S or grad or professional school student preferred; SP–Grad or grad professional school student preferred.)

Women’s health concerns, health status, and healthcare today. Historical, socioeconomic, and gender perspectives. Public health principles, access parameters, and multidisciplinary aspects. Roles of women as consumers and providers.

PubH 5627. Sexuality Education: Criteria, Curricula, and Controversy. (1 cr; SP–Prefer public health student or grad student or professional in public health or in education; 5 seats reserved for UC students)

Courses

PubH 5628. Seminar: Race, Class, and Family Formations. (1 cr; QP–Public health student or grad student or #; S-N only)
Impact of race/class on family formation, family dynamics, and family resiliency/maintenance. Explores whether intergenerational approaches in family intervention are effective among individuals who are not engaged in traditional social institutions.

PubH 5630. Research Methods in the Health Assessment of Women and Children. (2 cr; QP–Pub hlth or grad student, 5330 or 5330 or #; SP–Pub hlth or grad student, 5330 or 5330 or #; A-F only) Elements essential for evaluating and conducting research on health of women and children, including hypothesis generation, development of study design, variable identification and measurement, selection of analytic models, and dissemination of results.

PubH 5631. Program Evaluation in Maternal and Child Health. (2 cr; QP–5385; 5623 or 5806 or #, meh or pha major or #; SP–Research course, meh or pha major or #) Introduction to models and applications of program evaluation in public health, design strategies and methods for collecting and analyzing evaluative information; and consideration of social context and ethical and political factors that shape evaluation design, implementation, and utilization.

PubH 5633. Qualitative Research Methods. (2 cr; QP–Pub hlth or grad student, 5806 or 5631 or #; SP–Pub hlth or grad student, 5806 or 5631 or #) Overview of qualitative methods used in research and evaluation, emphasis on public health issues of children, youth, families, and communities. Understanding the applications of qualitative methods and evaluating data analysis skills.

PubH 5634. Advocating for Change in Children. (2 cr; QP–Pub hlth or grad student or professional in [pub hlth or ed]; SP–Pub hlth or grad student or #) Strategies for changing systems, building skills in public policy research, information, perception management, coalition building, personal persuasion, advocacy.

PubH 5639. Prevention: Theory, Practice, and Application in Public Health Service. (3 cr; QP–Grad or professional school student or professional in health-related discipline preferred; SP–Grad or professional school student or professional in health-related discipline preferred) Current issues and controversies around prevention and how it relates to health services. History, prevention as an idea, terminology, lifestyle intervention, programs and legislative issues, education, rules and implications for societal action.

PubH 5640. Public Health and Medical Care Organization. (2 cr; QP–Pub hlth or grad student or #; SP–Pub hlth or grad student or #) Structure and operation of public health and medical care systems in the United States: determinants of community health and characteristics of successful interventions, particularly with high-risk children, youth, and families.

PubH 5645. Families and Health: An Ecosystems Approach. (2 cr; QP–Pub hlth or grad student or #; SP–Pub hlth or grad student or #) Interrelationships between individual, family, and community health. Family theories and research and the impact of the sociocultural context, public policies, and community structures on health. Primary and secondary prevention strategies for promoting family health.

PubH 5647. Independent Study in Maternal and Child Health. (1-5 cr; QP–Pub hlth or grad student, 5806 or #; SP–Pub hlth or grad student or #) Independent study with direction from a maternal and child health faculty member.

PubH 5648. Topics in Maternal and Child Health. (1-4 cr [max 5 cr]; QP–#; SP–#) New course offerings.

PubH 5649. Maternal and Child Health Master's Project. (2-3 cr; QP–Mch major or #; SP–Mch major or S-N only) Students work with their adviser to complete one of the courses in the Master's Project sequence and the critical literature review, technical report.

PubH 5650. Teenage Pregnancy and Parenting: Models for Intervention. (2 cr; QP–Grad or public health student major or #) Understanding adolescent pregnancy, parenting, and sexual decision making from developmental and public health perspectives. Critical examination of best prevention, treatment, and policies for individual counseling, school-based interventions, youth-serving community organizations, and government.

PubH 5651. Critical Reading of Scientific Literature in Adolescent Health. (1 cr; SP–Pub hlth or grad student, 5414 or 5450 or equiv or #; SP–Pub hlth or grad student, 5414 or 5450 or equiv or #) Critical examination of empirical research in adolescent health across disciplines. Enhances skills in understanding theory, methods, measurement, sampling design, statistical analysis, structure of research articles, peer review process, and ethical responsibilities of researchers in reporting research findings.

PubH 5654. Adolescent Sexual Identity: Teen Risk and Professional Responsibility. (1 cr; QP–Professional in pub hlth or medicine or ed or soc work or counseling or youth service; SP–Professional in pub hlth or medicine or ed or soc work or counseling or youth service) Issues faced by adolescents and their families facing in terms with sexual orientation. Helpful ways to work with this hidden population and their families. One-day workshop.

PubH 5655. Sexual Orientation Issues for Adolescents. (2 cr; QP–Baccalaureate degree or employment in ed or hlth or soc service field; SP–Baccalaureate degree or employment in ed or hlth or soc service field) Adolescent sexual orientation from perspective of individual identity; impact of the community and response of the community toward gay, lesbian, bisexual, and transgender youth; and interventions/roles of professionals in the school and community.

PubH 5661. Community Organizing for Public Health. (2 cr; QP–Pub hlth or grad student or #) Introduces students to principles of community organizing and identifies challenges and strategies for public health professionals engaged in community organizing. Decreasing barriers to community participation: encouraging leadership, building coalitions and alliances, sustaining community organizing efforts.

PubH 5663. Cross-Cultural Health Issues. (2 cr; QP–Pub hlth or grad student or #; SP–Pub hlth or grad student or #) Health issues and “health culture” of ethnic communities in Minnesota, including Hmong, Hispanic, African American, and Native American. Cultural factors that influence health and health services.

PubH 5693. Grant Writing for Public Health. (1 cr; QP–Mch or pha major or #; SP–Mch or che or pubh nutr or ejt major or #) Hands-on workshop. Focuses on children, youth, and families. Identifying successful elements of a grant application. Grant review process. Critiquing a grant. Writing an application.

PubH 5700. Foundations of Public Health Administration Practice. (2 cr; QP–Pub hlth major or #; SP–Pub hlth major or #) Planning, organization, and administration of public health agencies at the state level; how these agencies function in relation to public health at local and national levels. Interactions with practicing public health administrators and specialists.

PubH 5701. Public Health Administration. (2 cr; QP–Pub hlth major or #; SP–Pub hlth major or #) Issues, administrative problems, activities, structure, organization, supervision, management of federal, state, local, and nonprofit public health agencies.

PubH 5702. Policy Issues in Public Health Administration. (2 cr; QP–Pub hlth major or #; SP–Pub hlth major or #) Policy development and implementation in public health agencies and organizations.

PubH 5705. Community Health Assessment. (2 cr; QP–Grad epi course, [pha or mch] major or #; SP–Grad epi major or #) Two weeks' course focusing on public health assessment, surveillance, lectures, group activities, individual presentations.

PubH 5708. Analysis of Administrative Data. (3 cr; SP–Public health or grad student or #) How to use data for various research designs. Origin, quality, strengths, limitations of data. Files based on Medicare/Medicaid data are used for hands-on learning. Emphasizes broad conceptual skills.

PubH 5711. Public Health Law. (2 cr; QP–Pub hlth student or #; SP–Pub hlth student or #) Basic concepts of the law, legislative process, legal bases for the existence and administration of public health programs, legal aspects of community public health issues and controversies, and regulatory role of government in the health services system.

PubH 5720. Management Communication. (2 cr; QP–Pha major; SP–Pha major) Role of communication in health services administration. Emphasis on development of skills in presentation speaking, interviewing, and written communications. Case study analysis of communication problems in public health organizations.


PubH 5726. Medical Device Industry: Business and Public Policy. (3 cr; SP–Pub hlth or grad student or #) Business, public policy, regulatory technology management issues concerning medical device/biotechnology industries. Nature/impacts of private-public sector interactions. Involvement by leaders in Minnesota organizations.

PubH 5727. Health Leadership and Effecting Change. (2 cr; QP–Pub hlth or grad student or #; SP–Pub hlth or grad student or #) Applications of a broad theoretical base in planned change to solve managerial and organizational problems. Futures and leadership in the health professions.

PubH 5729. Seminar on Medical Ethics. (2 cr; SP–4xxx or 5xxx ethics course or #) Patients’ rights/liberties, informed consent, confidentiality, ethical issues in medical research, initiation/termination of medical treatment, euthanasia, abortion, maternal/fetal conflicts, allocation of medical resources.

PubH 5731. Public Health Program Planning and Grant Writing. (3 cr; QP–Pha or meh major or #; SP–Pha or meh major or #) Provides knowledge and skills necessary for planning health promotion and disease prevention programs and writing grants to fund these programs. Uses PRECEDE-PROCEED Model as a framework for program planning.

PubH 5733. Interventions for Health of Populations. (3 cr; QP–5Nurs 8040; 5330 or #; SP–5Nurs 8601; 5330 or #) Synthesis of life cycle developmental approach and public health perspective with nursing and behavioral change conceptual models to develop intervention models that are effective in addressing priority public health problems across the life span.
Courses

PubH 5735. Public Ethics/Politics and Public Health. (2 cr; SP–Pub hth or grad student or #; SP–Pub hth major or grad student or #) Systematic examination of ethical values related to decision-making in public health interventions. Responsible behavior of the state in relation to health, public as public ethics, and distributive justice in philanthropic society.

PubH 5740. Organizational Behavior. (2 cr; QP–Pha major or #; SP–Pha major or #) Human behavior in organizations; motivation, leadership, influence of organizational structure, informal group behavior, interpersonal relations, supervision. Preventing and solving problems among individuals and groups in organizations.

PubH 5742. Ethics in Public Health: Practice, Policy, and Research. (2 cr; SP–Public health or grad student or #) Basic skills of ethical analysis. Recognizing, researching, analyzing issues arising in public health and public health research.

PubH 5743. Ethics in Health Care Administration. (2 cr; QP–Pha major or MHA or #; SP–Pha major or MHA or #) Ethical perspectives in managing health care organizations, components of decision-making framework, applying frameworks to selected ethical issues, institutional mechanisms for dealing with ethical problems.

PubH 5751. Principles of Management in Health-Services Organizations. (2 cr; SP–Grad or professional school student) Role of health care services administrators, principles of management, administrative process. Lectures, case studies.

PubH 5759. Health-Care Financial Management (Private Sector Emphasis). (3 cr; QP–5756, 5757, Pha major or MHA student or #; knowledge of computerized spreadsheets; SP–5756, 5757, Pha major or MHA student or #; knowledge of computerized spreadsheets) Basic principles of corporate finance and selected insurance concepts integrated and applied to health care with private sector emphasis. NPV; CAPM; capital and operating budgets; Medicare and RBRVS; risk-adjusted capitation; health-care reform.

PubH 5770. Topics: Hospital and Healthcare Administration. (2 cr; SP–5750 or 5-7 N only) Selected readings in hospital healthcare administration. Discussions based on readings.

PubH 5771. Health-Care Financial Management (Public Sector Emphasis). (3 cr; QP–3 cr college-level accounting course or #; knowledge of computerized spreadsheets; 2 cr–college-level accounting course or #; knowledge of computerized spreadsheets recommended) Basic principles of finance and selected insurance concepts integrated and applied to health care with public sector emphasis. NPV; public financing; capital and operating budgets; Medicare and RBRVS; risk-adjusted capitation; health-care management.

PubH 5777. Master’s Project: Public Health Administration. (3 cr; QP–Pha major or #; SP–Pha major or #; S–N only) Major research paper fulfilling the master’s project requirement.

PubH 5780. Topics: Public Health Administration. (2-3 cr; QP–Pha major or #; SP–Pha major or #) Topics of interest to public health administration students, or new public health administration courses.

PubH 5790. Sociology of Medicine and Health Care: An Introduction to Medical Sociology. (3 cr; QP–Soc 5855; SP–Soc 5855) Social and psychological components of health and medical care. Organization and delivery of health-care services; their problems and perspectives; focus on patient, care provider, and environment within which health-care services are dispensed.

PubH 5791. Independent Study: Public Health Administration. (1-8 cr; [max 8 cr] QP–Pha major; SP–Pha major or #; 5 N only) Independent study, under tutorial guidance, of selected problems and current issues.

PubH 5796. Field Experience: Public Health Administration. (3 cr; QP–Pha major; SP–Pha major or #; S–N only) Supervised field experience at a management level in selected community or public health agencies and institutions.

PubH 5801. Principles of Research and Program Evaluation. (2 cr; QP–Pub hth or grad student or #; SP–Pub hth or grad student or #) Introduction to research in public health, including formulation of research questions, methodology, designing sampling surveys, data collection techniques, instrument validity and reliability, role of statistical analysis, and ethics.

PubH 5806. Principles of Public Health Research. (2 cr; QP–Pub hth or grad or professional school student or #; SP–Pub hth or grad or professional school student or #) Evaluation of public health research literature and planning for independent research projects. Formulation of research questions, research design, sampling techniques, use of research concepts, and data analysis. Development of research techniques, including questionnaires, interviews, and data analysis.

PubH 5812. Managed Care. (3 cr; QP–Pha major or hsa major or MHA or #; SP–Pha major or hsa major or MHA or #; A-F only) Development and challenges of HMOs: risk sharing; provider contracts; utilization management; quality improvement; marketing and new product development; employer relations; Medicare and Medicaid contracting; budgeting; financial performance; pricing; regulation.

PubH 5852. Program Evaluation in Health and Mental Health Settings. (3 cr; QP–Pha major or #) Overview of evaluation, modes of evaluation, objectives of an evaluative study, sampling of subjects, methods of data collection, methods of analyzing data, interpretation of data, planning of final report, and ethical and political considerations.

PubH 5861. Health Insurance. (2 cr; QP–Microecon theory course or #; SP–Microecon theory course or #; A-F only) Financing personal health care: theory of insurance, insurance concepts integrated and applied to health care with private sector emphasis. NPV; CAPM; capital and operating budgets; Medicare and RBRVS; risk-adjusted capitation; health-care reform.


PubH 5864. Conducting Health Outcomes Research. (3 cr; SP–Intro course in epidemiology or health services research methods) Major concepts/principles in conducting health outcomes research that evaluate health services. Developing study designs matched to research questions. Frequently used study designs. Evaluating health outcomes. Analytical approaches.

PubH 5870. Survey Research and Sample Design in Health-Services Research. (2 cr; A-F only) General, technical, and theoretical context of survey research in health services research. Survey and sample design issues, with extensive use of case examples.

PubH 5871. Managing Health Information. (3 cr; SP–Grad student or public health student or #) Sources and types of health information, their quality, and Relational database methods for organizing using information. SAS/SQL skills necessary to manage information data.

PubH 5881. Topics in Health-Services Research and Policy. (1-4 cr only) New course offerings, selected readings, or individualized directed instruction.

PubH 5893. Economics of the Health-Care System. (3 cr; QP–Microecon theory course or #; SP–Microecon theory course or #; A-F only) Economic analysis of the U.S. health-care sector, emphasizing problems of pricing, production, and distribution. Health-care services as a factor contributing to nation’s health.

PubH 5894. Health-Services Policy. (2 cr; QP–Pha or hsa major or MHA major or #; SP–Pha major or MHA major or #) Social, political, and economic context within which U.S. health-care system developed; influence of those contextual elements on public policies guiding and regulating organization and delivery of health services.

PubH 5900. Public Health Nutrition: Principles and Programs. (3 cr; QP–Pub hlth or grad or professional school student or #; SP–Pub hlth or grad or professional school student or #) Principles of public health nutrition, roles and functions of public health nutritionists, programs and delivery mechanisms for promoting nutritional status of populations. Students explore their beliefs and competencies in relation to principles and philosophy of public health nutrition.

PubH 5902. Maternal and Infant Nutrition. (2 cr; SP–3000 cr course or equiv or #; SP–3000 cr course or equiv or #) Nutritional needs of childbearing women and infants. How to meet these needs through programs/services.

PubH 5905. Human Nutrition and Health. (2 cr; QP–Jr or sr or grad or professional school student or #; SP–Jr or sr or grad or professional school student or #) Broad range of nutrition topics of contemporary interest. Concepts and facts about science of human nutrition in relation to personal and community nutrition problems and concerns. Applies, introductory graduate-level course with labs.

PubH 5906. Field Experience: Public Health Nutrition. (1-8 cr; [max 10 cr] QP–Pub hlth nutr major; SP–Pub hlth nutr major; S–N only) Placement in an approved agency with opportunity for experience in nutrition-related activities of public health nutrition.

PubH 5907. Assessment of Dietary Intake. (1 cr; QP–Pub hlth nutr major or #; SP–Pub hlth nutr major or #) Methods for assessing dietary intake of populations and individuals: appropriate uses of dietary assessment methods in public health, clinical, and research settings; evaluation and interpretation of dietary data.

PubH 5908. Anthropometric Assessment of Nutritional Status. (1 cr; QP–5450 or 5414 or equiv, grad or professional school student; SP–5450 or 5414 or equiv, grad or professional school student) Anthropometry as a tool for assessment of nutritional status; training and experience in taking basic measurements; practical experience in anthropometry; conceptual rationales and interpretation of anthropometric data.

PubH 5909. Topics: Public Health Nutrition. (1-12 cr; [max 12 cr] QP–Pub hlth nutr major or #; SP–Pub hlth nutr major or #) Independent study with faculty guidance in research topic.

PubH 5910. Critical Review of Research in Public Health Nutrition. (1 cr; QP–Pub hlth or mch major, grad-level course each in research, biostats, epi or #; SP–Pub hlth or mch major, grad-level course each in research, biostats, epi or #) Applying principles of nutrition, epidemiology, and biostatistics to evaluate scientific research topics.
Courses

PubH 5911. Biochemical Assessment. (1 cr; QP—Grad or professional school student, 5450 or 5414 or equiv or #; SP—Grad or professional school student, 5450 or 5414 or equiv or #)
Use of biochemical measurements for evaluation of nutritional status. Biochemical measurement methods, data analysis, and applications of reference data, protein, vitamin, and mineral status.

PubH 5914. Community Nutrition Intervention. (3 cr; QP—Grad or professional school student or #; SP—Grad or professional school student or #)
Nutrition intervention strategies used in health programs. Selecting appropriate strategies, applying them to specific target audiences, and evaluating their usefulness in relation to program objectives.

PubH 5919. Public Health Nutrition Master's Research Project. (1-6 cr; QP—Pub hlth nutr major or #; SP—Pub hlth nutr major or #)
Independent research.

PubH 5920. Public Health Aspects of Nutrition Policy. (2 cr; QP—Pub hlth nutr or che or epi MPH or equiv or #; SP—Pub hlth nutr or che or epi MPH or epi or grad major or #; SP—Pub hlth nutr or epi MPH or grad major or #; SP—Pub hlth nutr or epi MPH or grad major or #)
Nutrition policy formulation and its effect on public health. Role of policy/legislation in control of nutrition; how these approaches differ from other prevention strategies.

PubH 5929. Independent Study in Public Health Nutrition. (1-8 cr; QP—Pub hlth nutrition or nutrition) grad student, #)
Arranged with public health nutrition faculty member.

PubH 5932. Nutrition: Adults and the Elderly. (2 cr; QP—Grad or professional school student or #; SP—Grad or professional school student or #; A-F only)
Current literature and research on nutrition needs and factors affecting nutritional status of adults and the elderly.

PubH 5933. Nutrition: Health/Disease Relationships. (2 cr; QP—5330, FScN 5622 or MdBc 5201 or equiv or #; SP—5330, FScN 5622 or MdBc 5201 or equiv or #)
Issues in nutrition and public health: biological and epidemiologic bases for public health dietary recommendations. Relations of nutrition to heart disease, cancer, hypertension, obesity, and other conditions.

PubH 5935. Child and Adolescent Nutrition. (2 cr; QP—Grad or professional school student or #; SP—Grad or professional school student or #)
Current issues and literature. Major nutrition issues of youth: biological, cultural, and psycho-sociocultural; influencing food behaviors and strategies for improving nutritional health.

PubH 8100. Topics in Environmental and Occupational Health Research. (1-6 cr; max 20 cr; SP—5414 or S-N only)
Selected readings and discussion of research topics.

PubH 8101. Research: Environmental and Occupational Health. (1-6 cr; max 6 cr; SP—Eh grad or MPH major)
Opportunities to pursue research in environmental and occupational health.

PubH 8120. Occupational Injury Epidemiology and Control Program (OIECP) Research Seminar. (1 cr (max 12 cr; QP—5120, 5320, 5450; SP—Eh grad major, OIEC specialty or equiv, 5120, 5320, 5450 or #)
Facilitates student research on occupational injury epidemiology and control through roundtable discussions and interdisciplinary involvement.

PubH 8140. Validity Concepts in Epidemiologic Research. (2 cr; QP—5320, 5340 (with grade of B or better); 5452; SP—5320, 5340 (with grade of B or better), 5452)
In-depth examination of conceptual basis for validity in observational epidemiologic research. Recognizing, evaluating, preventing, and correcting for confounding specification error, measurement error, and selection bias.

PubH 8160. Advanced Toxicology. (2 cr (max 12 cr; QP—One or more of: biochem and molecular biol, 5160; SP—One course each in biochem and molecular biol, 5160 or #)
Cellular and molecular mechanisms by which xenobiotics cause toxicity; investigative approaches to current research problems in toxicology and carcinogenesis. Apoptosis, cell cycle deregulation, genetic toxicology, molecular mechanisms of chemical carcinogenesis, and genetic basis for susceptibility to environmental toxins.

PubH 8161. Current Literature in Toxicology. (1 cr (max 3 cr; SP—5104; S-N only)
Modern methods in toxicology, critical thinking skills. Topics vary each semester. Students read discussion toxicological literature.

PubH 8170. Advanced Industrial Hygiene Applications. (2 cr; SP—5170; SP—5170, eh grad major; A-F only)
Recognition, evaluation, and control of occupational health and safety hazards; applications of concepts to specific industrial hygiene problems related to gases, vapors, aerosols, and particulates.

PubH 8330. Research in Epidemiology. (1-8 cr (max 12 cr; QP—Epi grad student or MPH major, #; SP—Research through School of Public Health cooperation.

PubH 8331. Field Practice in Epidemiologic Investigations. (1-8 cr (max 10 cr; SP—Epi grad student or MPH major, #; S-N only)
Supervised participation in epidemiologic investigations under auspices of health agencies or faculty of School of Public Health.

PubH 8332. Readings in Epidemiology. (1-4 cr (max 12 cr; SP—Epi grad student or MPH major, #)
Reading and current research articles.

PubH 8333. FTE: Master's. (1 cr; SP—Master's student, adviser and DGS consent)

PubH 8350. Advanced Epidemiologic Theory. (2 cr; QP—Epi Ph.D. major or #; S-N only)
Integrates concepts from PubH 5330, 5340—Epidemiology I, II. Critical discussion of current theoretical paradigms of epidemiology, philosophy of causal inference in epidemiology, and estimation of causal parameters.

PubH 8377. Seminar: Chronic Disease and Behavioral Epidemiology. (1 cr (max 2 cr; SP—Epi grad major or #; S-N only)
Readings, presentations, class discussions, and exercises provide experience in epidemiologic research methods. Specific disease behaviorally based diseases other than infectious and cardiovascular diseases and cancer.

PubH 8378. Advanced Seminar in Epidemiology. (1-3 cr (max 12 cr; SP—Epi grad major or #; S-N only)
Discussion of one or more major research areas of current interest.

PubH 8379. Seminar in Epidemiology. (2 cr; SP—Epi grad major or MPH major or #; S-N only)
Discussion of selected current problems.

PubH 8388. Special Topics and Issues in Epidemiology. (1 cr (max 3 cr; SP—Epi grad major or #; A-F only)
Intensive three-week immersion experience in study of epidemiologic topics and issues not treated in regular Ph.D. courses. Students explore emerging issues with faculty members who are developing or expanding a specific research area.

PubH 8389. Seminar: Topics in Epidemiology. (3 cr; SP—Epi grad or epi or che MPH major or #)
Current theoretical and measurement issues. Topics drawn from infectious and chronic disease epidemiology, epidemiologic methodology, and biostatistical applications.

PubH 8390. Teaching Practicum in Epidemiology. (2 cr; SP—Epi grad major or #; S-N only)
Instruction and hands-on experience in teaching methods at the graduate level.

PubH 8420. Survival Analysis. (3 cr; QP—5466 or equiv, Stat 5102, 5466 or equiv, S-N only)
Statistical methods for analysis of survival data, including Kaplan-Meier estimator, Cox's proportional hazards multiple regression model, time-dependent covariates, analysis of frailty, and multistate outcomes. Typical biomedical applications, including clinical trials and xenon-iodide.

PubH 8422. Modern Nonparametrics. (2 cr; QP—5466, Stat 5102; QP—5466, Stat 5102, MPH or grad student or #; Classical nonparametric inference; exact tests and confidence intervals; robust estimates, the jackknife, bootstrapping, and nonparametric smoothing and classification trees. Variety of models and applications; formal development sufficient for understanding statistical analysis and properties.

PubH 8429. Probability Models for Biostatistics. (3 cr; QP—5404, 8420, Stat 5102; QP—8420, 8421, Stat 5102, advanced biostats or stats major or #)
Three basic models used for stochastic processes in the biomedical sciences: point processes (with emphasis on Poisson processes), Markov processes (with emphasis on Markov chains), and Brownian motion. Probability, stochastic processes, and statistical inference studied for each process.

PubH 8430. Sequential Analysis. (2 cr; QP—5404, 8420, Stat 5102; QP—8420, 8429, Stat 5102, advanced biostats or stats major or #)
Probability theory underlying sequential analysis, including stopping times, Brownian motion, comparison of frequentist and Bayesian approaches. Biomedical applications, including monitoring clinical trials, laboratory quality control, sequential designs and allocation, inference following sequential design.

PubH 8431. Bayesian Decision Theory and Data Analysis. (4 cr; QP—5421 or programming exper with FORTRAN or C and S; Stat 5102, 8431; QP—5421 or programming exper with FORTRAN or C and S; Stat 5102, 8431, advanced biostats or stats major or #; Stanford and Bayes empirical methods in decision-theoretic frameworks for statistical analysis, including advanced data analytic and computing issues.

PubH 8433. Advanced Longitudinal Data Analysis. (3 cr; QP—[Stat 5101, Stat 8311, experience with [SAS or S-Plus], advanced [biostat or stats] student] or #; SP—Stat 5101, Stat 8311, experience with [SAS or S-Plus], advanced [biostat or stats] student or #)
Methods of inference for outcomes measured repeatedly in time or space. Linear and nonlinear models with or without normal or non-normal errors. Random effects, transitional marginal models with bioregional applications.

PubH 8434. Advanced Survival Analysis. (2 cr; QP—5404, 8420, 8429, Stat 5102; QP—8420, 8429, Stat 5102, advanced biostats or stats major or #)
Martingale methods and counting process theory as applied to survival data, including martingale foundations, statistical tests and comparing survival among groups, Cox proportional hazards model, diagnostic and analysis of residuals, multivariate survival analysis, and time-to-event theory analysis.

PubH 8436. Spatial Biostatistics. (2 cr; QP—5404, 8420, 8421, programming exper with statistical computing packages such as BMDP or SAS; QP—5404, 8421, programming exper with statistical computing packages such as BMDP or SAS)
Introduction to statistical methodologies for analyzing spatial data. Tests for spatial autocorrelation, spatial prediction through kriging, random spatial processes, and tests for disease clustering.

PubH 8444. FTE: Doctoral. (1 cr; QP—Doctoral student, adviser and DGS consent)

PubH 8470. Topics in Biostatistics. (1-4 cr; QP—#; S-N only)
Discipline specific.
Courses

PubH 8866. Doctoral Pre-Thesis Credits. (1-18 cr [max 60 cr]; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

PubH 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required (Plan A only))

PubH 8801. Health-Services Policy Analysis: Theory. (3 cr; SP–Hsp&a grad major or #; A-F only) Critical examination of theory underlying U.S. health services policy. Theoretical and empirical literature related to field. Analysis of alternative policy-making models and political and philosophical underpinnings of those models.

PubH 8802. Health Services Policy Analysis: Applications. (2 cr; SP–Hsp&a grad major or #; A-F only) Emphasizes relationships between health services research and policy, and uses case studies to examine how research influences policy and vice versa.

PubH 8803. Long-Term Care: Principles, Programs, and Policies. (2 cr; SP–Grad-level health care policy course; SP–Grad-level health care policy course or #) Long-term care policy for functionally impaired persons, particularly the elderly. Training in how to develop long-term care programs, grounded in research literature on evidence of program effects. Innovative programs addressing current fragmentation of services.

PubH 8805. Sociology of Health and Illness. (3 cr; SP–Hsp&a grad major or #; A-F only) Affective social structure and health outcomes/behaviors. Current/historical events/issues from the perspectives of sociological, social psychological, and biological theories. Students apply theories to topics they identify.

PubH 8806. Sociology of Health Occupations and Organizations. (3 cr; SP–Hsp&a grad major or #) Sociological theories of organizations/occupational groups, including health care reorganization and management, grounded in research literature on organizational processes and their impacts on providers.


PubH 8811. Research Studies in Healthcare. (3 cr; QP–8810; SP–8810 or #; A-F only) Research methods commonly used in health services research and policy issues/practices.

PubH 8813. Measurement of Health-Related Social Factors. (3 cr; QP–Intro stat course, understanding of simple correlations; SP–Intro stat course, understanding of simple correlations or #; A-F only) How social factors such as innovations, compliance, religiosity, and stress are measured and tested for reliability and validity. Relationships between theory, concepts, variables, data.

PubH 8820. Health Economics I. (3 cr; QP–One course each in intermediate microeconomics, calculus, intro to linear algebra; SP–One course each in intermediate microeconomics, calculus, intro to linear algebra; A-F only) Application of microeconomic theory to healthcare decisions of consumers and producers under different assumptions about market structure and behavior.

PubH 8821. Health Economics II. (3 cr; QP–8820; SP–8820 or #; A-F only) Application of microeconomic theory to healthcare decisions of consumers and producers under different assumptions about market structure and behavior.

PubH 8830. Research Project in Health Care. (1 cr; SP–Hsp&a grad major or #; A-F only) Development and articulation of a research proposal.

PubH 8831. Research Project in Health Care. (1 cr; QP–8830; SP–8830 or #; A-F only) Development and articulation of a research proposal.

PubH 8861. Topics in Theory and Principles of Health Services Research, Policy, and Administration. (1-3 cr; SP–Hsp&a grad major or #) Topics depend on faculty member. Usually students and faculty agree upon a topic they believe would enhance the development of doctoral students in health services research.

PubH 8880. Directed Research. (1-8 cr; SP–Hsp&a grad major or #)

PubH 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required)

PubH 8900. Seminar: Advanced Life Cycle Nutrition. (2 cr; SP–Pubh nutr or epi MPH or epi or food sci or nutr sci grad major or #; A-F only) Critical evaluations and in-depth discussions of research and research issues in nutrition during various stages of the life cycle. Methodological issues of applied human nutrition investigation, current status of knowledge, and implications of research results for public health policies, programs, and future research.

Radiology (Rad)

Rad 8100. Gastrointestinal Roentgenology. (1-15 cr)

Rad 8101. Urologic Roentgenology. (1-15 cr)

Rad 8102. Neurological Roentgenology. (1-15 cr)

Rad 8103. Cardiovascular Roentgenology. (1-15 cr)

Rad 8104. Pediatric Roentgenology. (1-15 cr)

Rad 8105. Pulmonary Roentgenology. (1-15 cr)

Rad 8200. Nuclear Medicine. (1-15 cr)

Rad 8210. Fundamentals of Nuclear Medicine. (1 cr; SP–1-st yr resident)

Rad 8250. Research: Nuclear Medicine. (1-15 cr)

Rad 8450. Research: Radiation Biology. (1-15 cr)

Rad 8550. Research: Radiological Physics. (1-15 cr)

Recreation, Park, and Leisure Studies (Rec)

School of Kinesiology and Leisure Studies

College of Education and Human Development

Rec 5101. Foundations of Recreation. (3 cr; QP–M.Ed. or grad student or #; SP–M.Ed. or grad student or #; A-F only) Investigational, historical, sociological, psychological, and philosophical foundations of the recreational use of leisure in contemporary society. Includes survey of course needs.

Rec 5111. Sports Facilities. (3 cr; QP–Kin 5111; Kin or rec major or #; SP–Kin 5111; Kin or rec major or #; A-F only) Steps in planning and building facilities for athletics, physical education, and sport. College, professional, and public use.

Rec 5161. Recreation Land Policy. (3 cr; QP–1500 or 5100 or #; SP–1501 or 5101 or #; A-F only) Historical development of recreational land policy in the United States and selected contemporary issues in policy, management, interpretation, and research.

Rec 5191. Commercial Recreation and Tourism. (3 cr; QP–3550 or #; SP–3551 or #; A-F only) Scope and development of profit-oriented recreation agencies, including an emphasis on the tourism industry.

Rec 5211. Introduction to Therapeutic Recreation. (3 cr; QP–1520 or 5100 or #; SP–1501 or #; A-F only) Purpose, methods, techniques, and roles of special recreation therapists in meeting social, emotional, physical, and intellectual needs of people with disabilities. Involves recreational therapy services, roles of specialist recreation therapists in therapeutic interactions, and priorities of recreation therapists in serving children with disabilities.

Rec 5215. Assess and Monitor Patient/Client Functioning in Recreation Therapy. (3 cr; SP–TR major or academic health professional or #; majors A-F only) Selecting appropriate therapeutic activities, analyzing patient behavior in groups, and designing treatment plans and standards of appropriate behavior for individuals in group environments, and management of patient/client service delivery, record keeping, and administrative responsibilities.

Rec 5221. Therapeutic Recreation and Diagnostic Groups. (3 cr; QP–5210 or #; SP–5211 or #; A-F only) Definitions, philosophies, methodologies regarding therapeutic recreation services for persons in diagnostic groups, such as cognitive, physical, sensory, and psychiatric impairments/disabilities. Lectures, group discussions, presentations by patients, professionals, and self-advocates. Clinical or community practicum assignment.

Rec 5241. Functional Intervention: Recreation Therapy in Geriatric Care. (3 cr; SP–3541 or 5111 or #; A-F only) Role of leisure in the maintenance of mental, physical, social, emotional health functioning. Issues relative to prevention of impairment/disability. Rehabilitation, support of vital life involvement, effects on design/delivery of recreationservices.

Rec 5271. Community Leisure Services for Persons With Disabilities. (3 cr; QP–1520, rec major, or #; SP–1501, rec major, or #; A-F only) Explores and applies case studies, examples, and techniques of normalization and最少限制性环境策略的低保障服务开发和管理。在不同社会背景下,建立无障碍和适应性。康复,支持对真正健康和生活质量的影响,作用于设计/传输/实施/提供/发展服务。

Rec 5288. Grant Writing in Human Services. (3 cr; A-F only) Identify, develop, and procure financial assistance for programs in human services, including education, recreation, and social programs. Skills and strategies for preparing and evaluating competitive proposals for grant support through federal agencies and private foundations and corporations.

Rec 5301. Wilderness and Adventure Education. (4 cr; QP–3150; A-F only) Rationale for, methods in applying wilderness/advantage education programs in education, recreation, corporate, human service settings. Emphasizes adventure/wilderness program management.

Rec 5311. Programming Outdoor and Environmental Education. (3 cr; A-F only) Methods, materials, and settings for developing and conducting environmental and outdoor education programs.

Rec 5461. Foundations of Sport Management. (3 cr; QP–Kin 5461; Kin or rec major or #; SP–Kin 5461; Kin or rec major or #; A-F only) Theoretical and practical elements of managing and running sport enterprises. Organizational theory, policy, practical examples of sport management skills/strategies.
Courses

Rec 5511. Women in Sport and Leisure. (3 cr; QP– §Kin 5510; SP–§ Kin 5511; A-F only)
Critically examines women’s involvement in/ contributions to sport, physical activity, and leisure.

Rec 5801. Legal Aspects of Sport and Recreation. (4 cr; QP– §3550 or §; SP–§ Kin 3581; 3551 or 5461 or §; A-F only)
Legal issues related to recreation, park, and sport programs and facilities with public/private sectors.

Rec 5900. Special Topics: Contemporary Issues in Leisure Services. (1-12 cr [max 12 cr])
Contemporary issues emphasizing administrative and supervisory functions in recreation and allied professional areas; individual offerings, to be determined by faculty, focus on professional issues and professional groups.

Rec 5901. Research Methodology in Kinesiology and Leisure Studies. (3 cr; QP– §Kin 5980, M.Ed. or grad student or §; SP–§ Kin 5981; M.Ed. or grad student or §; A-F only)
Defines and reviews various types of research in exercise and sport science, physical education, and recreation programs; various qualitative research, field studies, and methods of introspection as alternative research strategies instead of relying on traditional scientific paradigm.

Rec 5992. Readings: Recreation. (1-3 cr [max 9 cr])
Independent study under instructor guidance by a faculty member in leisure studies. Intended as an opportunity to conduct in-depth study and reading on particular topic(s) not covered in regular coursework.

Rec 5995. Problems in Recreation, Park, and Leisure Studies. (1-12 cr [max 30 cr]; QP–M.Ed. or grad student or §; SP–§ M.Ed. or grad student or §; A-F only)
Independent study of leisure service programs, systems, facilities, or policies; focus on conduct of research programs. Individual or small group project (e.g., library or field research) or demonstration projects in the field of leisure studies and services. Not intended for additional fieldwork, practicum, or programming experience.

Rec 8210. Seminar: Leisure Services. (3 cr; SP– Rec M.Ed. or grad student or §; A-F only)
Critical study and special problems in recreation, park, and leisure services and in therapeutic recreation.

Rec 8320. Seminar: Theoretical Perspectives in Leisure Behavior. (3 cr; QP–§ 5100; SP–§ 5101 or §; A-F only)
Major theoretical paradigms and empirical findings, where appropriate, from leisure studies in particular and social sciences in general.

Rec 8333. FTE: Master’s. (1 cr; SP– Master’s student, adviser and DGS consent)

Rec 8390. Seminar: Administrative Problems in Leisure Services and Therapeutic Recreation. (3 cr; QP–3550 or equiv; SP–Rec M.Ed or grad student or §; A-F only)
Administrative and management issues and problems in leisure services and therapeutic recreation.

Rec 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required (Plan A only))

Rec 8980. Graduate Research Seminar in Recreation, Park, and Leisure Studies. (1-3 cr; SP–§5981, EPsy 5261 or §; S-N only)
Analyzing, designing, and reporting on research problems in leisure studies.

Rec 8995. Research Problems in Recreation, Park, and Leisure Studies. (1-4 cr [max 16 cr]; QP–§5980; SP–§; S-N only)
Conducting individual scholarly research. Intended for M.A., Ph.D., or other graduate-level students with a major emphasis in recreation, park, and leisure studies. Not for working on an M.A. Plan A or Ph.D. thesis.

Rehabilitation Science (RSC)

Department of Physical Medicine and Rehabilitation

Medical School

RSC 8333. FTE: Master’s. (1 cr; SP– Master’s student, adviser and DGS consent)

RSC 8444. FTE: Doctoral. (1 cr; SP– Doctoral student, adviser and DGS consent)

RSC 8666. Doctoral Pre-Thesis Credits. (1-18 cr [max 60 cr]; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim orally)

RSC 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required (Plan A only))

RSC 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; SP–Max 24 cr per semester or summer; 24 cr required)

Religions In Antiquity (RelA)

Department of Classical and Near Eastern Studies

College of Liberal Arts

RelA 5013. Biblical Law and Jewish Ethics. (3 cr; SP– §3013, §5111, §5113, §5117)

RelA 5070. Topics in Ancient Religion. (3 cr; SP– RelA 3071 or 3072 or 3073 or 5071 or 5073 or any RelS course or §)
Study of a specific aspect of religion in Classical and Near Eastern antiquity such as healing cults, magic and divination, Cthonistion, or prophecy and authority. Topics specified in Class Schedule.

RelA 5071. Greek and Hellenistic Religions. (3 cr; SP– §3071, §3171)
Greek religion from the Bronze Age to Hellenistic times. Sources include literature, art, and archaeology. Honor and the Olympian deities; ritual performance; prayer and sacrifice; temple architecture; cemeteries; death and the afterlife; mystery cults; philosophical religion; Near Eastern salvation religions. Meets with 3071.

RelA 5072. The New Testament. (3 cr; SP– §53072, §3172)

RelA 5073. Roman Religion and Early Christianity. (3 cr; SP– §53073)

RelA 5080. New Testament Proseminar. (3 cr; SP– RelA 1082 or 3072 or equiv)

RelA 5088. Archaeology in Biblical Lands I: Old Testament Period. (3 cr; SP– §53088)


RelA 5503. History and Development of Israelite Religion. (3 cr; SP– §RelA 5503)
Survey of the evolution of Israelite religion. Cultural practices, law and religion, prophecy, religion and historiography. Relationship to surrounding religious systems.

RelA 5504. Development of Israelite Religion II. (3 cr; SP– §RelA 5504)
Ancient Judaism from the Persian restoration (520 B.C.E.) to Roman times (2nd century C.E.). Religious, cultural, and historical developments are examined to understand Jewish life, work, and worship under a succession of foreign empires: Persian, Greek, Roman.

RelA 5993. Directed Studies. (2-4 cr [max 10 cr])
Guided individual reading or study.

Religious Studies (RelS)

Department of Classical and Near Eastern Studies

College of Liberal Arts

RelS 5111. Problems in Historiography and Representation of the Holocaust. (3 cr; SP– JwSt 5321/RelS 5321 [formerly 3541]) History of the Holocaust or §)
An advanced course focusing on issues connected with the Holocaust, Inclusiveness of other groups, Holocaust versus Shoah, Theologico-political discussions about perpetrators, an examination of the problems of representation in literature and art, problems of narrative technique after Auschwitz.

RelS 5993. Directed Studies. (1-4 cr [max 24 cr])
Directed studies in religion. Credits may vary from term to term to a limit of nine.

Rhetoric (Rhet)

Department of Rhetoric

College of Agricultural, Food, and Environmental Sciences

Rhet 5111. Message Design: Theory and Practice I. (3 cr; SP– Grad student or §; A-F only)
Audience analysis, media selection, message design through various theoretical perspectives, including cognitive/schema, social construction, feminist, intercultural theories. Usability testing, contextual inquiry as means to study effectiveness of messages.

Rhet 5112. Message Design: Theory and Practice II. (3 cr; SP– §5111; A-F only)
Political, economic, social, and technical aspects of communication, focus on reader feedback and design project.

Rhet 5196. Internship in Scientific and Technical Communication. (3-6 cr [max 6 cr]; QP–§ STC grad or §; SP– STC grad or §; S-N only)
Internships may include the University, industry, or government agencies. An internship proposal, progress report, internship journal (optional), and final report with letter from the internship supervisor are required.
Courses

Rhet 5258. Information-Gathering Techniques in Scientific and Technical Communication. (3 cr; A-F only)
Questionnaire development, informational interviewing, focus group interviewing, Guides, schedules, questioning techniques, communication theories in employment cycle interviews. Descriptive statistics used to analyze data.

Rhet 5270. Special Topics. (1-3 cr [max 3 cr]; QP–[STC or RSTC] [major or grad student]; #; SP–[STC or RSTC] [major or grad student]; #; A-F only)
Topics specified in Class Schedule.

Rhet 5291. Independent Study. (1-3 cr [max 3 cr]; QP–#; A; SP–#)
Supervised reading and research; advanced projects not covered in regularly scheduled offerings.

Rhet 5511. Research in Scientific and Technical Communication. (3 cr; A-F only)
Expository writing, research techniques for quantitative/qualitative methodologies in scientific/technical communication. Face-to-face, phone, focus group interviewing. Questionnaire development, contextual inquiry. Using rating, ranking, sort methods. Ethics, experimental bias, inferential statistics.

Rhet 5531. Scientific and Technical Communication Course Development and Pedagogy I. (3 cr; QP–Grad or #; SP–Grad; A-F only)
Pedagogical philosophy/methodology in beginning writing, technical communication, distance education courses. Introduction to theories of teaching in scientific/technical communicating teaching with multimedia.

Rhet 5532. Scientific and Technical Communication Course Development and Pedagogy II. (3 cr; QP–5531 or #; SP–5531 or 5532; A-F only)
Pedagogical philosophy/methodology in advanced writing, technical communication, distance education courses. Introduction to theories of teaching in scientific/technical communicating teaching with multimedia.

Rhet 5533. Scientific and Technical Communication Course Development: Teaching Seminar. (1 cr; QP–5531, 5532; SP–5531 or 5532; A-F only)
Mentorship identification, facilitate communication with student's first teaching assignment. Students share observations, solve teaching problems in seminar setting. Issues facing new teachers, developing a philosophy of teaching. Focuses on evaluating work in classroom.

Rhet 5534. Designing Technical Training for Intercultural Audiences. (3 cr; A-F only)
Select and research training topic, write learning objectives and outcomes, set conditions for learning, complete a comprehensive course outline, and one training module.

Rhet 5562. Theory and Practice in International Business Communication. (3 cr; QP–3562; SP–3562 or equiv; A-F only)
Theories and practices in intercultural and international scientific, technical, and business communication. Examine cultural differences by studying cultural metaphors and research studies by interviewing people from other cultures including international business managers, and through case studies.

Rhet 5564. Science Writing for Popular Audiences. (3 cr; QP–3564 or #; SP–3564 or #; A-F only)
How sciences are “translated” for popular audiences. Rhetorical theory used to write popularized articles. Developing a rhetoric for writing articles. Controversial issues surrounding movement from sciences to "science/less" to "science/poor." (A-F only)

Rhet 5775. Major Figures in Rhetorical Tradition: Classical Period. (3 cr; A-F only)
Classical rhetoric: method, Epistemological status of rhetoric, Ethical implications of persuasion. Emphasizes "Aristotle's Rhetoric" as founding document. Other figures (e.g., Plato, Isocrates, Cicero, Quintilian).

Rhet 5776. Major Figures in Rhetorical Tradition: Modern Era. (3 cr; A-F only)
Aristotelian rhetoric in modern era, Francis Bacon, scientific revolution, George Campbell, rise of human sciences. Kenneth Burke, semiotics in twentieth century. (A-F only)

Rhet 5801. Research Methods in Rhetoric and Scientific and Technical Communication. (3 cr; QP–STC/RSTC grad or #; A-F only)
Quantitative/qualitative research methods. Theoretical perspectives with demonstrative and approaches to scientific/technological rhetoric.

Rhet 5802. Applied Research Methods in Scientific and Technical Communication. (3 cr; QP–STC/RSTC grad student or #; A-F only)
Methodological choices, arguments, and uses of data in case studies. Students design and conduct a pilot study and review/apply research methods, survey research, ethnography, rhetorical/situational analysis, and/or interviews, and descriptive statistics. Review responsibilities of conducting research.

Rhet 8333. FTE: Master's. (1 cr; SP–Master's student, adviser and DGS consent)
Rhet 8444. FTE: Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)
Rhet 8505. Design Project. (5 cr; SP–STC/RSTC grad student or #; A-F only)
Extended problem-solving situation in business, government, or industry. Student acts as consultant to explore problem, identify possible solutions, introduce solution, apply it.

Rhet 8510. Topics in Rhetorical Theory, History, and Criticism. (3 cr [max 12 cr]; A-F only)
Rhetorical theory in context of culture influenced by science/technology. Topics vary. See Class Schedule.

Rhet 8520. Topics in Science and Rhetoric. (3 cr [max 12 cr]; A-F only)
Doctoral seminar on interaction of gender with science/technology. Topics vary. See Class Schedule.

Rhet 8530. Topics in Feminist Theory in Science, Technology, and Communication. (3 cr [max 12 cr]; A-F only)
Doctoral seminar on interaction of gender with science/technology. Topics vary. See Class Schedule.

Russ 5404. Tolstoy in Translation. (3 cr; SP–53404)
Novels, stories, and philosophical writings of Leo Tolstoy.

Russ 5407. Stories and Plays of Anton Chekhov in Translation. (3 cr; SP–5407)
Study of literary devices and themes in selected stories and major plays using the intrinsic approach.

Russ 5409. 19th-Century Russian Novel. (3 cr; SP–53409)
The Russian realistic novel from origins to decline; social, political, and intellectual circumstances that led to its emergence as the dominant genre of the “age of realism” in Russia.

Russ 5411. Dostoevsky in Translation. (3 cr; SP–53411)
Novels, stories, and other writings of Fyodor Dostoevsky.

Russ 5421. Literature: Middle Ages to Dostoevsky in Translation. (3 cr; SP–53421)
Russian literature from about 1000 A.D. to mid-19th century, emphasizing writers of the first half of the 19th century.

Russ 5422. Literature: Tolstoy to the Present in Translation. (3 cr; SP–53422)
Survey of Russian literature from mid-19th century to the present: realism, modernism, feminism and other trends.

Russ 5461. Methods of Translating Fiction From Russian to English. (3 cr; SP–53601, 53602 or equiv)
Learning to recreate a variety of literary styles through the experience of translation.

Russ 5900. Topics in Russian Language, Literature, and Culture. (1-4 cr; SP–5900 for language topics)
Variable topics in Russian language, literature, and culture.

Russ 5993. Directed Studies. (1-4 cr; SP–#, A, Q)
Guided individual study.

Russian Area Studies (RAS)

Institute of International Studies

College of Liberal Arts

RAS 8333. FTE: Master's. (1 cr; SP–Master's student, adviser and DGS consent)
RAS 8777. Thesis Credits: Masters. (1-18 cr; A-F only)
Research and readings on special problems or projects.
**Courses**

**Sanskrit (Skt)**
Department of Classical and Near Eastern Studies
College of Liberal Arts

Skt 5001. Beginning Sanskrit. (3 cr)
Introduction to the classical language of ancient India.

Skt 5002. Beginning Sanskrit. (3 cr; SP–Skt 5001 or equiv)
Introduction to the classical language of ancient India.

Skt 5201. Intermediate Sanskrit. (3 cr; SP–Skt 5002 or equiv)
Readings in Sanskrit literature.

Skt 5202. Intermediate Sanskrit. (3 cr)
Readings in Sanskrit literature.

Skt 5710. Topics: Language and Literature. (3 cr; SP–#)
Selected reading and/or study of linguistic problems in Sanskrit.

Skt 5992. Directed Readings. (3 cr; SP–Skt 5002 or equiv)
Guided individual reading or study.

Skt 8993. Directed Studies. (1-12 cr [max 30 cr])

**Scandinavian (Scan)**
Department of German, Scandinavian, and Dutch
College of Liberal Arts

Scan 5202. Scandinavian Romanticism. (3 cr)
Study of Scandinavian literature (poetry, drama, and prose), 1800-1870. Texts in the original languages.

Scan 5501. Scandinavian Mythology. (3 cr)
Study of Scandinavian mythology based on primary sources represented by Saxo Grammaticus, Snorri Sturluson’s *Edda* and *Ynglinga Saga*, and the *Poetic Edda*. Myths are analyzed using contemporary critical approaches. All readings in translation.

Scan 5502. The Icelandic Saga. (3 cr)
Study of the sagas written in 14th-century Iceland. Discussion includes cultural and historical information about medieval Iceland and analysis of a selection of sagas using contemporary critical approaches. All readings in translation.

Scan 5613. Contemporary Scandinavian Literature. (3 cr)
An investigation of issues which emerged as extremely important after 1945 in Scandinavia, as articulated by writers and analyzed by researchers in social sciences. All readings in translation.

Scan 5615. Ibsen and the Beginnings of Modern Drama. (3 cr)
Close reading of Ibsen’s “modern tragedies” from *A Doll’s House* (1879) to *When We Dead Awaken* (1899). Focus is on the dialectics between Ibsen and his society, and dramatic structure and staging conventions in the context of modern theater. Readings in English for nonmajors.

Scan 5616. Strindberg and the Drama in Revolt and Change. (3 cr)
Strindberg as the master of naturalistic drama and the precursor of modernity in European and American theater. Close reading of plays with emphasis on dramatic structure and staging conventions in the context of modern theater. All readings in English for nonmajors.

Scan 5670. Topics in Scandinavian Studies. (3 cr [max 9 cr])
Topic may focus on a specific author, group of authors, genre, period, or subject matter. Topics specified in Class Schedule. Readings in English for nonmajors. May meet with 3670.

Scan 5701. Old Norse Language and Literature. (3 cr)
Acquisition of a reading knowledge of Old Norse linguistic, philological and literary study of Old Norse language and literature.

Scan 5702. Old Norse Saga Reading and Analysis. (3 cr; SP–Skt 5002 or equiv reading knowledge of Old Norse)
Reading and analysis of Old Norse prose narratives, including close reading and discussion of the critical literature on both prose narratives and medieval Icelandic culture. All primary texts read in Old Norse.

Scan 5703. Old Norse Poetry. (3 cr; SP–Skt 5701 or equiv reading knowledge of Old Norse)
Reading and analysis of either eddic poetry from the *Poetic Edda* or skaldic poetry. Texts read in Old Norse.

Scan 5704. History of the Scandinavian Languages. (3 cr)
Investigation of the development of the Scandinavian languages from the earliest periods to the present.

Scan 5711. Structure of the Scandinavian Languages. (3 cr; SP–introductory course in linguistics or #)
Investigation of the philological, grammatical, and lexical systems of the Scandinavian languages.

Scan 5993. Directed Studies. (1-4 cr [max 12 cr]; SP–#)
Guided individual reading and study.

Scan 8002. Introduction to Scandinavian Studies. (3 cr)
Introduction to history of Scandinavian studies, to field of Scandinavian studies as an integral area with particular disciplines, and study of Scandinavian languages, literatures, and cultures. Integrated sections on Scandinavian bibliography.

Scan 8500. Seminar in Medieval Scandinavian Languages and Literature. (3 cr; SP–#)
Sample topics: Voltaire’s *Sagas*, studies in Snorri Sturluson’s *Edda*, dialogue analysis in the heroic *Edda*, Myths are analyzed using contemporary critical approaches. All readings in translation.

Scan 8510. Seminar in Scandinavian Linguistics. (3 cr [max 9 cr])
Selected problems in synchrony and diachrony of the Scandinavian languages (e.g., history or structure of Scandinavian languages).

Scan 8610. Seminar in Scandinavian Drama. (3 cr; max 9 cr)
Sample topics: dramaturgy and representation in modern drama, epic theater.

Scan 8630. Seminar in Scandinavian Criticism. (3 cr [max 9 cr])
Sample topics: feminist theory in Scandinavia, writing*history* in Scandinavia.

Scan 8702. Philosophical Proseminar II: History of Germanic Philology. (3 cr; A-F only)
Introduction to history and development of Germanic philology from 1800 to the present. See Ger 8701.

Scan 8975. Scandinavian Immigrant Languages and Literatures. (3 cr)
Introduction for graduate students in Scandinavian and related fields to research opportunities. Sources and methodology.

Scan 8994. Directed Research. (1-3 cr [max 12 cr]; SP–#)
A may be taken as tutorial with #)

**Scientific Computation (SciC)**

**Graduate School**

SciC 8001. Parallel High-Performance Computing. (3 cr; SP–Undergraduate degree in field using sci comp or #)
Interdisciplinary overview of computer science aspects of scientific computation, both hardware and techniques. Parallel computing, architectures, programming, and algorithms; restructuring compilers and infrastructures.

SciC 8011. Scientific Visualization. (3 cr; SP–Undergraduate degree in field using sci comp or #)
Basic issues in scientific visualization, visualization software, graphics, representation of scientific data, modeling, hardware for visualization, user interface techniques, output, commonly used algorithms and techniques for visualization, animation, information visualization, higher dimensional data, case studies, and examples of successful visualizations.

SciC 8021. Advanced Numerical Methods. (3 cr; SP–Undergraduate degree in field using sci comp or #)

SciC 8031. Modeling, Optimization, and Statistics. (3 cr; SP–Undergraduate degree in field using sci comp or #)
Interdisciplinary overview of mathematical modeling, optimization, and statistical techniques for scientific computation. Nonlinear equations and nonlinear optimization, statistics, control theory, modeling and simulation.

SciC 8041. Computational Aspects of Finite Element Methods. (3 cr; SP–Undergraduate degree in field using sci comp or #)
Fundamental concepts and techniques of finite element analysis. Variational equations and Galerkin’s method; weak formulations for problems with nonsymmetric differential operators. Petrov-Galerkin methods; examples from solid and fluid mechanics; properties of standard finite element families, implementation.

SciC 8095. Problems in Scientific Computation. (1-3 cr [max 9 cr])
SP–Undergraduate degree in field using sci comp or #)
Selected topics in interdisciplinary aspects of scientific computing.

SciC 8190. Supercomputer Research Seminar. (1 cr [max 3 cr]; SP–Undergraduate degree in field using sci comp or #)
Series of seminars by distinguished lecturers.

SciC 8333. FTE Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)

SciC 8444. FTE Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)

SciC 8594. Scientific Computation Directed Research. (1-4 cr [max 9 cr]; SP–Undergraduate degree in field using sci comp or #)

SciC 8666. Doctoral Pre-Thesis Credits. (1-18 cr [max 60 cr]; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

SciC 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

SciC 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required)
SAPh 8255. Pharmaceutical Marketing. (3 cr; SP–Grad SAPh major or #; A-F only) Historical development of distributive systems, marketing channels, institutions, policies, and practices as they relate to pharmaceutical industry. Contemporary issues and theories related to pharmaceutical marketing. Pharmaceutical proportion, especially directed to consumer advertising.

SAPh 8270. Clinical Conferences. (2 cr; SP–Grad SAPh major or #)

SAPh 8420. Social and Behavioral Aspects of Pharmacy Practice. (3 cr; SP–Grad SAPh major or #; A-F only) Historical development of the profession; its growth and development, emphasizing forces of education, professionalization, attitude modification, and changes occurring as a product of legal and organizational forces in society.

SAPh 8500. Pharmacy and Its Environment. (3 cr; SP–Grad SAPh major or #; A-F only) Cultural foundations of pharmacy. Development of present state of pharmacy practice. Role of pharmacist as health practitioner in relation to the health practitioners, identification of factors health policy, regulation, economics, research and development, promotion that affect individual responses to drug therapy.

SAPh 8700. Hospital Pharmacy Administration. (3 cr; SP–Grad SAPh major or #; A-F only) History, classification, organization, and functions of hospital departments in relation to the pharmacy service.

SAPh 8702. Hospital Pharmacy Survey. (1 cr [max 3 cr]; SP–Grad SAPh major or #) Readings for self-directed students to explore contemporary issues in hospital pharmacy practices.

SW 5051. Human Behavior and the Social Environment. (2-3 cr; SP–Grad student or 12 cr in social sciences or #; SP–Grad student or 8 cr social sciences or #) Social psychological, biological, cultural, and individual factors of individual and group development as applied to social work practice. Behavioral and life-cycle development focusing on diversity and each stage of life. Discuss development in terms of the individual, professional and patient.

SW 5052. Ecologies of Child Development Within Communities of Color. (3 cr; SP–Grad or #; SP–Grad or #) Examine social, affective, and cognitive development of children of color across all life cycles. Ecological systems framework. Family, school, peers, and community are studied as ecological contexts which influence development and trajectories for these children and youth. Attention is given to poverty, race, and oppression.

SW 5101. Historical Origins and Contemporary Policies and Programs in Social Welfare. (3-4 cr; SP–Grad or adult special or #; SP–Grad or adult special or #) Examines historical roots of social work and its growth into a distinct profession. Historical development of social work, social welfare, and human services from origins to contemporary policy and programs. Examines the role of social work in addressing social problems.

SW 5105. Women and Public Policy. (3 cr) Study of feminist organizations; issues and conflicts within organizations and movements; methods and sources for studying feminism.

SW 5107. Child Development and Social Policy. (3 cr; SP–Grad or #; SP–Grad or #) Examines the intersection of conceptual orientations of developmental psychology with policies that affect children and families. Demographic, historic, and social trends underlying the assumptions that drive policies directed at women and children; projections of future policies.

SW 5309. Case Management with Special Populations. (3 cr; SP–Grad or adult special or #; SP–Grad or adult special or #) Examines concepts and principles of case management practice with special populations such as older adults, persons with developmental disabilities, and persons with serious and persistent mental illness. The core functions of case management practice in a range of settings are addressed in relationship to issues of diversity, vulnerability, and empowerment.

SW 5313. Social Work with Older Adults. (2 cr; SP–Grad or adult special or #; SP–Grad or adult special or #) The practice components of social work with older adults including assessment, intervention, and case management. Looks to the perspectives of bio-psycho-social strengths and challenges and within the context of current social policy and delivery systems.

SW 5314. Social Work in the Schools. (2 cr; SP–Grad or adult special or #; SP–Grad or adult special or #) Application of social work methods in a school setting. Emphasizes assessment, diagnosis, consultation, advocacy, interdisciplinary team building, and crisis intervention.

SW 5315. Social Work Practice in Hospitals and Health Care Settings. (2 cr; SP–Grad or adult special or #; SP–Grad or adult special or #) Prepares students for social work practice in hospital and healthcare settings. Focus on the integration of conceptual and practice subject matter with other differential assessment, clinical intervention models, impact of acute and chronic illness, specialty populations, managed care, and ethical issues, interdisciplinary team work, and transition planning in healthcare.

SW 5316. Brief Treatment and the Task-Centered Approach. (2 cr; SP–Grad or adult special or #; SP–Grad or adult special or #) Prepares students for brief treatment models in work with individuals, families, and groups including their theoretical and empirical bases. Practice with diverse populations in context of managed care. Emphasis on the task-centered approach including skill training and supervised practice.

SW 5317. Social Work With Involuntary Clients. (2 cr; SP–Grad or adult special or #; SP–Grad or adult special or #) Includes theory, ethics, effectiveness, and intervention methods for work with client systems that experience involuntary contact with social worker. Interventions at macro, micro, and macro levels are included. Practice in settings such as child welfare, mental health, corrections, and public schools as well as practice related to organizational responses to change.
Courses

SW 5318. Family Centered Home Based Services. (2 cr; QP–Grad or adult special or #; SP–§58314; grad or adult special or #)
Ecological, multi-system approach focusing on the family system. Trivial theory, metacommunicatively, strengths-based, case management and team treatment. Family-based services evaluated for high risk, multi-problem families and as alternative to foster placement.

SW 5319. Adolescents: Norms, Culture, and Health. (2 cr)
Relationships among familial, social, societal, political, economic, environmental, psychosocial, and cultural determinants of adolescent behavior that affect health, major public health issues and problems of adolescents.

SW 5481. Child Abuse Prevention I: Research and Theory. (3 cr; QP–Admission to child abuse prevention specialization; SP–Bachelor's degree or #)
Foundation of research for level I child abuse prevention studies certificate.

SW 5482. Child Abuse Prevention II: Program Development, Evaluation, and Advocacy. (3 cr; QP–Admission to child abuse prevention specialization, #; SP–§5481)
Design and evaluation of policies and programs of interventions to prevent child abuse. This is the second course in the Level I Child Abuse Certificate program.

SW 5483. Child Abuse Prevention III: Skill Building I—Cultural and Legal Issues. (3 cr; SP–Bachelor's degree or #)
Risk factors, protective factors, resilience in cultural settings. Identifying design strategies appropriate to cultural characteristics. First course for Level II child abuse prevention certification.

SW 5484. Child Abuse Prevention IV: Skill Building II—Risk Assessment and Interviewing. (3 cr; SP–Bachelor's degree or #)

SW 5519. Mediation and Conflict Resolution. (3 cr; SP–§5815)
Develops mediator skills for making informed decisions regarding the appropriateness of mediation for conflicts frequently confronted by social work practitioners such as divorce, neighborhood disputes, conflicts between professional and clients, conflicts between spouses, and conflicts between victims and offenders.

SW 5525. Global Perspectives on Social Welfare, Peace, and Justice. (3 cr; QP–1001 or SP–2001 or #)
Role of international social welfare in meeting basic human needs and promoting human rights, social justice, and peace. Theories, models, and policies in different economic and political systems with emphasis on Third World conditions.

SW 5705. Violence in Families. (3 cr; SP–§5705, §5707; grad student or adult special or #)

SW 5706. Issues and Interventions in Child Sexual Abuse. (2 cr; QP–Grad or adult special or #; SP–§5705; grad or adult special or #)
Major social problems and interventions involved in child sexual abuse. Develop knowledge and skills in working with sexually abused children and their families. Perceptions of victims, non-offending parents, perpetrators, and other family members. Interviewing, justice system, child protection.

SW 5707. Interventions with Battered Women and Their Families. (2 cr; QP–Grad or adult special or #; SP–§5705; grad or adult special or #)
Current theories, research, and evaluation of interventions with battered women and their families. Focus on practice, e.g., direct work with social institutions, victim-survivors, and assaulter and their families.

SW 5708. Substance Abuse and Social Work. (3 cr; QP–Grad or adult special or #; SP–Grad or adult special or #)
Assessment and intervention in situations involving substance abuse with special emphasis on cross-cultural practice. Relationships of substance abuse to areas such as child welfare, mental illness, and violence within families are examined.

SW 5810. Seminar: Special Topics. (1-4 cr)
Topics specified in Class Schedule.

SW 5811. Social Work Ethics. (2 cr; QP–Grad student or adult special or #; SP–§6801; grad student or adult special or #)
Acquire knowledge base and develops skills required to identify ethical issues, resolve ethical dilemmas, and make ethical decision in the context of professional practices in social work. Value base and ethical standards of the profession and ethical decision-making models examined in depth.

SW 5812. Legal Aspects of Social Work. (2 cr; QP–Grad or adult special or #; SP–§5813, §8801; grad or adult special or #)
Legal regulation of social work; licensing standards; professional liability; ethical issues and sanctions. Social worker involvement in legal processes of preparing for court testimony and cross examination. Substantive law affecting social work practice in selected areas such as child protection, mental health, family law, and domestic violence.

SW 5813. Child Welfare and the Law. (2 cr; QP–Grad student or adult special or #; SP–§5812, §8801; second yr M.S.W. or advanced standing or #)
Social work practice in juvenile court; child abuse and neglect reporting laws; risk assessment, reasonable efforts, case planning, custody proceedings, permanency planning, termination of parental rights, child testimony, social worker testimony, adoption laws.

SW 5991. Independent Study in Social Work. (1-4 cr; max 4 cr)
Independent study in areas of special interest to student and faculty.

SW 8010. Field Practicum I. (1-4 cr; max 8 cr; QP–§8400; SP–§8201; S-N only)
Field and social work practice under direct supervision. Professional orientation to a group of practice, development of professional identity, and understanding of social justice as integral to the profession. Field practice seminar completed concurrently with placement.

SW 8020. Field Practicum II. (1-4 cr; max 6 cr; QP–§8401; SP–§8010; S-N only)
Builds upon the skills developed in 8010. Students develop competence in identified concentration and integrate policy formulations into coherent professional position. Field practice seminar completed concurrently with placement.

SW 8030. Advanced Standing Social Work Practicum. (1-4 cr; max 8 cr; QP–Advanced standing; S-N only)
Field practice under direct supervision. Advanced social work practice related to student’s concentration, and policy formulation integrated into coherently professional position, social justice as integral to the profession. Field practice seminar completed concurrently with placement.

SW 8051. Psychopathology and Social Work Practice. (3 cr; QP–§8401; SP–§8202 or advanced standing or #)
Psychopathology from a systemic perspective. Biopsychosocial influences on diagnosis, course, treatment of common mental disorders diagnosed from infancy through adulthood. Differential effects on populations at-risk. Diagnostic skills, alternative intervention strategies, social work roles.

SW 8101. Social Policy and Delivery Systems for Child Welfare and Family Services. (3 cr; QP–§5111; SP–§5101 or advanced standing or #)
Federal, state, and local policies related to contemporary child welfare system and system of social services for families. Current and past social policies, financing, and structure and organization of service delivery; process of influencing policy changes in children and family services.

SW 8103. Health and Mental Health Policy. (3 cr; QP–§5111; §5101 or advanced standing or #)
Factors affecting health and mental health of variety of populations. Policies on organizational, state, and local levels affecting health status, financing, and delivery of health and mental health services. Ethical issues embedded in policies and issues in need of policy development.

SW 8150. Special Topics in Social Policy. (1-9 cr; max 9 cr; SP–#)

SW 8201. Social Work Methods: Practice With Individuals and Systems. (3 cr; QP–MSW)
Introduction to theories, knowledge, values, skills in initial phases of social work practice. Practice process: assessment, goal setting, contracting, intervention, treatment. Developing relationships, interviewing skills, and practice in diverse populations. Ecological problem-solving framework from empowerment orientation.

SW 8202. Social Work Methods: Practice With Families and Groups. (3 cr; QP–§8400; SP–§8202 or #)
Intervention theories, roles, methods, evaluation in practice with families and groups. Continues ecological problem-solving framework from SW 8201.

SW 8211. Macro Social Work Practice and Policy Advocacy. (3 cr; QP–§5111, §5349; SP–§5101 or #)
Policy analysis, development, implementation, community development, social action, social planning, ecological, problem-solving, empowerment perspectives, policy methods. Theories of organizational/community development change.

SW 8301. Advanced Child Welfare Practice. (3 cr; QP–§5111, §8401; SP–§8202, §8211) or adv standing or #)

SW 8303. Advanced Mental Health Practice with Adults. (3 cr; QP–§8401; SP–§8202, §8211 or adv standing or #)
Theory/practice of cognitive, affective, behavioral, and psychodynamic social work treatment in inpatient and community settings. Criteria for differential applications, including brief treatment and crisis-oriented approaches. Cultural and social aspects of mental health issues important to practice.

SW 8304. Advanced Practice With Children and Adolescents. (3 cr; QP–§8401; SP–§8202, §8211 or adv standing or #)

SW 8313. Social Work Practice in Interdisciplinary Teams. (3 cr; QP–§8401; SP–Advanced standing or foundation courses)
Interdisciplinary and interorganizational collaboration primarily in healthcare and school settings. Socialization of role, specialty skills and differences. Role expectations, ambiguity, strain. Value disputes and other human social dilemmas. Collaborative practice: relational communication, advocacy, consultation, mediation, conflict resolution skills.
SW 8314. Social Work Interventions With Families. (3 cr; QP–8402; [8121 or 8120 or 8520]; SP–55318; adv standing or 8202 or #) Interventions based on systems perspective of family as center of focus, in environmental context. Policy/practice principles of working with families in their home, community environment.

SW 8333. FTE: Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)

SW 8411. Life-Cycle Theory. (2 cr; QP–8401; SP–Advanced standing or 8202 or #) Strengths-based approach to client treatment grounded in Erik H. Erikson’s theory of the life cycle. Model explicitly considers differences in environmental supports and “healthy” outcomes, based on culture, race, gender, sexual orientation, spiritual belief, and age. Focus on maximizing health and remediating disorders.

SW 8444. FTE: Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)

SW 8460. Special Topics: Practice With Individuals, Families, and Groups. (1-3 cr [max 9 cr]; QP–8401; SP–8201 or #) Advanced practice courses.

SW 8501. Planning, Marketing, and Program Development. (3 cr; QP–8111, 8402; SP–5101, 8202 or advanced standing or #) Principles, applied practice of management concepts in human service settings. Management theories, organizational planning and development, marketing/communications. Management practice that is client/community-focused, results-oriented, and that seeks to achieve positive social change.

SW 8502. Resource Development and Management. (3 cr; QP–8301; SP–[8202, 8211] or adv standing or #) Procuring/managing financial resources in social work settings. Principles of philanthropy. Fundraising, grant writing, preparing monitoring budgets, interpreting basic financial reports. Management information systems, accountability requirements.

SW 8503. Personnel Leadership and Management. (3 cr; QP–8301; SP–8501 or #) Skills and principles in effective leadership. Legal and strategic considerations in personnel management, including workplace diversity, selection, hiring and development of paraprofessional staff, evaluation, compensation and benefits, promotions and staff termination, management of work groups and organizations.

SW 8505. Advanced Community Organization and Advocacy. (3 cr; QP–8301; SP–8501 or #) Methods for stimulating and supporting joint action for constructive change to fulfill community needs. Principles of working with local organizations and social action to accomplish life changes.

SW 8519. Mediation and Conflict Resolution for Social Workers. (3 cr; SP–55519; M.S.W. student or grad conflict mgmt minor or #) Advanced mediation skills for social workers; appropriateness of mediation in conflicts that frequently confront social work practitioners, such as divorce, neighborhood disputes, and conflicts between parents and adolescents, between spouses, and between co-workers and offenders.

SW 8525. Global Perspectives on Social Welfare, Peace, and Justice. (3 cr; QP–5111 or 5349; SP–5101 or #) Role of international social welfare in meeting basic human needs and promoting human rights, social justice, and peace. Theories, models, and strategies of social welfare in different economic and political systems, emphasizing Third World nations. Skills for social workers and other professionals in the helping professions.

SW 8601. Social Work Research Methods. (3 cr; SP–M.S.W. student or #) Introduction to quantitative and qualitative social work research skills fundamental to development and critical use of information relevant to social work practice; decision making and evaluation in a case, program policy levels; Social research, data development, research questions, sampling, measurement, research design, data collection and analysis.

SW 8602. Direct Practice Evaluation. (2 cr; QP–8901 or equiv; SP–8601 or equiv or #) Students design, evaluate interventions that incorporate current evaluation methods and principles derived from research theory, practice wisdom, their own experience. Evaluation methods include single-system design, client-focused evaluations, practitioner-focused evaluations, and cost-effectiveness; standardized instruments, self-constructed instruments.

SW 8603. Program Evaluation. (2 cr; QP–8901 or equiv; SP–8601 or equiv or #) Conceptual, methodological, political, psychological, and administrative factors related to conducting and reporting social work program evaluation. Social programs as cause and effect; models, types, and strategies of evaluation; appraisal of selected research literature.

SW 8666. Doctoral Pre-Thesis Credits. (1-12 cr [max 60 cr]; SP–Max 12 cr per semester or summer, doctoral student who has not passed prelim oral) In-depth study under individual supervision.

SW 8693. Directed Study. (1-6 cr [max 6 cr]; SP–#) Independent study under individual supervision. Projects may be conducted in conjunction with field learning experiences or other coursework.

SW 8702. Advanced Social Work Practice With Diverse Populations. (2 cr; QP–Foundation courses; SP–Advanced standing or foundation courses or #) Models of ethnic-sensitive social work practice performed in human service management or direct practice settings. Critical examination of human needs and organizational responses to ethically and culturally competent practice with populations at risk.

SW 8801. Social Work Ethics and Legal Issues. (3 cr; QP–Foundation courses; SP–55811, 55812, 55813; foundation courses or adv standing or #) Develops knowledge base and skills required to identify, understand legal and ethical issues, resolve ethical dilemmas, and make ethical decisions within a social work roles and ethics. Value base, ethical standards, ethical decision making, application of law and professional standards related to social work. Legal aspects of child welfare practice.

SW 8803. Social Work Supervision, Consultation, and Leadership. (3 cr; QP–Foundation courses; SP–Foundation courses or advanced standing or #) Principles, practices, and models of supervision in human service systems: administrative, educational, and supportive functions. Organizational leadership and mediation skills. Contextual factors that influence supervisory role and function. Principles and methods of teamwork, staff development, and consultation.

SW 8851. History of Social Work and Historical Research Methods. (3 cr; QP–Required research courses for soc work Ph.D. student; equiv research methods courses for other grad students; SP–Required research courses for soc work Ph.D. student; equiv research methods courses for other grad students) Methods of historical research and survey of history and evolution of social welfare and social work, using primary and secondary source materials.

SW 8855. Social Policy Formulation and Analysis. (3 cr; SP–Soc work Ph.D. student or #) Application of theoretical, conceptual frameworks, and research methodology to analysis of social issues and formulation of social welfare policy.

SW 8861. Theory and Model Development in Social Work. (3 cr; SP–Soc work Ph.D. student or #) Intervention research methods and contemporary social work practice models. Practice models studied include direct intervention in a variety of systems from the individual to community. Theoretical, value, and institutional foundations of contemporary practice models examined through lens of intervention research.

SW 8863. Social Work Teaching Methods and Educational Issues. (3 cr; SP–Soc work Ph.D. student or 2nd-yr M.S.W. student or #) Teaching methods, skills, strategies, and issues related to teaching, scholarship, and services in context of social work education. Familiarizes students with current issues, including curriculum development. Includes concurrent teaching experience in a social work class.

SW 8871. Social Work Research Seminar I. (3 cr; SP–Soc work Ph.D. student or #) First of two sequential Ph.D. seminars. Students review and expand their knowledge of basic concepts and methods of social research; current issues and controversies in social science and social work research and knowledge development. Development of research questions, sampling, measurement, data collection strategies, and qualitative and quantitative research.

SW 8872. Social Work Research Seminar II. (3 cr; SP–8891; SP–8871 or #) Additional topics: methodologies and design of quasi-experiments, surveys, descriptive research, grounded theory, and analysis of qualitative and quantitative data.

SW 8875. Research Practicum. (2 cr max 6 cr; SP–Soc work Ph.D. student or #; SP–5N only) Experience in conduct of research following completion of 8871 and 8872. Students work under faculty direction.

SW 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; SP–Max 18 cr per semester or summer, 24 cr required)

Sociology (Soc)

Department of Sociology
College of Liberal Arts

Soc 5090. Topics in Sociology. (1-3 cr; QP–#; SP–1001 or #) Topics specified in Class Schedule.

Soc 5091. Independent Study. (1-4 cr; QP–#; SP–#) Independent study of an established 5xxx course.

Soc 5301W. Social Movements. (3 cr; SP–# for undergrads; 3301 or #) Origins, dynamics, and consequences of social movements. Dilemmas and challenges facing movement organizations. Relationships among movements, parties, and states and role of movements in bringing about change. Case studies of civil rights, labor, environmental, women’s, gay rights, and student movements.

Soc 5455. Sociology of Education. (3 cr; QP–1001 or equiv or #; SP–1001 or equiv or #) Structures and processes within educational institutions. Links between educational organizations and the social context, particularly as it relates to educational change.


Soc 8001. Sociology as a Profession. (1 cr; SP–Grad soc major; 5 N only) Sample topics: role of sociology in society, professional organizations, employment opportunities, professional ethics, and writing for publication or grant proposals.
Courses

Soc 8011. Sociology of Higher Education: Theory and Practice. (3 cr; SP–Grad soc major or #) Social/political context of teaching. Ethical issues, multiculturalism, academic freedom. Teaching skills (e.g., lecturing, leading discussions). Active learning. Evaluating effectiveness of teaching. Opportunity to develop syllabus or teaching plan.

Soc 8090. Topics in Sociology. (1-4 cr; SP–#) Topics specified in Class Schedule.

Soc 8091. Independent Study. (1-5 cr; SP–#) Independent study of an established 8xxx course.

Soc 8093. Directed Study. (1-4 cr; SP–#) May be used to fulfill sociology graduate requirement for advanced methodological training.

Soc 8101. Sociology of Law. (3 cr; QP–3101, 3102, 5705 recommended) Sociological analysis of law and society. In depth review of research on why people obey the law, of social forces involved in creation of law (both civil and criminal), procedures of enforcement, and impact of law on social change.

Soc 8111. Criminology. (3 cr) Overview of theoretical developments and empirical research. Underlying assumptions, empirical generalizations, and current controversies in criminological research.

Soc 8148. Law, Society, and the Mental Health System. (3 cr; QP–Grad student, 5148 or #; SP–Grad student, 4148 a or B–A: F only) Intensive survey of psychopathology. Reference to criminal behavior, criminal justice system.

Soc 8190. Topics in Law, Crime, and Deviance. (3 cr [max. 12 cr]; QP–Grad student in sociology or #; SP–Grad student in sociology or #) Advanced topics in law, crime, and deviance. Social underpinnings of legal/illegal behavior of legal systems.

Soc 8201. Social Stratification and Mobility. (3 cr; QP–3xxx soc course or 5401 or #; some stat recommended; SP–3811 or equiv or #) Form and context of hierarchical arrangements. Relationship of hierarchy to social order and individual behavior. Structures of social stratification. Status attainment. Mobility. Inequality and economic development, social development, and technological change. Economic status relations to social status, including race, gender.

Soc 8211. Race Relations Theory. (3 cr) Major theoretical debates. Basic contemporary and classical theoretical approaches to studying U.S. race relations; contemporary and historical experiences of specific racial and ethnic groups.

Soc 8221. Sociology of Gender. (3 cr; QP–3401) Organization, culture, and dynamics of gender relations and gendered social structures. Sample topics: gender, race, and class inequalities in the workplace; women’s movement; social welfare and politics; gender inequality, theories and methodological debates in gender studies; sexuality; sociology of emotions.

Soc 8290. Topics in Social Stratification. (3 cr) Comparative perspectives on social inequality; race, class, and gender; quantitative research on gender stratification; stratification in post-communist societies; institutional change and stratification systems; industrialization and stratification. Topics specified in Class Schedule.

Soc 8311. Political Sociology. (3 cr; QP–3401 or 5401 or equiv) Social dimensions of political behavior and social origins of different forms of the state. How various theoretical traditions—Marxist, Weberian, and feminist—address key issues in political sociology, including citizenship, revolution, state formation, origins of democracy, welfare state, and fascism.

Soc 8333. FTE: Master’s. (1 cr; SP–Master’s student, adviser and DGS consent) Sociology of aging, sociology of youth, and mental health and adjustment early in life. Topics specified in Class Schedule.

Soc 8336. Doctoral Pre-Thesis Credits. (1-18 cr [max 60 cr]; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Soc 8377. Thesis Credits: Doctoral. (1-18 cr; max 50 cr) SP–Max 18 cr per semester or summer; 10 cr total required (Plan A only)

Soc 8390. Topics in Political Sociology. (3 cr) Topics with common focus on social underpinnings of political behavior and political change. Sample topics: democracy and development, international legal and political systems, power and protest in advanced capitalist states, development and international migration, and civil society and democracy. Topics specified in Class Schedule.

Soc 8411. Research on Formal Organizations. (3 cr; QP–3401 or 5401 or equiv or #) Theories of the structure, functions, and behavior in corporations and bureaucracies. Organization structure; from standpoint of organizational, transaction costs, and structural response: organizational failures. Power, conflict, and bargaining in organizational decision making. Course content varies.

Soc 8421. Work and Occupations. (3 cr; QP–3201 or 3401 or 5401 or #) Sociological analysis of work, occupations, and labor markets, including contemporary theory and research. Course emphasis varies with instructor. Course content varies.

Soc 8444. FTE: Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)

Soc 8490. Advanced Topics in Social Organization. (3 cr; SP–#) Content varies with instructor. Sample topics: gender and organizations, interorganizational interactions, comparative studies of nonprofit organizations, consumer behavior, industry and technology, social networks, conflict, coercion, and social exchange. Topics specified in Class Schedule.

Soc 8501. Sociology of the Family. (3 cr) Theoretical and empirical works from contemporary family sociology. Content varies with instructor. Sample topics: definitions of the family, family roles, family interactions, marriage and divorce, childbearing, parenthood, and cultural variations in families.

Soc 8540. Topics in Family Sociology. (3 cr) Families and mental health, families, work, and the labor market: historical and comparative research on the family. Topics specified in Class Schedule.

Soc 8551. Social Structure and the Life Course. (3 cr) General concepts and premises of life course analysis as applied to economic, social, family, and historical context. Life course phenomena, social change, social position, and familial, economic, and social determinants of the life course. Sample topics: definitions of the family, family roles, family interactions, marriage and divorce, childbearing, parenthood, and cultural variations in families.


Soc 8666. Doctoral Pre-Thesis Credits. (1-18 cr [max 60 cr]; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

Soc 8701. Sociological Theory. (4 cr; QP–8711, 8725; SP–Grad soc major or #; A-F only) Topics specified in Class Schedule. Course content varies.

Soc 8790. Topics in Life Course Sociology. (3 cr) Sociology of aging, sociology of youth, and mental health and adjustment early in life. Topics specified in Class Schedule.

Soc 8795. Advanced Topics in Social Organization. (3 cr; SP–Grad soc major or #; A-F only) Seminar topics: theories of conflict, theories of purposeful action, Marxist theory, and stratification, agency debate.

Soc 8801. Sociological Research Methods. (4 cr; SP–Grad soc major or #; A-F only) Multilevel objectives of social research and how they inform research design. Conceptualization and measurement of complex concepts. Broad issues in research design and quantitative and qualitative approaches to data collection and management.

Soc 8811. Advanced Social Statistics. (4 cr; SP–5811 or equiv; grad soc major or #; A-F only) Statistical methods for analyzing social data. Sample topics: advanced multiple regression, logistic regression, limited dependent variable analysis, analysis of variance and covariance, log-linear models, structural equations, and survival analysis. Applications to datasets using computers.

Soc 8888. Thesis Credits: Doctoral. (1-24 cr [max. 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required)

Soc 8990. Advanced Topics in Research Methods. (3 cr; SP–Grad soc major, 8801, 8811 or #) Advanced quantitative methods (e.g., multilevel models) and historical, comparative, field, and survey research. Topics specified in Class Schedule.

Software Engineering (SEng) Department of Computer Science Institute of Technology SEng 5115. Graphical User Interface Design, Evaluation, and Implementation. (3 cr; SP–SEng major; A-F only) Design and evaluation of interactive application interfaces, user and task centered approaches to design, guidelines for graphical design, interface evaluation techniques, current interface trends, including web interfaces and information visualization. Group projects that include designing, prototyping, and implementing an application interface.

SEng 5116. Graphical User Interface Toolkits. (2-3 cr; SP–SEng major; SP–SEng major; A-F only) Toolkit-centered introduction to GUI implementation technology. Students learn to use a GUI toolkit to implement a graphical application. Introduction to advanced techniques, including constraint-based data management, 3D visualization tools, and toolkit structure and design.

SEng 5131. Network Programming. (2-3 cr; QP–SEng major; SP–SEng major; A-F only) Java programming, concurrent programming, network programming, distributed database, security, collaborative computing, object-oriented architecture and design, network publishing, messaging architecture, distributed object computing and intertran
Courses

SEng 5199. Topics in Software Engineering. (2-3 cr; max 6 cr; QP–SE grad student; SP–SE grad student; A-F only) Topics specified in Class Schedule.

SEng 5511. Artificial Intelligence. (3 cr; QP–Grad SEng major; SP–Grad SEng major; A-F only) Introduces ideas and theories of AI. Problem solving, search, inference techniques, Logic, and theorem proving. Knowledge representation, rules, frames, semantic networks. Planning and scheduling. Introduces Lisp programming language.

SEng 5551. Introduction to Intelligent Robotic Systems. (3 cr; QP–Grad SEng major; SP–Grad SEng major; A-F only) Transformations, kinematics and inverse kinematics, dynamics, and control. Sensing (robot vision, force control, tactile sensing), applications of sensor-based robot control, robot programming, mobile robotics, and micro-robots.

SEng 5707. The Principles of Database Systems. (3 cr; QP–Grad SEng major; SP–Grad SEng major; A-F only) Fundamental concepts: conceptual data organization, database models, data definition, database design; security and integrity; performance evaluation; query optimization; distributed database systems.

SEng 5708. Object-Oriented Databases. (2 cr; QP–Grad SEng major; SP–Grad SEng major; A-F only) Applications and motivation: extended relational, object-relational, and object-oriented database models; object identifier, types and constructors; versions and schema evolution; query language (recursion, path expressions, etc.); object indices, buffer management and other implementation issues; triggers, rules, complex objects, and case studies.

SEng 5801. Software Engineering I: Software Life Cycle, Requirements Specification, and Design. (3 cr; QP–Grad SEng major; SP–Grad SEng major; A-F only) Development cost, effectiveness, software engineering lifecycle, problems specification analysis, system design techniques, documentation, Lectures, project.

SEng 5802. Software Engineering II: Advanced Software Engineering. (3 cr; QP–Grad SEng major; SP–Grad SEng major; A-F only) Topics in software engineering and in object-oriented software development. Software design/implementation using UML, object-oriented techniques, object-oriented languages such as Java. Lectures, project.

SEng 5811. Software Testing and Verification. (2 cr; QP–5801, grad SEng major; SP–5801, grad SEng major; A-F only) Theoretical/practical aspects of testing software. Analyzing a requirements document for test conditions. Writing a test plan. Designing, creating, and executing test cases. Recording defects. Writing a test report.

SEng 5851. Software Development for Real-Time Systems. (2-3 cr; QP–Grad SEng major; SP–Grad SEng major; A-F only) Analysis, design, verification, and validation of real-time systems. Periodic, aperiodic, and sporadic tasks, scheduling theory, timing properties, schedulability issues.

SEng 5841. Formal Modeling and Analysis in Software Engineering. (2 cr; QP–Grad SEng major; SP–Grad SEng major; A-F only) Formal specification of software artifacts: applicability of formal specifications; introduction to methods such as aZ,SCR, and Schedul. Formal analysis techniques: basic theorem proving; reachability analysis techniques; model checking; introduction to tools such as PVS, StateMate, SPIN, and SMV.

SEng 5851. Software Project Management. (3 cr; QP–Grad SEng major; A-F only) Concepts useful in managing software projects. Project management cycle: initiation, planning, controlling, status reporting, review, post project analysis. Leadership and motivation strategies. Lecture, discussion, individual/team presentations/projects.

SEng 5852. Quality Assurance and Process Improvement. (3 cr; QP–Grad SEng major; SP–Grad SEng major; A-F only) Theory and application of capability maturity model: process assessment, modeling, and improvement techniques. Lifecycle phases related to development and maintenance: quality, safety, and security assurance; project management; and automated support environments. Group projects and case studies.

SEng 5899. Software Engineering Seminar. (1-3 cr; QP–Grad SEng major; SP–Grad SEng major; A-F only) Software engineering trends. Talks by invited speakers, selected readings.

SEng 5900. Directed Study. (1-3 cr; A-F only) Directed study researching in software engineering. Topics specified in collaboration with instructor.

SEng 8333. FTE: Master’s. (1 cr; SP–Master’s student, advisor and DGS consent) SEng 8494. Capstone Project (Plan B Project). (3 cr; A-F only) Students work in teams on software project using tools, techniques, and skills acquired during previous coursework. Each team with a client/pupil requirement, agrees upon design, and achieve a successful acceptance test of resulting software system.

Soil Science (Soil) Department of Soil, Water, and Climate College of Agricultural, Food, and Environmental Sciences

Soil 5111. Practicum Internship in Precision Agriculture. (2-5 cr; QP–A-F or S-P—S—N only) Practical experience in precision agriculture in the industry/business. Content and extent of work at the internship site is jointly decided by the instructor, host business representative, and student. Optional adviser.

Soil 5125. Soil Science for Teachers. (3 cr) Basic physical, chemical, and biological properties of soil. Soil genesis, classification, and principles of soil fertility. WWW used for lab. Soil survey information used to make a land-use plan. Similar to 2125 with less emphasis on chemistry.

Soil 5211. Environmental Biophysics and Ecology. (2 cr; QP–[Biol 1009 or equiv], Math 1251, Phys 1101, [upper div or grad student] or [F]; SP–[Biol 1009 or equiv], Math 1271, Phys 1101, [upper div or grad student] or [F] A-F only) Basic concepts of environmental variables such as temperature, humidity, wind, and radiation. Mechanics of heat mass transfer between living organisms and its surrounding environment. Set of practical examples to integrate concepts and transport processes.


Soil 5232. Vadose Zone Hydrology. (3 cr; QP–[Math 1251 or equiv], [Phys 1042 or equiv] or [S]; SP–[Math 1271 or equiv], [Phys 1042 or equiv]) Basic soil physical properties/processes governing transport of mass/energy in soils. Emphasizes water and solute transport through unsaturated and vadose zones, their impact on subsurface hydrology, and on water quality. Lectures, hands-on laboratory exercises, discussion of real world problems, problem solving.

Soil 5311. Soil Chemistry and Mineralogy. (3 cr; QP–Chem 1002 or equiv, Phys 1102, grad; SP–[Chem 1002 or equiv], Phys 1102, grad) Structural chemistry, origin/identification of crystallinity and clay minerals. Structure of soil organic matter. Chemical processes in soil: solubility, adsorption/desorption, ion exchange, oxidation/ reduction, acidity, alkalinity. Solution of problems related to environmental degradation, plant nutrition, and soil genesis.

Soil 5312. Soil Chemistry and Mineralogy Laboratory. (2 cr; QP–SP; $5311 recommended) Companion laboratory to 5311. Clay mineral preparation for X-ray diffraction, selective mineral dissolution, cations exchange properties, absorption and solubility reactions and their modeling, chemical weathering, and organic matter extraction and identification.

Soil 5402. The Atmospheric Boundary Layer. (3 cr; QP–Math 1251, Phys 1251, Stat 3011; SP–Math 1271, Phys 1201, Stat 3011) Calculus-based introduction to the atmospheric boundary layer (ABL), the interface between the earth’s surface and the atmosphere. Topics include ABL development and turbulence, surface energy balance, ABL fluxes, anemometry, and observational and modeling methods.

Soil 5421. Introduction to Atmospheric Science. (3 cr; max 3 cr; QP–Math 1251, Phys 1251, Stat 3011; SP–Math 1271, Phys 1201, Stat 3011) Calculus-based introductory description of the atmosphere including atmospheric chemistry, dynamics, radiation, thermodynamics, chemical composition, and cloud processes. Discuss applications to climate, meterology, the hydrologic cycle, anemometry, and biogeochemical cycles.

Soil 5515. Soil Genesis and Landscape Relations. (3 cr; QP–3125 or 2125 or S-P, [F]; SP–2125 or S-P) Basic soil morphology and soil profile descriptions; genetic processes and models of soil development; soil pedogenesis, hydrology, and soil processes; spatial analysis and soil classification; soil surveys and land use; soil geography.

Soil 5555. Wetland Soils. (2-3 cr; QP–1020 or 3125 or equiv or S-P, [F]; SP–1125 or 2125 or S-P or S-P or [F]; SP–1125 recommended; A-F only) Morphology, chemistry, hydrology, formation of mineralogenic soils in wet environments. Soil morphological indicators of wet conditions, field techniques of identifying hydric soils for wetland delineations. Methods, Wetland soil protection, regulation, mitigation. Field trips, lab, field, hydric soil delineation project.


Soil 5611. Soil Biology and Fertility. (3 cr; QP–3125, Biol 1009 or equiv, Chem 1051 or equiv, or grad, BioC 3000 and MCB 3000 recommended; SP–2125 or 3125 or 1009 or equiv, Chem 1021 or equiv, sr, grad, BioC 3000, MCB 3000 recommended) Soil microorganisms and biodiversity. Soil microbial communities. Biogeochemical cycles. Macro and micronutrient fertilization, and element function in plants and microbes. Composts, sludge and manures in fertilization. Plant-microbe associations, nitrogen fixation, mycorrhizal fungi, and biological control of root pathogens. Pollution and bioconversion.

Soil 5711. Forest Soils. (2 cr; QP–1020 or 3125; SP–1125 or 2125) Factors affecting tree growth, estimation, modification, and management effects on site productivity, regeneration.
South Asian Languages and Cultures (SALC)

Department of Asian Languages and Literatures
College of Liberal Arts

SALC 5011. Indo-Aryan Linguistics. (3 cr)
Phonological, morphological, and syntactic developments; Indo-European, Old Indo-Aryan, Middle Indo-Aryan, Hindi, and other major modern Indo-Aryan languages.

SALC 5090. Instruction in Asian Languages. (3-5 cr)
Instructional specialization in one of the South Asian languages.

SALC 5201. Ancient Indian Literature in Translation. (3 cr)
Literary achievements of Indian civilization from the ancient period.

SALC 5202. Modern Indian Literature in Translation. (3 cr)
Literary achievements of Indian civilization from the modern period.

SALC 5204. Folklore of India. (3 cr)
A study of the main genres of Indian folklore—folk tales, folk songs, folk tales, folk dramas, proverbs, and fables—that reflect the relationship between Indian society and the interrelationship between related traditions, both great and small.

SALC 5411. Introduction to Indian Philosophy. (3 cr)
Major concepts; principal schools of Indian philosophy; traditional and contemporary views.

SALC 5412. Buddhism. (3 cr)
Development of Buddhism focusing on sectarian trends, modern religious practices, myth, and ritual, pilgrimage patterns, and religious festivals, and the interrelationship between Indian social structure and Hinduism.

SALC 5413. Hinduism. (3 cr)
Development of Hinduism focusing on sectarian trends, modern religious practices, myth, and ritual, pilgrimage patterns, and religious festivals, and the interrelationship between Indian social structure and Hinduism.

SALC 5414. Comparative Religions of South Asia. (3 cr)
Comparative and contrast basic philosophical concepts, literatures, and religious practices of Buddhism, Hinduism, and Jainism with those of Islam and Sikhism.

SALC 5456. The Cinema of India. (3 cr)
Survey of cinema of South Asia; aesthetic, social, economic, and political perspectives.

SALC 5500. Problems in Indian Philosophy. (3 cr)
An introduction to Indian philosophy emphasizing analyses of moral and knowledge.

SALC 5521. Gandhi and Non-Violent Revolution. (3 cr)
Character of Gandhi; his influence on contemporary, and his role today.

SALC 5556. Women in India: Role and Repression. (3 cr)
Representation of Indian women studied through literature of contemporary Indian women and against background of traditional Indian values and roles.

SALC 5710. Seminar in South Asian Languages. (4-5 cr)
Selected topics on South Asian languages; no knowledge of South Asian languages required.

SALC 5720. Seminar in South Asian Literature. (4-5 cr)
Selected topics on South Asian literature.
Span 5106. Don Quijote. (3 cr; SP–Three 3xxx or 5xxx literature courses in Spanish or Portuguese) Analysis of Cervantes’ “Don Quijote” in sociocultural context, focusing on the novel’s exception from the romantic period to postmodern times.

Span 5109. The Crisis of the Old Regime: Spanish Literature of the Enlightenment and Romanticism. (3 cr; SP–Three 3xxx or 5xxx literature courses in Spanish or Portuguese) Major literary works and intellectual movements and conflicts represented in written culture of the 18th and early 19th centuries (1680-1845), examined as expressions of the long crisis of Spain’s Old Regime and the diverse currents of modernism and the “generation of 1898.”

Span 5111. Contemporary Spanish Literature Since 1915. (3 cr; SP–Three 3xxx or 5xxx literature courses in Spanish or Portuguese) Major literary works and movements in Spain from 1915 to 2000. Neomodernism; surrealism; social realism; literatures of dictatorship and exile; postmodernism; Poetry, novel, drama, essays, film, video; literary theory.

Span 5211. Spanish Drama in Performance: 17th-Century Comedia. (3 cr; SP–Three 3xxx or 5xxx literature courses in Spanish or Portuguese) Major dramatists of the Spanish comedia (e.g., Cervantes, Lope, Tirso de Molina). Traditional genres such as tragedy, farce, interludes, and farcical elements and problems of honor, blood purity, free will, city vs. country, justice examined against the backdrop of social and political history.

Span 5234. Feminism and Literature in Spain. (3 cr; SP–Three 3xxx or 5xxx literature courses in Spanish or Portuguese or #) Spanish feminist thought and practice; literature, cultural discourse, literary and cultural history.

Span 5272. Hispanic Modernism. (3 cr; SP–Three 3xxx or 5xxx literature courses in Spanish or Portuguese) Critique of artistic and literary production in Hispanic cultures from mid-19th century to present. Modernity and modernization in Hispanic world. “Generation of 1898.” Castilian, Catalan, and Latin American practices along interdisciplinary and comparative lines.


Span 5522. National Literary Consciousness and Free Trade. (3 cr; SP–Three 3xxx or 5xxx literature courses in Spanish) Literary movements as part of the process of forming nations in Spanish America.

Span 5528. Popular Literary Consciousness: 1900-1950. (3 cr; SP–Three 3xxx or 5xxx literature courses in Spanish) Spanish-American literature between the eve and aftermath of the two world wars. Impact of modernization, industrialization, and nationalistic and populist thought on emergence of distinctive writing, thematic trends, and literary genre conventions.

Span 5529. National Affirmation and Transnationalization. (3 cr; SP–Three 3xxx or 5xxx literature courses in Spanish or Portugal) Literary trends of the contemporary period (1950 to present) as reactions to internal social demands for development of independent national cultures and response to international cultural pressures.

Span 5531. Hispanic Literature of the United States. (3 cr; SP–Three 3xxx or 5xxx Spanish or Portuguese literature courses or #) Contemporary Latin American literature, in Spain and Europe, and in the Hispanic diaspora. Analysis of Hispanic literature in the United States.


Span 5536. Feminism and Literature in Latin America. (3 cr; SP–Three 3xxx or 5xxx literature courses in Spanish or Portuguese or #) Latin American feminism in thought and practice; literature, cultural discourse, literary history.

Span 5701. History of Ibero-Romance. (3 cr; SP–3703, #) History of Spanish and Portuguese language and literature. 

Span 5711. The Structure of Modern Spanish: Phonology. (3 cr; SP–3701, two 3xxx or 5xxx Spanish or Portuguese language courses or #) Structure of the Spanish language, including sound changes, phonetic patterns, and sound symbolism.

Span 5712. The Structure of Modern Spanish: Morphology. (3 cr; SP–3704) Developing morphological theories and descriptions of Spanish. Examining of phonological and syntactic effects on morphology.

Span 5713. The Structure of Modern Spanish: Syntax. (3 cr; SP–3702, two 3xxx or 5xxx Spanish language courses or #) Study and analysis of the principal constructions found in the syntax of Spanish.

Span 5714. Theoretical Foundations of Spanish Syntax. (3 cr; SP–5713 or #) Theoretical foundations for the analysis of language. Grammar, grammatical relations, word order, constituency, subordination, information structure, grammaticalization. How these are present in the syntactic structure of Spanish.

Span 5715. The Structure of Modern Spanish: Semantics. (3 cr; SP–5714) Analyzing semantic theory to Spanish conceptual organization and the structuring of experience, meaning, and cultural values; semantic fields, categorization processes, cognitive models, metaphor, metonymy, and mental imagery as source and change of meaning.

Span 5716. The Structure of Modern Spanish: Pragmatics. (3 cr; SP–5715 or #) Concepts used in current literature in Spanish pragmatics, such as deixis, presupposition, conversational implicature, speech act theory, and conversational inference.

Span 5731. Spanish Dialectology: Regional and Social Dialects of Modern Spain. (3 cr; SP–Three 3xxx or 5xxx linguistics courses in Spanish or Portugal) Major dialect areas of Spain, with distinguishing phonological, morphological, lexical, and syntactic variations off each. Impact of regional political, social, and socioeconomic transformations on language.

Span 5732. Spanish Dialectology: Regional and Social Dialects of Modern Spanish America. (3 cr; SP–Three 3xxx or 5xxx linguistics courses in Spanish or Portugal) Major dialect areas of Spanish America, with distinguishing phonological, morphological, lexical, and syntactic variations of each. Their historical origin and evolution and the impact of cultural, political, and socioeconomic transformations on the language.

Span 5800. Spain’s Image and the Hispanic Culture. (Towards the XXI Century). (3 cr; SP–5711 or #) Contemporary Spanish society from perspectives of humanities, social sciences. Major sociocultural changes in Spain during 20th century. Emphasis on education, development of independent national cultures and in response to international cultural pressures.

Span 5910. Topics in Spanish Peninsular Literature. (3 cr; max 9 cr; SP–Three 3xxx or 5xxx literature courses in Spanish or Portugal) Proven and emerging areas of study: Problems in Spanish cultural history and their applicability to studies of artistic movements, ideological trends, formal methods, or literary genres. Topics specified in Class Schedule.

Span 5920. Topics in Spanish-American Literature. (3 cr; max 9 cr; SP–5710 or 5711 or 5714 or #) Spanish-American literature analyzed according to important groups, movements, trends, methods, and genres. Specific approaches depend on topic and instructor. Topics specified in Class Schedule.

Span 5930. Topics in Ibero-Romance Linguistics. (3 cr; max 9 cr; SP–#) Problems in Hispanic linguistics: a variety of approaches and methodologies.

Span 5970. Directed Readings. (1-4 cr; max 9 cr; SP–M.A. or Ph.D. candidate, #) Student-submitted plans for particular topics, figures, periods, or issues. Readings in Spanish and/or Spanish-American subjects.

Span 5985. Sociolinguistic Perspectives on Spanish in the United States. (3 cr; SP–Three 3xxx or 5xxx linguistics courses in Spanish or #) Sociolinguistic analysis of issues such as language maintenance/shift in U.S. Latino communities, code switching, attitudes of Spanish speakers toward varieties of Spanish and English, language change in bilingual communities, and language policy issues.

Span 5990. Directed Research. (1-4 cr; max 9 cr; SP–4, 5) Student-submitted plans for particular topics, figures, periods, or issues. Readings in Spanish and/or Spanish-American subjects.
Courses

Span 8200. Spanish Literary Texts: Theories of Formal Structures. (3 cr; max 9 cr; SP–Sxxx courses in Span literature and culture) Advanced research in methods of literary analysis of discourse. Emphasizes theoretical and practical frameworks within which representative texts are analyzed and interpreted from differing perspectives.

Span 8212. Spanish Theater of the 16th Century: Drama up to Lope. (3 cr; SP–Sxxx courses in Span literature and culture) Medieval origins of drama to La Celestina (1499-1502), pastoral and allegorical overviews of Spanish and Portuguese dramatists, popular theater up to emerging public and private theaters under Italian influence. Rojas, Encina, Vicente, Naharro, Cervantes, and new tragedians.


Span 8300. The Construction of Spanish Literary History. (3 cr; max 9 cr) Two Sxxx courses in Span literature and culture) Origins and development of Hispanic literary canon: sociohistorical theories of Spanish literary histories academic and historiographic disciplines. Critiques of modern literary theories through analysis of literary works by major writers.

Span 8312. Two Spanish Masterpieces: Libro de Buen Amor and La Celestina. (3 cr; SP–5106, 5117 or 5xxx course in Portuguese) Cultural reappraisal of the Middle Ages by reference to two Spanish masterpieces: the Archibald’s Book of True Love and Rojas’ La Celestina (1499-1502). Emphasizes historical function of varied genres, motifs, and sources adapted by the authors.

Span 8333. FTE: Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)

Span 8444. FTE: Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)

Span 8666. Doctoral Pre-Thesis Credits. (1-18 cr; max 60 cr; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

Span 8710. Seminar in Spanish and Portuguese Phonology. (3 cr; max 9 cr; SP–5711, Ling 5302 or #) Critical examination of readings and research on specific topic.

Span 8730. Seminar in Spanish and Portuguese Syntax. (3 cr; max 9 cr; SP–5714 or #) Critical examination of readings and research on specific topic.

Span 8750. Seminar in Spanish and Portuguese Pragmatics. (3 cr; max 9 cr; SP–5716 or #) Critical examination of readings and research on specific topic.

Span 8777. Thesis Credits: Master’s. (1-18 cr; max 50 cr; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Spanish-Portuguese (SpPt)

Speech-Communication (Spch)

Department of Speech-Communication College of Liberal Arts

Spch 5110. Special Topics in Communication Theory. (3 cr; max 6 cr) Advanced theoretical problems. See department office for prerequisites.


Spch 5233W. Electronic Media and National Development. (3 cr) Use of electronic media to change social, political, economic, and cultural life. Use by developing nations to improve agricultural practices, by geoic standards, and awareness of civic responsibility.

Spch 5261. Political Economy of Media Culture. (3 cr; SP–3211 or #) Organizational practices of media communicators. Media content as link between communicators and audiences. How viewers use/interpret media content.

Spch 5401. Advanced Theories of Communication. (3 cr; SP–3401 or grad) Survey of major theoretical approaches to communication including, positivism, constructivism, and systems.

Spch 5402. Advanced Interpersonal Communication. (3 cr; SP–1102, 3402 or 3411 or 3431 or 3441 or 3451) Social-scientific approaches to interpersonal communication; theory and research findings.


Spch 5406. Communication and Gender. (3 cr; SP–One woman’s studies course or #) How gender affects verbal communication. Development of analytical skills through readings, exercises, research that increase awareness of the power of language and the influence of gender perspectives. Comparisons across languages possible.


Spch 5411. Small Group Communication Research. (3 cr; SP–3411 or #; A-F only) Survey of small group communication research: theory and practice. Group decision-making and leadership.

Spch 5421. Quantitative Methods in Communication Research. (3 cr; SP–3401 or #; A-F only) Social scientific methods used in studying human communication. Optional data processing laboratory for additional credit.

Spch 5431. The Process of Persuasion. (3 cr; SP–3431) Communication campaigns (e.g., advertising, political) targeting persuasive processes and theories. Research paper required.
Spch 5441. Communication in Human Organizations (3 cr; SP—5441 or #)
Communication in organizational settings. Organizational structure and dynamics and their effect upon the communication process. Individual projects.

Spch 5451W. Intercultural Communication Processes. (3 cr)
Theory and research on cultural differences in values, norms, behaviors, and perceptions that affect communication across cultures internationally and domestically.

Spch 5461. Conversation Analysis. (3 cr; SP—Ling 3001 or 5001)
Discourse processes in dyadic and multiparty conversation. Application of concepts through analysis of conversations.

Spch 5462. Field Research in Spoken Language. (3 cr; SP—5461, Ling 3001 or 5001)
Transcribing and analyzing verbal communication and movement related to it. Applying concepts to recorded conversations.

Spch 5611. Survey of Rhetorical Theory. (3 cr; SP—1101)
Survey of rhetorical theory from ancient to contemporary period; application of theory to public discourse.

Spch 5611W. Introduction to Rhetorical Criticism. (3 cr; SP—1101, 3601 recommended) An analysis of public discourse using various theoretical perspectives.

How discourse has been used to establish or maintain power. Speeches and public debates used to examine American public address from 17th century (e.g., Puritan sermons) to the Civil War.

How discourse has been used to establish or maintain power. Speeches and public debates used to examine U.S. public address from the mid 19th century to 1950.

Spch 5970. Directed Study. (1-3 cr; max 6 cr; SP—Nine 3xxx–5xxx Spch cr; #, A, Q, S only) Guided individual reading or study.

Spch 8110. Seminar: Advanced Speech Problems. (3 cr; SP—undergrad degree in speech-comm or equiv)
Evaluation of research methods in speech-communication.

Spch 8210. Seminar: Selected Topics in U.S. Electronic Media. (3 cr; max 6 cr; SP—5210 or #; offered when feasible)
Literature survey evaluating research topics conducting independent research project on a particular topic.

Qualitative research methods for studying media institutions, texts, audiences, and contexts.

Spch 8231. Seminar: National and International Electronic Media Systems. (3 cr; SP—4231 or #)
Historical and contemporary aspects of national and international electronic media systems. Roles of national and international regulatory bodies. Approaches to programming and evidence of effectiveness.

Spch 8333. FTE: Master’s. (1 cr; SP—Master’s student, adviser and DGS consent)

Spch 8402. Seminar: Interpersonal Communication. (3 cr; SP—5402 or #)
Evaluate and develop new perspectives for analyzing, diagnosing, and managing interpersonal communication problems.

Spch 8403. Seminar: Emotion and Communication. (3 cr)
Major theories of emotion and the role of emotion in communication.

Spch 8406. Seminar: Language and Gender Research. (3 cr; SP—5406)
Readings and research on current issues. Data collected that test hypotheses and apply theory.

Spch 8411. Seminar: Small Group Communication Theory. (3 cr)
Research problems and methods.

Spch 8444. FTE: Doctoral. (1 cr; SP—Doctoral student, adviser and DGS consent)

Spch 8451. Seminar: Intercultural and Diversity Research. (3 cr)
Development of ideas and methods for research project, M.A. Plan B project, or Ph.D. dissertation.

Spch 8452. Seminar: Methods of Intercultural/Diversity Facilitation. (3 cr; SP—4451 or 5452 recommended)
Theories of and techniques for managing effective intercultural communication and diversity. Intercultural training.

Spch 8502. Seminar: Communication Theory Construction. (3 cr; SP—5421 or #)
Logic of communication theory development and modification from a social scientific perspective. Types of communication theories.

Spch 8503. Historical and Descriptive Research in Speech-Communication. (3 cr)
Electronic information in conducting and analyzing historical and descriptive research, approaches to historical research, assessing primary and secondary sources, completing a major research project.

Spch 8504. Seminar: Rhetorical Criticism. (3 cr; SP—5615 or #)
Rhetorical criticism theories and methods. Rhetoric as applied to university studies and the growth of hermeneutics as vantage points for reassessing rhetorical methods.

Spch 8606. Seminar: Rhetorical Analysis of Campaigns and Movements. (3 cr; SP—5431, 5617 or 5618, 10 cr soc sci or #)
Literature and methodology in historical and contemporary rhetorical campaigns and movements.

Spch 8611. Seminar: Rhetoric. (3 cr; max 6 cr; SP—5611 or #)
History and criticism of rhetorical theory. Research in rhetoric.

Spch 8625. Seminar: Communication Ethics. (3 cr; SP—Ethics course or #; A-F only)
Independent research on communication ethics in interpersonal, group, organizational, cultural, and media settings. Theories of ethics and ethics of analysis.

Spch 8666. Doctoral Pre-Thesis Credits. (1-18 cr; max 60 cr; SP—Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

Spch 8777. Thesis Credits: Master’s. (1-18 cr; max 50 cr; SP—Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Spch 8888. Thesis Credits: Doctoral. (1-24 cr; max 100 cr; SP—Max 18 cr per semester or summer; 24 cr required)

Stat 5031. Statistical Methods for Quality Improvement. (4 cr; QP—[3012 or 3091 or 5122 or 5123 or 5124 or 5125, Math 1252; SP—[3021 or 3022 or 4102 or 5021 or 5120 or 8102], Math 1272)
Random variability sampling. Controlling statistical process. Shewhart quality control charts. Analyzing plant data, trend surface, and variance and design of experiments.

Stat 5041. Bayesian Decision Making. (3 cr; QP—[5122 or 5123 or 5152 or #; SP—4101 or 5021 or 5101 or #)

Stat 5101. Theory of Statistics I. (4 cr; QP—[55121, 55122; Math 3252; SP—4101, 5561; Math 2263)
Logical development of probability, basic issues in statistics. Probability spaces. Random variables, their distributions and expected values. Law of large numbers, central limit theorem, generating functions, multivariate normal distribution.

Stat 5102. Theory of Statistics II. (4 cr; SP—4102; 5101; Math 5563)

Stat 5201. Sampling Methodology in Finite Populations. (3 cr; QP—[3011 or 5121 or 5122 or 5123 or #; SP—3011 or 3021 or 5021 or #)

Stat 5302. Applied Regression Analysis. (4 cr; QP—[5161; 3012 or 5131 or 5133 or 5302 or 4102 or 5021 or 5102 or #)
Simple, multiple, and polynomial regression. Estimation, testing, prediction, Use of graphics in regression. Stepwise and other numerical methods. Weighted least squares, nonlinear models, response surfaces. Examination of interactions and transformations.

Stat 5303. Designing Experiments. (4 cr; QP—[55163; 3012 or 5021 or 5133 or 5135 or 5137 or SP—3022 or 5021 or 5102 or #)

Stat 5401. Applied Multivariate Methods. (3 cr; QP—[5302 or 5132 or 5135; SP—5302 or 8102 or #)

Stat 5421. Analysis of Categorical Data. (3 cr; QP—[5162; 3012 or 5021 or 5133 or 5135 or SP—5302 or 8102 or #)

Stat 5601. Nonparametric Methods. (3 cr; QP—[5021 or 5122 or 5123 or 5152 or #; SP—5022 or 4102 or 5021 or #)
Tests of independence. Classical rank-based procedures (e.g., Wilcoxon, Kruskal-Wallis). Goodness-of-fit. Topics may include smoothing, bootstrap, and generalized linear models.

Stat 5931. Topics in Statistics. (3 cr)
Topics vary according to student needs/available staff.

Stat 5932. Topics in Statistics. (3 cr)
Topics vary according to student needs/available staff.
Courses

Stat 5993. Tutorial. (1-6 cr; max 12 cr; SP-#) Directed study in areas not covered by regular offerings.

Stat 8061. Applied Statistical Methods I. (4 cr; SP–Grad stat major or #; A-F only)

The regression problem; linear regression with one or more predictor variables; computer graphics in regression; building model; assessment and diagnostic tools; generalized linear models; logistic, Poisson, and non-linear regression.

Stat 8062. Applied Statistical Methods II. (4 cr; SP–5162; SP–8065; grad stat major or #; A-F only)

Categorical data analysis; log-linear models, logit models, multinomial response models, exact and asymptotic inference, conditional independence; models of association; Experimental design: randomization, ANOVA, contrasts and multiple testing, factorial, blocking, covariates, splitplots, random effects, fractional factorial, response surfaces

Stat 8101. Theory of Statistics I. (3 cr; SP–Grad stat major or #)

Probability, transformations, expectation, univariate and multivariate distributions, central limit theorem, sampling and sampling distributions, sufficiency, likelihood.

Stat 8102. Theory of Statistics II. (3 cr; SP–5152; SP–8110; grad stat major or #)

Point and interval estimation, maximum likelihood, delta method, hypothesis testing, decision theory, analysis of variance, regression.

Stat 8111. Mathematical Statistics I. (3 cr; SP–5133 or 5135; Math 5615, 5616 or real analysis)

Probability theory, basic inequalities, characteristic functions, and exchangeability. Multivariate normal distribution. Exponential family, Decision theory, admissibility, and Bayes rules.

Stat 8112. Mathematical Statistics II. (3 cr; SP–5152; SP–8111)


Stat 8121. Theory of Inference. (3 cr; SP–5153, Math 8658; SP–8112, Math 8657 or #)

Topology may vary according to instructor and student interests. Sample topics: conditional distributions and sufficiency, estimation theory, comparison of statistical inference theories; Neyman-Pearson hypothesis-testing theory and its extensions, confidence regions, invariance, and nonparametric, sequential, likelihood, and Bayesian inference.

Stat 8131. Predictive Inference. (3 cr; SP–5152 or equiv; SP–8112 or equiv)

Traditional frequentist and non-traditional predictive approaches. Bayesian predictive methods and the purpose for which data are used. Theoretical apparatus discussed using a variety of common statistical paradigms. Model selection, comparisons and allocation, posterior analysis and control.

Stat 8141. Probability Asessment. (3 cr; SP–5133 or equiv; SP–5102)

Probability as a language of uncertainty for quantifying and communicating expert opinion and for use as Bayesian prior distributions. Methods for elicitation and construction of subjective probabilities. De Finetti coherence, predictive elicitation, fitting subjective probability models, computer-aided elicitation, and subjective Bayesian updating. Use of expert elicitation with frequentist inferences. Topics may vary depending on instructor.

Stat 8171. Sequential Analysis. (3 cr; SP–5153; SP–8112)

Wald’s sequential probability ratio test and modifications. Sequential decision theory. Martingales. Sequential estimation, design, and hypothesis testing. Recent developments.

Stat 8201. Topics in Sampling. (3 cr; SP–5153; SP–8102 or #; S-N only)

Sampling theory; stratified sampling, ratio estimators, cluster sampling, double sampling, superpopulation theory. Bayesian methods, multiple imputation, nonresponse.

Stat 8311. Linear Models. (4 cr; SP–Linear algebra, 5122 or 5133; SP–Linear algebra, 5102 or 8102 or #)

General linear model theory from a coordinate-free geometric approach. Distribution theory, ANOVA tables, testing, confidence statements, max models, covariance structures, variance components estimation.

Stat 8312. Linear and Nonlinear Regression. (3 cr; SP–8312; SP–8311)

Nonlinear regression: asymptotic theory, Bates-Watts curvature, superdiagonals, parameter plots, projected residuals, transformation and duality methodology. Wald versus likelihood inference. Topics in linear and generalized linear models as they relate to nonlinearity issues, including diagnostics, semi-parametric models, and model assessment.

Stat 8313. Topics in Experimental Design. (3 cr; SP–8312; SP–8311)

Optimal, Bayes, and nonlinear design; algorithms for computing designs; sample size; recent developments.

Stat 8321. Regression Graphics. (3 cr; SP–8312; SP–8311)


Stat 8333. FTE: Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)

Stat 8401. Topics in Multivariate Methods. (3 cr; SP–8312; SP–8311)


Stat 8411. Multivariate Analysis. (3 cr; SP–8312; SP–8152)

Multivariate normal distribution. Inference on the mean, covariance, and correlation and regression coefficients; related sampling distributions such as Hotelling’s T-squared and Wishart distributions. Multivariate analysis of variance, principal components and canonical correlation, Discriminant analysis.

Stat 8421. Theory of Categorical Data Analysis. (3 cr; SP–5162; SP–8062 or #)

Categorical data, multidimensional, cross-classified arrays, mixed categorical and continuous data. Ordinal responses. Current research topics.

Stat 8444. FTE: Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)

Stat 8501. Introduction to Stochastic Processes With Applications. (3 cr; SP–5131 or 5153; SP–5101 or 8111)

Markov chains in discrete and continuous time, renewal processes, Poisson process, Brownian motion, and other stochastic processes encountered in applications.

Stat 8511. Time Series Analysis. (3 cr; SP–5153 or 5153; SP–5102 or 8111 or #)


Stat 8666. Doctoral Pre-Thesis Credits. (1-18 cr; max 60 cr; SP–Max 18 cr per semester or summer; doctoral student who has not passed preliminary oral)

Stat 8701. Computational Statistical Methods. (3 cr; SP–8312, programming expert; SP–8311, programming expert)

Random variate generation, variance reduction techniques. Robust location estimation and regression, smoothing additive models, regression trees. Programming projects; basic programming ability and familiarity with standard high level language (preferably FORTRAN or C) are essential.

Stat 8711. Statistical Computing. (3 cr; SP–8162; SP–8701 or #)

Basic numerical analysis for statisticians. Numerical methods for linear algebra, eigen-analysis, integration, and optimization and their statistical applications.

Stat 8721. Programming Paradigms and Dynamic Graphics in Statistics. (3 cr; SP–5153, 5163; SP–8062, 8102)

Alternative programming paradigms to traditional procedural programming, including object-oriented programming and functional programming. Applications to development of dynamic statistical graphics and representation and use of functional data, such as mean function in non-linear regression log likelihoods and prior densities in Bayesian analysis.

Stat 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Stat 8801. Statistical Consulting. (2 cr; SP–Grad stat major or #; S-N only)

Almost all statistics graduates will provide some level of consulting to statistical users or clients. Principles of effective consulting and problem-solving, meeting skills, and reporting. Aspects of professional practice, behavior, ethics, and continuing education.

Stat 8811. Statistical Consulting Practicum. (3 cr [max 3 cr]; SP–Statistics grad student, S-N only)

Providing (under faculty supervision) statistical support to clients, primarily University researchers. Exercise in problem solving, ethics, listening/communication skills.

Stat 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required)

Stat 8900. Student Seminar. (1 cr [max 2 cr]; SP–Statistics grad student, S-N only)

Preparation or presentation of seminar and statistical topics.

Stat 8931. Advanced Topics in Statistics. (3 cr)

Topics vary according to student needs and available faculty.

Stat 8932. Advanced Topics in Statistics. (3 cr)

Topics vary according to student needs and available faculty.

Stat 8992. Directed Readings and Research. (1-6 cr [max 12 cr]; SP–#; S-N only)

Directed study in areas not covered by regular offerings.
Studies of Science and Technology (SST)

Institute of Technology

SST 8000. Colloquium. (1.5 cr; max 3 cr; SP–Grad SST minor; S-N only)
A series of weekly lectures by nationally and internationally known scholars who provide interdisciplinary and methodological backgrounds speaking on a variety of issues.

SST 8100. Seminar: Models, Theories, and Reality. (3 cr; SP–HSCI 8111 or [Phil 8601 or 8602 or 8605] or #)
Students participate in ongoing research on the role of models and theories in science, and prepare and present research papers.

SST 8200. Seminar: The Physical Sciences. (3 cr; SP–HSCI 8111 or [Phil 8601 or 8602 or 8605] or #)
Students participate in ongoing research in history, philosophy, and social study of physical sciences and prepare and present research papers.

SST 8300. Seminar: The Biological and Biomedical Sciences. (3 cr; SP–HSCI 8111 or [Phil 8601 or 8602 or 8605] or #)
Students participate in ongoing research in history, philosophy, and social study of biological and biomedical sciences, and prepare and present research papers.

SST 8400. Seminar: Science, Technology, and Society. (3 cr; SP–HSCI 8111 or [Phil 8601 or 8602 or 8605] or #)
Students participate in ongoing research on interactions involving science, technology, and society from perspectives of history, philosophy, and social study of science, and prepare and present research papers.

SST 8420. Social and Cultural Studies of Science. (3 cr; SP–4)
Recent work: theoretical and methodological differences among practitioners; selected responses from historians and philosophers of science.

Sumerian (Sum)

Department of Classical and Near Eastern Studies

College of Liberal Arts

Sum 5011. Elementary Sumerian I. (3 cr; SP–Adv undergrads with 2 yrs of another foreign lang, grds) Sumerian writing and grammar. Readings from classical Sumerian literary and historical texts.

Sum 5012. Elementary Sumerian II. (3 cr; SP–5011) Reading from classical literary and historical texts.

Surgery (Surg)

Department of Surgery

Medical School

Surg 8200. Clinical Surgical Problems in Management. (3 cr; SP–Grad surg major; A-F only)
Diagnostic and management instruction in all phases of clinical surgery, inpatient and outpatient.

Surg 8201. Surgery Roentgenological Pathology Conference. (1 cr; SP–Grad surg major; A-F only)
Weekly review of surgical patients presenting interesting roentgen and pathological findings. Staff from the Departments of Surgery, Radiology, and Laboratory Medicine and Pathology. Basic science and management principles of the surgical patient.

Surg 8202. Surgical Research. (3 cr; SP–Grad surg major; A-F only)
Graduate students undertake original investigation of problems in either experimental or clinical surgery.

Surg 8203. Surgery Complications and Research Conference. (1 cr; SP–Grad surg major; A-F only)
Evaluations of surgical patients, including postoperative course; discussion and critical evaluation of current research problems.

Surg 8207. Transplantation Conference. (1 cr; SP–Grad surg major; A-F only)
Interdepartmental discussion and evaluation of current clinical and research problems.

Surg 8333. FTE: Master’s. (1 cr; SP–Master’s student, advisor and DGS consent)

Surg 8444. FTE: Doctoral. (1 cr; SP–Doctoral student, advisor and DGS consent)

Surg 8666. Doctoral Pre-Thesis Credits. (1-18 cr; max 60 cr; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)
Surg 8777. Thesis Credits: Master’s. (1-18 cr max 50 cr; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])
Surg 8888. Thesis Credits: Doctoral. (1-24 cr max 100 cr; SP–Max 18 cr per semester or summer; 24 cr required)

Sustainable Agricultural Systems (SAgr)

Department of Agronomy and Plant Genetics

College of Agricultural, Food, and Environmental Sciences

SAgr 8010. Colloquium in Sustainable Agriculture. (2 cr; QP–Coursework in biological or social sciences that provides introduction to ag practices or issues; SP–Coursework in biological or social sciences that provides introduction to ag practices or issues; A-F only)
Forums for university faculty, students, and representatives of the farming community, including farmers, agricultural organizations, agricultural businesses, and representatives of state agencies, to engage in discussions on topics related to sustainability of food production.

SAgr 8020. Field Experience in Sustainable Agriculture. (1-4 cr; QP–Coursework in biological or social sciences that provides introduction to ag practices or issues; SP–Coursework in biological or social sciences that provides introduction to ag practices or issues; S-N only) 3- to 14-week internship with growers or organizations working with sustainable agriculture issues. Students analyze issues in final written project, oral seminar.

Sustainable English as a Second Language (TESL)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

TESL 5401. Language Analysis for Teachers of English as a Second Language. (4 cr; SP–Ling 5001)
Overview of the structure of the English language geared to the needs of teachers of English to speakers of other languages. Study the structures of English as seen from the point of view of second-language speakers as well as native speakers. More complex structures of English syntax, as well as English semantics, pragmatics, and discourse structures. Second in a two-course sequence.

TESL 5402. Language Analysis for Teachers of English as a Second Language. (4 cr; SP–Ling 5001 or LING 5001)
Overview of the structure of the English language geared to the needs of teachers of English to speakers of other languages. Study the structures of English as seen from the point of view of second-language speakers as well as native speakers. More complex structures of English syntax, as well as English semantics, pragmatics, and discourse structures. Second in a two-course sequence.

TESL 5721. Methods in Teaching English as a Second Language. (3 cr; SP–Ling 3001 or 5001 or #)
Introduction to methods for teaching English as a second language to adults.

TESL 5722. Practicum in Teaching English as a Second Language. (4 cr; max 8 cr; SP–ESL major or minor, 5721 or #; S-N only)
Observation of, and practice in, teaching English as a second language to adults or college/university level.

TESL 5723. Materials for Teaching English as a Second Language. (3 cr; SP–5721, 5722 or #)
Evaluation and preparation of teaching materials for English as a second language.

TESL 5724. Introduction to Language Assessment. (3 cr; QP–Ling 5001 or #; SP–Ling 5001 or #; A-F only)
Prepares students to engage in meaningful, appropriate, and fair second-language assessment practices. Students develop a portfolio and test results, then construct a new form of assessment.

TESL 5910. Seminar in Teaching English as a Second Language. (3 cr; max 9 cr; SP–#)
Topics related to English as a second language and applied linguistics. Topics specified in Class Schedule.

TESL 5993. Directed Studies. (1-4 cr max 9 cr; SP–A, Q)
Directed study for teaching English as a second language.

TESL 8333. FTE: Master’s. (1 cr; SP–Master’s student, advisor and DGS consent)

TESL 8751. English for Specific Purposes. (3 cr; SP–5721, 5401, 5402 or #)
Critical view of literature and register of English used in fields such as engineering, nursing, and business. Students gather data and write reports.

TESL 8777. Thesis Credits: Master’s. (1-18 cr max 50 cr; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Teaching English as a Second Language (TESL)

Department of Theatre and Dance

College of Liberal Arts

Th 5100. Theatre Practicum. (1-4 cr max 20 cr; QP–A; SP–4, A [4 cr of 3100 for undergrads]) Individual creative projects in production of approved plays as action director, dramaturg, or playwright. (See 5500 for design practicums.)

Th 5171. History of the Theatre I. (3 cr)
Theater as a mirror of society. Aesthetics, philosophy, and practices of the theater arts. Ancient to mid-18th century.

Th 5172. History of the Theatre II. (3 cr)
Theater as a mirror of society. Aesthetics, philosophy, and practices of theater arts. Mid-18th century to present.

Th 5181. Blacks in American Theatre. (3 cr)
Historical survey of the development of American Black theatrical tradition. Essays, plays, playwrights, and theaters from early colonial references to Black Arts Movement.
Th 5182. Contemporary Black Theatre: 1960-Present. (3 cr)

Th 5321. Career Preparation for the Actor. (3 cr; QP–3323 or M.F.A. actor or #; SP–3322)

Th 5331. Physical Approaches to Acting: Use of Self. (2 cr; QP–3323, # by audition or M.F.A. actor; SP–M.F.A. actor or # by audition)

Th 5332. Physical Approaches to Acting: Stage Combat. (2 cr; QP–3323, # by audition or M.F.A. actor; SP–M.F.A. actor or # by audition)

Th 5333. Physical Approaches to Acting: Period Styles. (2 cr; QP–3323, # by audition or M.F.A. actor; SP–M.F.A. actor or # by audition)

Th 5341. Speech for Actors. (2 cr; QP–M.F.A. actor or #; SP–M.F.A. or #; A-F only)

Th 5342. Classical Text for Actors. (3 cr; QP–M.F.A. actor or #; SP–M.F.A. actor or #; A-F only)

Th 5500. Theatre Design Practicum. (1-3 cr [max 20 cr]; QP–4, A, SP–3515 or grad or #)

Th 5515. Design Composition and Collaboration. (3 cr; QP–Grad or 3513, 3771; 4; SP–Grad or 3515, 3771 or #)

Th 5520. Scene Design. (3 cr [max 9 cr]; QP–3513 or grad or #; SP–3515 or grad or #)

Th 5530. Costume Design. (3 cr [max 9 cr]; QP–3515 or grad or #; SP–3515 or grad or #)

Th 5540. Lighting Design for the Theatre. (3 cr [max 9 cr]; QP–3515 or grad or #; SP–3515 or grad or #)

Th 5550. Sound Design for Performance. (3 cr [max 9 cr]; QP–3554 or #; SP–3555 or #)

Th 5555. Audio Technology. (3 cr; QP–5556 or #; SP–Th major or #)

Th 5560. Drawing, Rendering, and Painting for the Theatre Designer II. (3 cr; QP–5510, 5510)

Th 5565. Drawing, Rendering, and Painting for the Theatre Designer I. (3 cr; QP–3513 or 3515 or grad; #; SP–3515 or grad or #)

Th 5570. Properties/Scenery Technology. (1-3 cr [max 15 cr]; QP–3515 or grad or #; SP–3515 or grad or #)

Th 5590. Theatre Technology Practicum. (1-3 cr [max 15 cr]; QP–A, SP–3515, A, 4 cr for undergrads)

Th 5711. Advanced Stage Direction. (3 cr; QP–3711 or grad or #; SP–3711, K, or grad)

Th 5715. Actor-Director Collaboration. (3 cr; QP–3323, 3771 or #; SP–Grad or 3322, 3771)

Th 5740. Lighting Design for the Theatre. (4 cr; QP–1101, 1504, 1321; 4; SP–1101, 1321, soph or #)

Th 5750. Stage Management for the Theatre. (4 cr; QP–1101, 1504, 1321; 4; SP–1101, 1321, soph or #)

Th 5755. Text Analysis for Drama. (3 cr; QP–3771 or grad; SP–3771 or grad)

Th 5760. Advanced Stage Management. (2-3 cr; QP–5716, 5717, 5717, 5717, 5717, A, 4 cr for undergrads)

Th 5770. Advanced Topics in Theatre Management. (2-4 cr [max 8 cr]; QP–5718, 5718)

Th 5780. Advanced Topics in Theatre Management. (2-4 cr [max 8 cr]; QP–5718, 5718)

Th 5790. Topics in Theatre. (1-4 cr [max 20 cr]; QP–Varies by topic; SP–Varies by topic)

Th 5993. Directed Study. (1-5 cr [max 20 cr]; QP–6 Th cr, #, A, D) Guided individual reading or study.

Th 8100. Theatre Practicum. (1-4 cr [max 20 cr]; SP–#, A) Individual creative project in production of approved plays as an actor, director, dramaturg, or playwright (see 8500 for design practicums).

Th 8102. Theatre Historiography. (3 cr)

Th 8103. The Theatre Dramaturg. (3 cr)

Th 8111. History and Theory of Western Theatre: Ancient World and Early Medieval. (3 cr)

Th 8112. History and Theory of Western Theatre: Medieval Through Renaissance. (3 cr)

Th 8113. History and Theory of Western Theatre: National Theatres to the French Revolution. (3 cr)

Th 8114. History and Theory of Western Theatre: Enlightenment Through Naturalism. (3 cr)

Th 8115. History and Theory of Western Theatre: 20th Century Through World War I. (3 cr)

Th 8116. History and Theory of Western Theatre: 20th Century From 1945 to the Present. (3 cr)

Th 8120. Seminar. (3 cr [max 12 cr]; Selected research topics from various theatre fields and periods. Sample topics: Border Crossings—Theatre History and Representation; The Theatre and Drama of the Third Reich, 1927-1944.)

Th 8333. FTE:Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)

Th 8444. FTE:Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)

Th 8500. Theatre Design Practicum. (1-3 cr [max 20 cr]; SP–#, A) Individual creative project in production of approved plays as designer for scenery, properties, costumes, lighting, or sound (see 8500 for design practicums).

Th 8590. Theatre Technology Practicum. (1-3 cr [max 20 cr]; SP–#) Individual creative project in technology or craft of costuming, lighting, makeup, props, scenic design, or theatre technology.

Th 8666. Doctoral Pre-Thesis Credits. (1-18 cr [max 60 cr]; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)
### Courses

#### Th 8711. Theory and Practice of the Modern Stage Director. (3 cr)
Survey of principal stage directors (e.g., Saxe-Meiningen, Meyerhold, Brecht, Strehler, Moshchukine, Brook) and their theories and practices from 1871 to today using books, journals, firsthand accounts, and videos.

#### Th 8750. MFA Directing Practicum. (2-3 cr [max 10 cr]; SP–MFA directing specialization; A-F only)
Performed and produced work of published or original one-act (2 cr) or full-length play (3 cr) with budgeted design and technical support.

#### Th 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

#### Th 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required)

#### Th 8900. Internship. (1-5 cr; SP–#; A-F only)

#### Th 8990. MFA Creative Thesis. (3-4 cr; SP–#, A)

#### Th 8994. Directed Research. (1-5 cr; SP–#, A)

#### Therapeutic Radiology (TRad)

**Department of Therapeutic Radiology**

**Medical School**

**TRad 8204. Tumor Clinic Conference. (3 cr)**

**TRad 8240. Radiation Therapy Conference. (3 cr)**

**TRad 8300. Radiation Therapy. (1-15 cr)**

**TRad 8310. Fundamentals of Radiation Therapy. (1 cr)**

**TRad 8315. Radiation Therapy Pathology. (1 cr)**

**TRad 8320. Radiation Therapy Treatment Planning Problems. (1 cr)**

**TRad 8325. Radiation Therapy Pediatrics Oncology. (1 cr)**

**TRad 8350. Research: Radiation Therapy. (1-15 cr)**

**TRad 8450. Research: Radiation Biology. (1-15 cr)**

**TRad 8550. Research: Radiological Physics. (1-15 cr)**

#### Toxicology (Txcl)

**Graduate School**

**Txcl 5011. Principles of Toxicology. (2 cr; SP–Grad txcl major or #; A-F only)**
Introduction to fundamentals of poisoning in individuals and the environment, assessment of potential health hazards, and applications of toxicology in various professional careers.

**Txcl 5195. Veterinary Toxicology. (3 cr; SP–Grad student or #; A-F only)**
Toxicology of minerals, pesticides, venoms, and various toxins. Identification of poisonous plants. Recognition, diagnosis, and treatment of animal poisonings.

**Txcl 5545. Introduction to Regulatory Medicine. (2-4 cr; SP–Grad student or #; A-F only)**
Explanation of products requiring pre-market approval and those that may be marketed without approval. Post-market surveillance. Adverse reactions, removal of product from market.

**Txcl 8012. Advanced Toxicology I. (3 cr; QP–5214 or Pubh 5261; SP–DuLuth: 8012, Chem 4342, Phsl 5601 or #; [TC: 8012, BioC 4332, Phsl 5062 or Phsl 6101 or #]; A-F only)**
Kinetic and dynamic determinants of target organ toxicity; pathophysiological alterations; interactions and relationships of the major target organ systems; mechanisms of mutagenesis, carcinogenesis, and teratogenesis.

**Txcl 8100. Investigative Toxicology. (1 cr [max 2 cr]; QP–5214; SP–8013 or #; A-F only)**
Evaluating and interpreting research issues and literature.

**Txcl 8333. FTE: Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)**

**Txcl 8444. FTE: Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)**

**Txcl 8666. Doctoral Pre-Thesis Credits. (1-18 cr [max 60 cr]; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)**

**Txcl 8777. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required)**

### Translation and Interpreting (TrIn)

**Institute of Linguistics, ESL, and Slavic Languages and Literatures**

**College of Liberal Arts**

**TrIn 5900. Topics in Translation and Interpreting. (1-4 cr; QP–#; SP–#)**
Topics specified in Class Schedule.

**TrIn 5993. Directed Study. (1-3 cr; QP–#; A-F only)**
Directed study in translation and interpretation.

### Urban Studies (UrbS)

**Department of Geography**

**College of Liberal Arts**

**UrbS 5101. The City and the Metropolis: An Exploration. (3-4 cr; SP–Grad or advanced UrbS undergrad with #)**
Advanced interdisciplinary examination of complex metropolitan environments using a grounded experiential approach. Examine the topic from historical, spatial, social, economic, political, policy and design perspectives. Day-long or weekend-long field trips are expected.

### Veterinary Medicine, Graduate (VMed)

**College of Veterinary Medicine**

**VMed 5080. Problems in Veterinary Epidemiology and Public Health. (1-3 cr; SP–#; A-F only)**
Individual study on problem of interest to epidemiologist or public health student.

**VMed 5165. Monitoring and Surveillance of Disease and Production. (2 cr; SP–#; A-F only)**
Discussions on techniques used to monitor animal disease and production.

**VMed 5596. Swine Diseases and Diagnostics. (2-3 cr)**
Review of recent advances in swine diseases; farm visits for on-farm disease diagnostics and control programs.

**VMed 8090. Epidemiology of Zoonoses and Diseases Common to Animals and Humans. (1-4 cr; SP–Epidemiology and infectious disease course or #; A-F only)**
Major human zoonotic diseases, methods of transmission, diagnosis, control, and prevention.

**VMed 8195. Pre-Harvest Food Safety and Public Health Aspects of Food Animal Production. (1-3 cr; SP–#)**
Includes presentations and discussions on farm HACCP principles and prudent use of antibiotics.

**VMed 8201. Advanced Small Animal Veterinary Medicine. (1-5 cr; A-F only)**
Discussion of diseases of organs or systems in animals, including degenerative, psychological, anomalous, metabolic, nutritional, neoplastic, immune, inflammatory, toxic, and traumatic disorders.

**VMed 8202. Internal Medicine in Small Companion Animals. (1-3 cr; A-F only)**
Lectures, assigned readings, and discussions on internal medical problems of dogs and cats.

**VMed 8203. Advanced Diagnosis and Therapeutics of Animal Disease. (1-2 cr; A-F only)**
Detailed examination, treatment, and discussions of naturally occurring diseases in patients admitted to Veterinary Teaching Hospital.

**VMed 8210. Seminar: Veterinary Medicine. (1 cr)**
Participation and presentation at regularly scheduled seminars about internal medicine.

**VMed 8220. Advanced Nephrology/Urology Clinics. (1-3 cr)**
Clinical investigation of naturally occurring urinary diseases in patients admitted to Veterinary Teaching Hospital.

**VMed 8230. Medical Conference. (1-3 cr)**
Participation in weekly conference about internal medical disorders.

**VMed 8250. Problems in Acid-base, Electrolyte, and Fluid Metabolism. (2-4 cr; A-F only)**
Clinical problems and physiology of acid-base, electrolyte, and fluid disorders of dogs and cats.

**VMed 8293. Advanced Studies in Nephrology and Urology. (1-3 cr; A-F only)**
Studies of urinary tract disease with goal of generating new knowledge.

**VMed 8294. Research Studies in Nephrology and Urology. (1-3 cr)**
Individual research on selected problems.

**VMed 8296. Advanced Large Animal Veterinary Medicine. (1-3 cr [max 6 cr]; SP–DVM, grad vet med major, CAPS 7801, A-F only)**
Discussion of diseases of organs or systems in animals in a clinical setting.

**VMed 8333. FTE: Master’s. (1 cr; SP–Master’s student, adviser and DGS consent)**

**VMed 8360. Evidence-based Medicine. (2 cr; A-F only)**
Use of medical literature in clinical problem solving.

**VMed 8393. Medical Conference. (1-3 cr [max 6 cr]; SP–#; A-F only)**
Medical, surgical, or obstetrical cases supported by anatomic, bacteriologic, pathologic, physiologic, pharmacologic, and radiologic evaluations whenever applicable.

**VMed 8394. Research in Veterinary Medicine. (1-3 cr)**
Research problems relating to any aspect of animal medicine or the various systems in animals.

**VMed 8396. Diagnostic and Therapeutic Techniques of Animal Diseases. (1-3 cr [max 6 cr]; SP–CAPS 7801, DVM, grad vet med major, #)**
Detailed examination, discussions, and treatments of cases of animal diseases in a clinical setting.

**VMed 8444. FTE: Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)**
**Courses**

**VMed 8492. Seminar: Infectious Diseases and Swine Medicine.** (2 cr; SP–DVM or equiv degree; A-F only) Students, faculty, and guest speakers present seminars on current research in diagnosis, control, and treatment of infectious diseases.

**VMed 8494. Research in Infectious Diseases.** (1-3 cr) Directed research.

**VMed 8495. Problems in Infectious Diseases.** (1-3 cr) In-depth discussion on specific problems for various infectious diseases of farm animals.

**VMed 8520. Advanced Immunology.** (2 cr) Lectures and case presentations.

**VMed 8530. Advanced Swine Diseases.** (2 cr) Lectures and discussion on advances.

**VMed 8592. Infectious Disease Journals: Critical Thinking.** (1 cr) Reading and critical discussions of articles.

**VMed 8593. Advanced Veterinary Virology and Serology.** (1-3 cr) Discussion and laboratory practice.

**VMed 8666. Doctoral Pre-Thesis Credits.** (1-18 cr; max 60 cr; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

**VMed 8679. Problems in Veterinary Critical Care/Emergency Medicine.** (2 cr; SP–DVM or equiv degree; A-F only)

**VMed 8680. Advanced Veterinary Critical Care/Emergency Medicine.** (2-4 cr; SP–DVM or equiv degree) Discussion of current topics, focusing on literature and research results in periodicals, proceedings, texts.

**VMed 8681. Advanced Small Animal Surgery.** (1-3 cr) Advanced techniques and procedures.

**VMed 8682. Advanced Large Animal Surgery.** (1-3 cr) Surgery of various systems in large animals, with preparative and postoperative evaluation and management.

**VMed 8683. Surgery of the Gastrointestinal System.** (2-4 cr; A-F only) Advanced techniques and problems.

**VMed 8684. Surgical Physiology.** (1-3 cr) Discussion on pathophysiology of surgical diseases in dogs and cats.

**VMed 8685. Neurosurgery.** (2-4 cr; A-F only) Advanced neurosurgical diseases of small animals amenable to surgical treatment.

**VMed 8686. Thoracic and Cardiovascular Surgery.** (2-4 cr; A-F only) Advanced thoracic and cardiovascular diseases of small animals amenable to surgical treatment.

**VMed 8687. Plastic and Reconstructive Surgery.** (2-3 cr; A-F only) Advanced techniques in conditions of small animals.

**VMed 8688. New Techniques in Large Animal Surgery.** (1-6 cr; max 6 cr; SP–DVM or equiv degree, #; A-F only)

**VMed 8689. Urogenital Surgery.** (2-3 cr) Advanced techniques in treatment of small animals.

**VMed 8691. Research in Large Animal Surgery.** (1-6 cr; SP–DVM or equiv degree; A-F only) Independent research projects.

**VMed 8692. Seminar: Small Animal Surgery.** (1 cr; A-F only) Discussion of problems and case analysis.

**VMed 8693. Seminar: Large Animal Surgery.** (1 cr; max 6 cr; SP–DVM or equiv degree; A-F only) Discussion of current literature and surgical board preparation.

**VMed 8694. Research in Small Animal Surgery.** (1-3 cr; S-N only)

**VMed 8695. Problems in Large Animal Surgery.** (1-3 cr) New techniques and procedures in large animal orthopedic surgery.

**VMed 8696. Research in Critical Care/Emergency Medicine.** (1-3 cr; SP–DVM or equiv degree) Special problems course. Directed study, prospective and retrospective models of evaluation are defined, critiqued, and used for experimental design and data collection to validate research methods.

**VMed 8777. Thesis Credits: Master’s.** (1-18 cr; max 50 cr; SP–Max 18 cr per semester or summer; total required [Plan A only])

**VMed 8780. Advanced Avian Critical Care: Principles and Procedures.** (2 cr; SP–Course each in vet pathology, physiology, pharmacology, anatomy, small animal anesthesia and critical care; A-F only) Procedures and protocols for managing avian medical emergencies such as starvation, toxins, respiratory failure, and massive trauma.

**VMed 8781. Seminar: Advanced Veterinary Anesthesiology.** (1-3 cr; SP–[CVM 6321, CVM 6322] or equiv, grad student; A-F only) Active interaction around topics of advanced anesthesiology in veterinary species.

**VMed 8782. Advanced Veterinary Abdominal Imaging.** (1-3 cr) Applications and discussion of basic principles through emerging techniques.

**VMed 8783. Advanced Veterinary Thoracic Imaging.** (1-3 cr) Application and discussion of basic principles through emerging techniques.

**VMed 8784. Veterinary Therapeutic Radiology.** (2-3 cr; max 6 cr) In-depth discussion of principles, practice, techniques, and complications.

**VMed 8785. Veterinary Nuclear Medicine.** (1-3 cr; max 6 cr) In-depth discussion of principles, practice, techniques, and complications.

**VMed 8788. Seminar: Veterinary Critical Care/Emergency Medicine.** (1 cr; SP–DVM or equiv degree; A-F only) Current topics.

**VMed 8789. Research in Avian Clinical Problems and Procedures.** (1-3 cr) Students conduct medical and surgical procedures involved in management of avian trauma and critical care patients.

**VMed 8791. Research in Veterinary Anesthesia.** (1-3 cr; SP–[CVM 8781 or equiv, SACS 5550 or equiv; A-F only) Research methodology; controlled prospective and retrospective research studies. Collection and analysis of scientific data.

**VMed 8792. Seminar: Veterinary Radiology.** (1 cr; max 6 cr) Current topics in veterinary imaging, veterinary radiology, and oncology.

**VMed 8793. Seminar: Veterinary Pathobiology.** (1-3 cr; SP–DVM or equiv degree; A-F only) Basic mechanisms and concepts relating to reaction of tissue to injury. Gross and microscopic interpretation of tissue nodules and cells, tissue damage, chronicity, inflammation, and neoplasia.

**VMed 8794. Special Problems in Veterinary Radiology.** (1-3 cr; SP–DVM or equiv degree, #) Specialized and directed scientific readings and discussion; allows for individualizing students’ graduate programs.

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**Vetpath**

**Vetpath 5601. Veterinary Parasitology.** (4 cr)

**Vetpath 8333. FTE: Master’s.** (1 cr; SP–Master’s student, adviser and DGS consent)

**Vetpath 8444. FTE: Doctoral.** (1 cr; SP–Doctoral student, adviser and DGS consent)

**Vetpath 8501. Advanced Veterinary Basic Pathology.** (2-3 cr; SP–A) Basic mechanisms and concepts relating to reaction of tissue to injury. Gross and microscopic interpretation of tissue nodules and cells, tissue damage, chronicity, inflammation, and neoplasia. Students complete a special project selected in conjunction with instructor.

**Vetpath 8502. Advanced Systemic Pathology.** (3-4 cr; QP–[5501 or 8501], #; SP–[5501 or 8501], #) Reaction of specific systems to injury emphasizing basic response capabilities of tissue organs, with materials illustrating gross and microscopic changes. Students complete a special project selected in conjunction with instructor.

**Vetpath 8504. Advanced Veterinary Histopathology.** (1 cr; QP–[5502, 5503, A; SP–[5502, 5503, #] Discussion and study of selected case materials from veterinary anatomic, diagnostic, and surgical pathology programs.

**Vetpath 8531. Hospital Pathology.** (1-2 cr; QP–[5501, 5502, 5503, #; SP–[5501, 5502, 5503, #] Necropsy and surgical pathology techniques, examination of tissues for diagnosis, and preparation of reports and records.

**Vetpath 8540. Problems: Veterinary Pathology.** (2-6 cr; max 12 cr; SP–A) Independent study.

**Vetpath 8550. Problems: Veterinary Clinical Pathology.** (2-6 cr; max 12 cr; SP–A) Independent study.

**Vetpath 8640. Problems: Parasitology.** (2-6 cr; max 12 cr; SP–A) Independent study.

**Vetpath 8666. Doctoral Pre-Thesis Credits.** (1-18 cr; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)
Women’s Studies (WoSt)

Department of Women’s Studies College of Liberal Arts

WoSt 5101. Feminist Approaches to Ethnicity. (3 cr)
Preparation for feminist ethnographic research in the social sciences. Using recent works by feminist ethnographers, focus is on the methods, politics, and ethics, as well as gender, race, class, and class-cultural issues pertaining to fieldwork.

WoSt 5102. Feminist Approaches to History. (3 cr; SP–#; 8 cr WoSt or grad or #)
Analysis and practice of feminist history. Theories, methods, and sources that address the intersectionality of gender, race, class, and sexuality.

WoSt 5103. Feminist Pedagogies. (3 cr; SP–#; 12 cr WoSt or grad or #)
Theory and practice of feminist pedagogies by comparing and evaluating various multicultural feminist theories of education, teaching, and the application of specific theories, techniques, and teaching strategies.

WoSt 5105W. Gendered Rhetoric of Science and Technology. (3 cr; SP–#; 8 cr WoSt or grad or #)
How cultural gender roles are affected by science and technology as well as influence scientific and technological thinking and communication strategies.

WoSt 5106. The Cultural Construction of Sex, Gender, and Sexuality. (3 cr; SP–Feminist studies grad or 12 cr WoSt or grad or #)
Investigation of Euro-American concepts of sex, gender, sexuality in representative texts and images from the 17th century to the present. Critical and source materials from literary and cultural studies, history, biology, anthropology, psychology, and sociology.

WoSt 5107. Gender, Culture, and Science. (3 cr)
Critical study of some of the major papers concerning the relations of gender and scientific inquiry produced in the past 20 years.

WoSt 5190. Topics: Methods of Inquiry. (3 cr)
Topics specified in Class Schedule.

WoSt 5201. Global Processes and the Politics of Sexuality. (3 cr; SP–12 cr WoSt or feminist studies grad student or #)
Comparative examination of the social construction of sexuality. Formal debates on gender roles, regulations, categories of deviance, representation of sex in the media, and cultural and social issues related to sexuality and agency.

WoSt 5202. Feminist Therapies. (3 cr)
Feminist and multicultural perspectives regarding therapy and other helping forms for women, including philosophy of feminist therapy, feminist ethics in therapy, gender, sexual identity, and class in therapy, and related topics.

WoSt 5203. Women and Madness in History and Literature. (3 cr; SP–#; 5 cr WoSt or grad or #)
The representation of madness and how it intersects with gender as well as class, race, and nationality.

WoSt 5290. Topics: Biology, Psychology, and Social Perspectives. (3 cr)
Topics specified in Class Schedule.

WoSt 5300. Communication and Gender. (3 cr; SP–One women’s studies course or #; A-F only)
How gender affects verbal communication. Development of analytical skills through readings, exercises, research, and group discussion.

WoSt 5390. Topics: Literature, Film, and Other Arts. (3 cr)
Topics specified in Class Schedule.

WoSt 5403. Chicana/Latina Feminisms. (3 cr; SP–8 cr WoSt and/or Chic or grad or #)
The historical and social development of Chicana and Latina feminisms in general and their various specific contexts.

WoSt 5404. Working Class Women’s Cultures. (3 cr; SP–12 cr WoSt or #)
Myths and realities surrounding working class women and other cultures. Use sociological and literary materials to explore women’s lives and to hear their own stories.

WoSt 5405. Chicana: Women and Work. (3 cr; SP–#)
Chicanas’ working lives in families, community, local, national, and global workforces. Questions and issues related to growing integration of women’s systems of production.

WoSt 5490. Topics: Comparative and Global Studies. (3 cr; SP–#)
Topics specified in Class Schedule.

WoSt 5501. Women and the Law. (3 cr; SP–9 cr [WoSt or pre-law grad or #])
Legal systems and their role in women’s historical legal rights and issues related to constitutional rights of women.

WoSt 5505. Women and Indigenous Land Struggles. (3 cr; SP–8 cr WoSt and/or Chic or grad or #)
Representative land struggles by indigenous women from a critical race and gender perspective.

WoSt 5590. Topics: Civic and Community Studies. (3 cr; SP–master’s or #)
Topics specified in Class Schedule.

WoSt 5593. Directed Study. (1-12 cr; SP–master’s or #; SP–#)

WoSt 5594. Directed Instruction. (1-12 cr; SP–master’s or #)

WoSt 5595. Directed Research. (1-8 cr; SP–master’s or #)

WoSt 8101. Intellectual History of Feminism. (3 cr)
Major trends in feminist intellectual history from 18th century to the present, especially in the United States and Europe.

WoSt 8102. Advanced Studies in Sexuality. (3 cr)
Contemporary theoretical and methodological research on selected issues related to gender, race, and the body.

WoSt 8103. Feminist Theories of Knowledge. (3 cr)
Interdisciplinary seminar; feminist approaches to knowledge in and to criticism of paradigms of knowledge operative in the disciplines. Feminists’ use of concepts of subjectivity, objectivity, and intersubjectivity; feminist empiricism, standpoint theory, and postmodernism and poststructuralism.

WoSt 8108. Feminist Theories and Methods I. (3 cr; SP–Ph.D. or grad minor student)
Two-semester interdisciplinary seminar. First term: current debates in gender theory; intersections of gender theory with critical race theory, postcolonial theory, sexuality theory, and social class analysis. Second term: interdisciplinary feminist research frameworks and methodologies from humanities and social sciences.

WoSt 8109. Feminist Theories and Methods II. (3 cr; SP–8108, or master’s studies Ph.D. or grad minor student)
Two-semester interdisciplinary seminar. First term: current debates in gender theory; intersections of gender theory with critical race theory, postcolonial theory, sexuality theory, and social class analysis. Second term: interdisciplinary feminist research frameworks and methodologies from humanities and social sciences.

WoSt 8190. Topics: Feminist Theory. (1-3 cr; SP–master’s or #)

WoSt 8201. Feminist Theory and Methods in the Social Sciences. (3 cr)
Seminar on recent theories, including feminist versions of positivist interpretive, critical, historical, and postmodernist models of social science knowledge. Methodological approaches to feminist theories and methods of inquiry, including use of narrative, ethnomethodology, discourse analysis, and comparative methods in history.
WoSt 8202. Sociology of Gender. (3 cr) Organization, culture, dynamics of gender relations and gendered social structures. Gender, race, and class inequalities in the workplace; the women's movement; social welfare and politics of gender inequality; gender and science; theoretical debates in gender theory and methods; sexuality; cultural studies of gender; sociology of emotions.

WoSt 8290. Topics: Social Sciences and Public Policy. (1-3 cr)

WoSt 8301. Feminist Literary Criticism. (3 cr) Recent developments and major issues in feminist studies of literature. Introduction to a variety of feminist theories, methodologies, and scholarship in the fields of feminist literary theory and criticism, emphasizing broad range of feminist textual analysis and linking them to various University departments.

WoSt 8333. FTE: Master's. (1 cr; SP—Master's student, adviser and DGS consent)

WoSt 8390. Topics: Literary Studies. (1-3 cr)

WoSt 8401. Gender, Space, and Resistance. (3 cr) Identity politics, social movements, and development politics; complex interrelationships among gender, space, and resistance. Social nature of place and space; sociopolitical and economic processes by which gendered, raced, and classed differences are constituted, reinforced, and resisted in and through space, place, and social networks.

WoSt 8444. FTE: Doctoral. (1 cr; SP—Doctoral student, adviser and DGS consent)

WoSt 8490. Topics: Comparative and Global Studies. (1-3 cr)

WoSt 8590. Topics: Historical Studies. (1-3 cr)

WoSt 8666. Doctoral Pre-Thesis Credits. (1-18 cr [max 60 cr]; SP—Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

WoSt 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; SP—Max 18 cr per semester or summer; 24 cr required)

WoSt 8993. Directed Study. (1-6 cr [max 9 cr])

WoSt 8994. Directed Instruction. (1-8 cr [max 36 cr])

WoSt 8995. Directed Research. (1-8 cr [max 36 cr])

WoSt 8996. Women's Studies/CAPS Colloquium. (1-6 cr [max 36 cr]; S-N only) Feminist studies Ph.D. students must register for 1 credit per semester. Credits are available also to other graduate students.

WoSt 8997. Feminist Research and Writing. (3 cr; SP—8109, passed written prelims in degree granting program) Develops interdisciplinary feminist components of Ph.D. thesis or other major piece of writing. Facilitates research writing.

WPS 8303. Advanced Topics in Panel Products Technology. (2 cr; QP—5307; SP—4307) Particle/laminate processing; additives, pre-cure; design of panels for specific end-uses.


WPS 8306. Graduate Seminar. (1 cr [max 3 cr]) Communication of scientific knowledge related to wood and paper science through the media of poster sessions, oral presentations, and the Internet.


WPS 8311. Mechanics of Wood and Wood Composites. (2 cr; SP—4) Advanced topics on behavior of wood composites.

Work, Community, and Family Education (WCFE)

Department of Work, Community, and Family Education

College of Education and Human Development

WCFE 5002. Thinking, Learning, and Teaching in Work, Community, and Family. (3 cr; A-F only) Nature of thinking/learning in everyday life contexts of family, work, community. Theory/practice relevant to stimulating/supporting thinking/learning in these contexts.

WCFE 5011W. Technology and Public Ethics. (3 cr; A-F only) Nature of technology, values, ethical issues related to technology, Technology and transformation of workplace, family, community life. Critique of technology.

WCFE 5021. Learning Through Service. (3 cr) Service as both a philosophy and method of learning. Content covers both the theory and the practice of service in school-based and community-based organizations.

WCFE 5031. Information Resources in Education. (3 cr; S-N only) Sources of knowledge and search strategies for accessing library, electronic, institutional, and informal sources of information.

WCFE 5101. Introduction to Leadership and Administration of WCFE. (3 cr) Basic concepts of finance, public relations, communications, legal aspects, leadership, personnel policies and management, program planning and development, evaluation, and interinstitutional collaboration of work, community, and family education programs in school-based settings.

WCFE 5102. Leadership in WCFE. (2 cr) An introduction to the concepts of leadership, leadership styles and responsibilities, and application to work, community, and family education settings.

WCFE 5121. Principles of Supervisory Management. (3 cr) Introduction to the principles of supervision in education, business, industry, government, and service organizations.

WCFE 5125. Critical Pedagogy. (3 cr; S-N only) Examination of critical pedagogy—critique of power relations regarding race, culture, class, gender, and age in various educational settings; consideration of improved practice in education for children, youth, and adults.

WCFE 5131. Planning WCFE. (3 cr) Examination of educational planning, and evaluation of work, community, and family education in formal and nonformal settings.

WCFE 5141. Evaluation of WCFE. (3 cr) Designing and conducting project, program, and systems evaluations in work, community, and family education contexts and settings.

WCFE 5201. Family and Work Relationships. (3 cr; A-F only) Examination of the interactions of work and family to prepare professionals to improve work and family relationships.

WCFE 5201. Philosophy and Practice of Vocational Education. (2 cr; A-F only) Purposes, recipients, practices, legislation, and funding, socioeconomic contexts of work, community, and family education.

WCFE 5331. Coordination Techniques for Work and Community Education. (3 cr) Purposes of cooperative work and community education; responsibilities of instructor coordinator; guidance, selection, placement, supervision and evaluation of students; articulation of related instruction; training for identification, orientation, development, and evaluation; management of the program.

WCFE 5341. Global Program Delivery Techniques and Technology. (2 cr; A-F only) Special educational activities and teaching and communications methods and techniques for youth and adults, ranging from outreach to extension services, with an emphasis on youth and adult education programs in different global settings.

WCFE 5351. Methods for Change in Developing Countries. (3 cr; A-F only) Sociocultural and cultural parameters as they pertain to promoting the adoption of improved practices in rural, community, and agricultural development, including formal and informal education institutions. Project planning, implementation, and evaluation related to actual change and development situations in developing countries.

WCFE 5400. Special Topics in Youth Development Leadership. (1-4 cr [max 4 cr]) An examination of important social and political topics of current interest to youth development practitioners with an emphasis on leadership implications for practice in youth agencies, congregations, schools, and other community settings. Content varies by offering.

WCFE 5411. The Everyday Lives of Youth. (3 cr; A-F only) Lives of realities of body, time, space, other, and self from an existential and phenomenological perspective.

WCFE 5412. Experiential Learning: Theory and Practice. (3 cr; A-F only) A-F only) Examines the theory and practices of learning by doing. Emphasis on the educator's personal engagement in the actual process to understand the technical, motivational, and evaluative aspects of experiential learning.

WCFE 5413. Organizational Approaches to Youth Development. (3 cr; A-F only) Language, historical influences, and educational philosophies fundamental to youth development work in organizations serving youth.
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<th>Courses</th>
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<tr>
<td><strong>WCFE 5414. Issues in Youth Development Leadership.</strong>&lt;br&gt;3 cr; A-F only&lt;br&gt;Examines an issues of leadership that drive the professional practice of community-based youth work. Participants engage experts from the field, community, community schools, and workplaces to develop a deeper understanding of how public issues and policy affect the everyday lives of youth.</td>
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<tr>
<td><strong>WCFE 5451. Seminar: Youth Development Leadership.</strong>&lt;br&gt;1-4 cr; max 4 cr; SP—Youth Development Leadership student or #; SP—S-N only&lt;br&gt;Appraises principles of healthy youth development, informal learning venues, and experiential education to practice/roles of community-based youth work. Individual and group projects focus on applied research, community-based teaching, learning, and foundations of ethical practice. Four-semester course.</td>
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<tr>
<td><strong>WCFE 5496. Leadership Field Experience: Youth Development.</strong>&lt;br&gt;(4 cr; S-N only)&lt;br&gt;Leadership support of healthy youth development. Work in an agency dedicated to community-based youth programming, education, public policy, advocacy for children, youth, families.</td>
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<tr>
<td><strong>WCFE 5511. Education for Work.</strong>&lt;br&gt;3 cr&lt;br&gt;Examination of contextual bases underlying education for work; implications for practice.</td>
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<td><strong>WCFE 5521. School-to-Work Policies.</strong>&lt;br&gt;3 cr&lt;br&gt;Examination of the aims and purposes, federal and state policies, educational reform, and issues and concepts relating to school-to-work education.</td>
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<td><strong>WCFE 5522. School-to-Work Practices.</strong>&lt;br&gt;3 cr&lt;br&gt;Examination of learning in context; curricular integration; educational system articulation; educational partnerships; best practices in school-based, work-based, service-based learning, and connecting activities; building community support; and leadership related to school-to-work education.</td>
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<td><strong>WCFE 5696. Teaching Internship: Introduction.</strong>&lt;br&gt;(1 cr; SP—AdPy course; SP—Upper div AdPy course)&lt;br&gt;Practical experiences in teaching to develop ideas, research, practice, and continuing education. Participants make and react to presentations. (Two credits counted in doctoral program.)</td>
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<tr>
<td><strong>WCFE 5697. Teaching Internship: School and Classroom Settings.</strong>&lt;br&gt;(2 cr; SP—5696 for init lic program)&lt;br&gt;Part-time supervised teaching experience in a school. Seminars on managing student’s learning in the context of work, community, and family education programs in contemporary schools and on becoming a reflective educator.</td>
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<tr>
<td><strong>WCFE 5698. Teaching Internship.</strong>&lt;br&gt;(3 cr; max 8 cr; SP—AdPy)&lt;br&gt;Teaching experience in a school system that provides programs for grades 5-12.</td>
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<tr>
<td><strong>WCFE 5699. Teaching Internship: Extended Practice.</strong>&lt;br&gt;(1 cr; SP—5698)&lt;br&gt;Extended student teaching experience in a school system that provides programs for grades 5-12.</td>
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<tr>
<td><strong>WCFE 5771. Teaching Entrepreneurship: Small Business Management.</strong>&lt;br&gt;3 cr&lt;br&gt;Methods, organization, curriculum development and modification, and implementation of educational programs for entrepreneurs.</td>
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<tr>
<td><strong>WCFE 5801. Educating Special Populations in Work, Community, and Family Settings.</strong>&lt;br&gt;3 cr&lt;br&gt;Identifies and advocates for educational and work-based educational practices that are considered best practices in school-based, work-based, service-based learning, and connecting activities; building community support; and leadership related to school-to-work education.</td>
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<tr>
<td><strong>WCFE 5821. Diversity Issues and Practices in Work, Community, and Family Settings.</strong>&lt;br&gt;3 cr&lt;br&gt;Examination of the nature of diverse populations and their unique learning and training needs, exemplary programs, and collaborative efforts among persons representing work, community, and family settings.</td>
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<td><strong>WCFE 5822. Diversity and Organizational Transformation in Work, Community, and Family Education.</strong>&lt;br&gt;2 cr&lt;br&gt;Developing models for understanding the impact of diversity on individual, organizational, and community outcomes; discussing organizational change and relationships of diversity.</td>
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<td><strong>WCFE 5823. Program Planning and Improvement for Special Populations in Work, Community, and Family Education.</strong>&lt;br&gt;2 cr&lt;br&gt;Concepts, issues, and practices related to the design, implementation, and evaluation of efforts focused on developing new programs or modifying existing programs for individuals with special learning needs in work, community, and family settings.</td>
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<td><strong>WCFE 5901. Using Research in Work, Community, and Family Education.</strong>&lt;br&gt;3 cr&lt;br&gt;Introduction to the role of work, community, and family education research in professional practice, significant problems of practice for research, alternative models of research, and synthesis and application of the results of research.</td>
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<td><strong>WCFE 5909. Special Topics in Work, Community, and Family Education.</strong>&lt;br&gt;(1-4 cr; max 4 cr)&lt;br&gt;Topics vary.</td>
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<td><strong>WCFE 5993. Directed Study in WCFE.</strong>&lt;br&gt;(1-4 cr; max 4 cr; SP—A-F only)&lt;br&gt;Self-directed study, with faculty advice, is not covered by regular courses.</td>
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<td><strong>WCFE 8100. Work, Community, and Family Education Colloquium.</strong>&lt;br&gt;(1-3 cr; max 3 cr)&lt;br&gt;Selected topics of significance to work, community, and family education professionals. Topics based on interest and demand.</td>
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<td><strong>WCFE 8141. History and Philosophy of Work, Community, and Family Education.</strong>&lt;br&gt;3 cr&lt;br&gt;Historical and philosophical views regarding ideas, research, practice, and continuing issues in work, community, and family education.</td>
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<td><strong>WCFE 8142. Work, Community, and Family Education Comparative Systems.</strong>&lt;br&gt;3 cr; SP—8141&lt;br&gt;Comprison of work, community, and family education systems within the United States and between the United States and other countries.</td>
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<td><strong>WCFE 8444. FTE: Doctoral.</strong>&lt;br&gt;1 cr; SP—Doctoral student, adviser and DGS consent&lt;br&gt;Developing, reporting, and evaluating research. Participants make and react to presentations. (Two credits counted in doctoral program.)</td>
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<td><strong>Youth Development and Research (YoSt)</strong></td>
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<td><strong>School of Social Work</strong></td>
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<td><strong>College of Human Ecology</strong></td>
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<td><strong>YoSt 5031. Youth in the World.</strong>&lt;br&gt;(3 cr; SP—Upper div AdPy course; SP—Upper div AdPy course)&lt;br&gt;Encourages critical thinking about how youth is ideal and as a social identity and current social, economic, public discourse, and professional practice. Larger framework includes building a basis for understanding youth and working with or on behalf of youth.</td>
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<td><strong>YoSt 5032. Child and Adolescent Psychology for Practitioners.</strong>&lt;br&gt;3 cr; SP—Courses in ed psych or child or adolescent psych&lt;br&gt;Application of theory and research about children and adolescents including how findings can be used and how theories facilitate understanding of behavior.</td>
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<td><strong>YoSt 5101. Youth Work Practice I: Internship.</strong>&lt;br&gt;(3 cr; SP—3100, 5330; SP—3101, 5032 or equiv, 5111, 5112)&lt;br&gt;First course of a sequential internship that includes 15 hours per week working with youth in a community youth-serving organization. Developing and enhancing competence and identity as a youth worker, and reflect on and integrate knowledge about youth with ongoing experience in youth work.</td>
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<td><strong>YoSt 5102. Youth Work Practice II: Internship.</strong>&lt;br&gt;(3 cr; SP—5201, 5330; SP—5101, 5112, 5114, 5115)&lt;br&gt;Second course of a sequential internship that includes 15 hours per week of work with youth in a community youth-serving organization. Developing and enhancing competence and identity as a youth worker, and reflect on and integrate knowledge about youth with ongoing experience in youth work.</td>
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<tr>
<td><strong>YoSt 5111. Youth Work Methods I: Seminar.</strong>&lt;br&gt;(1 cr; SP—5201, 5330; SP—3101, 5032 or equiv, 5110, 5111, 5112, 5114, 5115)&lt;br&gt;Weekly discussion seminars taken concurrently with 5111 to integrate theory and practice with youth work experience. Written and experimental assignments to increase knowledge, competency, and skills related to working with youth.</td>
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<td><strong>YoSt 5112. Youth Work Methods II: Seminar.</strong>&lt;br&gt;(1 cr; SP—5201, 5330; SP—5111, 5112, 5114, 5115)&lt;br&gt;Weekly discussion seminars taken concurrently with 5102 to integrate theory and praxis with youth work experience. Written and experimental assignments to increase knowledge, competency, and skills related to working with youth.</td>
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YoSt 5234. Youth Agencies, Organizations, and Youth Service System. (2 cr; QP—Two soc/anth courses, work exper in a youth agency or org; SP—Two soc/anth courses, work exper in a youth agency or org)
Overview of major forms of youth agencies and organizations, sources of agency legitimacy, ideologies and values, and goals. Relations between and among agencies and organizations. Roles of adults and youth; professionals and nonprofessionals; paid staff and volunteers; youth participation; legal and ethical issues. Examples of existing and ideal agencies.

YoSt 5235. Community Building for Healthy Youth Development. (2 cr; QP—Two social sci courses, exper working with youth or #; SP—Two social sci courses, exper working with youth or #)
Community is a major context of adolescence and youth life, and community building is a major strategy for healthy development. Explore recent foundation and government reports that address issues and practical problems of community building.

YoSt 5240. Special Topics in Youth Studies. (2-8 cr [max 10 cr]; QP—Two social sci courses, exper working with youth or #; SP—Two social sci courses, exper working with youth or #)
In-depth investigation of one area of youth studies. Teaching procedure and approach determined by specific topic and student needs. Topic announced in advance.

YoSt 5241. Experiential Learning. (2 cr; QP—Two social sci courses, exper working with youth or #; SP—Two social sci courses, exper working with youth or #)
Cover rationale for and purposes of experiential learning in schools and youth-serving agencies, development and implementation of experiential programs for adolescents, and evaluation of experiential learning programs. Each student will develop a plan for an experiential program for teenagers.

YoSt 5291. Independent Study in Youth Studies. (1-8 cr [max 8 cr]; QP—5330 or equiv or #; SP—5032 or equiv or #)
Independent reading and/or research under faculty supervision.

YoSt 5301. Communicating with Adolescents About Sexuality. (2 cr; QP—Upper div AdPy course, exper working with youth or #; SP—Upper div AdPy course, exper working with youth or #)
Sexual development and experiences emphasizing how adults can be comfortable in communicating more effectively with young people. Sexual patterns, variations, roles, power, exploration and sex education.

YoSt 5313. Direct Work with Adolescents. (2 cr; QP—Two social sci courses, exper working with youth or #; SP—Two social sci courses, exper working with youth or #)
Designed to give an understanding of direct work with troubled and at-risk adolescents in a wide range of settings where youth workers or social workers are typically involved. Emphasis on young people in groups in the “life space” in everyday life, rather than in one-to-one office-based interactions.

YoSt 5321. Work with Youth—Individual. (2 cr; QP—5330 or equiv or #; SP—5032 or equiv or #)
Examination of basic assumptions underlying individual work with youth. Attention to special issues and concerns of adolescents and of persons who work with them, especially those who work with youth in one-to-one interactions.

YoSt 5322. Work with Youth—Families. (2 cr; QP—5230 or equiv or #; SP—5321 or upper div AdPy course, family theory course or #)
Theories and techniques of working with youth and their families. Emphasis on practical methods of structuring change; developing effective communication, decision-making and problem-solving systems; winning the family’s cooperation; the role of the professional in influencing healthy family development.

YoSt 5323. Work with Youth—Groups. (2 cr; QP—5230 or 5330 or #; SP—5321 or upper div AdPy course or #)
Increase knowledge and understanding of adolescent group needs and associations; increase knowledge of group process; and enhance skill in working with groups of adolescents in the community, in group living situations, and in group therapy.

YoSt 5402. Youth Policy: Enhancing Healthy Development in Everyday Life. (3 cr; QP—Two social sci courses, exper working with youth or #; SP—Two social sci courses, exper working with youth or #)
Youth policy is typically grounded to problems and risks and is specific to human services domains such as education, health, juvenile justice, employment, and the like. Create youth policy directed at enhancing healthy development through community building, program development, and other strategies.
Related Fields

Graduate degree programs do not exist in the following fields. However, students may earn graduate credit in courses related to their program and use faculty members on their examining committees from these fields. For graduate courses, see the Courses section in this catalog.

### Anesthesiology

**Lecturer**
Lisa C. Anderson, E

### Chicano Studies

**Professor**
Dennis Valdes, E

**Associate Professor**
Guillermo Rojas, E

### Dermatology

**Professor**
Mark K. Dahl (emeritus), E

**Assistant Professor**
James C. Vance, E

### Family Practice and Community Health

**Professor**
Carole J. Blind, E
Charles E. Boult, E
Edmond J. Coleman, E
Dwenda Gjerdingen, E
Joseph M. Keenan, E
Roger S. Mazze, E
Brian R. Mosser, E
Vernon E. Weckwerth, E

**Associate Professor**
Sharon S. Allen, E
Byron Crouse, Family Medicine, Duluth, E
Kenneth Hepburn, Nursing, E
James Pica, E
Beatrice E. Robinson, E

**Assistant Professor**
Walter Rocking, E
Michael H. Miner, E
Angela M. Vargas, E
Mark W. Yeazel, E

### Humanities

**Assistant Professor**
George Kliger, E

### Middle Eastern Languages

**Professor**
Iraq Bashir, Linguistics, and Asian and Slavic Languages, E

**Associate Professor**
Daniel D. Reisman, Classical and Near Eastern Studies, E

### Neurosurgery

**Professor**
Timothy J. Ebner, Neuroscience, E
Donald L. Erickson, E
Walter A. Hall, E
Walter C. Low, E
Robert E. Maxwell, E
Gaylan L. Rockswold, E

**Other**
Stephen J. Haines, E
Setti S. Rengachary, E

### Psychiatry (AdPy and CAPy)

**Professor**
Gerald J. August, E
Paul D. Clayton, E
Elke D. Eckert, E
William H. Frey, Pharmacy, E
Judith G. Gamard, Health Services Research, Policy and Administration, E
James A. Halkas, E
Dorothy Hata-Sakami, Epidemiology, E
Jerome L. Keoli, E
David T. Lykken (emeritus), Psychology, E
Thomas B. Mackenzie, E
Michael K. Popkin, E
Marilyn C. Santi, E

**Associate Professor**
Michael L. Bloomquist, E
Carme M. Borchardt, E
Scott J. Crow, E
George Realmuto, E

**Assistant Professor**
Daniel R. Hanson, E

**Other**
Harry M. Hoberman, E
Susan L. Warren, E

### Radiology

**Professor**
Donovan B. Reinke, E

**Associate Professor**
Marvin E. Goldberg, E

**Other**
Kent B. Reamley, E

### Therapeutic Radiology

**Professor**
John J. Kersey, Pediatrics, E
Faiz M. Khan, E
Seymour H. Levitt, E
Chang W. Song, E