Interdisciplinary Archaeological Studies (InAr)

College of Liberal Arts

InAr 5100. Topics in Interdisciplinary Archaeological Studies. (3 cr; SP–Grad InAr major or #; A-F only)
Topics specified in Class Schedule.

InAr 8004. Method and Theory in Archaeology. (3 cr; SP–Grad InAr major or #; A-F only)
Survey and evaluation of archaeological approaches to non-literal, material evidence for past human activities and societies.

InAr 8100. Interdisciplinary Seminar. (3 cr; SP–Grad InAr major or #; A-F only)
Review and evaluation of approaches to interdisciplinary research; themes vary. Leadership and research shared by staff, visitors, and students.

InAr 8200. Directed Readings. (1-7 cr; SP–Grad InAr major or #)

InAr 8300. Directed Research. (1-7 cr; SP–Grad InAr major or #)

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

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

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

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

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

International Relations (IntR)

Institute of International Studies

College of Liberal Arts

IntR 5900. Topics in International Relations. (3 cr)
Proseminar. Selected issues in international relations. Topics vary.

Interpersonal Relationships Research (IRel)

Graduate School

IRel 8001. Proseminar in Interpersonal Relationships Research. (1 cr [max 2 cr]; SP–Grad IRel minor; S-N only)
Surveys major topics, including theoretical assumptions, methods, and samples of current research.

IRel 8021. Seminar: Statistical and Methodological Issues in Research on Dyadic Relationships. (2 cr; SP–Grad IRel minor; S-N only)
Survey of topics in design and analysis of research on behavior in two-person interactions.

IRel 8360. Seminar: Topics in Interpersonal Relationships Research. (2 cr [max 6 cr]; SP–Grad IRel minor or #)
Intensive study of topics.

Italian (Ital)

Department of French and Italian

College of Liberal Arts

Ital 5209. TRECENTO LITERATURE: RULES OF THE CANON. (4 cr; SP–3015, 3201 or #)
Works of Boccaccio and Petrarch and their role in establishing the canon of Italian vernacular literature. Taught in English also as MSt 5610.

Focuses on issues of gender, sexual difference, equality, and emancipation raised by Italian women writers and thinkers from the 19th century to the present.

Ital 5321. Italian Renaissance Epic. (4 cr; SP–3015, 3201 or #)
Study of the narrative poems of Boiardo, Ariosto, and Tasso in the context of the fashioning of early modern Europe.

Ital 5337. Nation and Narration: Writings in the 19th Century. (4 cr; SP–3015)
Introduces the construction of modern Italian national identity by examining the role that literature plays in this process. Works by Manzoni, Foscolo, Leopardi, Gioia, Verga, Serato, and Deledda studied in the context of a range of sociopolitical and cultural issues.

Ital 5401. MONDO DI DANTE. (4 cr; SP–3015, 3201 or #)
Intensive reading of Dante’s Inferno, Purgatorio, and Vita Nuova with emphasis on Dante’s linguistic and cultural contributions.

Ital 5609. WORLD OF DANTE. (4 cr [max 8 cr])
Taught in English. Intensive reading of Dante’s Inferno, Purgatorio, and Vita Nuova with emphasis on the personal, poetic, and political stakes of the journey of Dante’s pilgrim through hell to the earthly paradise.

Ital 5970. DIRECTED READINGS. (1-4 cr; SP–#)
Meets unique requirements decided on by faculty member and student. Individual contracts list contact hours, number of credits, written and other work required.

Ital 8301. FTE: MASTERS’. (1 cr; SP–Master’s student, adviser and DGS consent)

Ital 8777. THESIS CREDITS: MASTER’S. (1-18 cr; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Ital 8992. DIRECTED READINGS. (1-4 cr; SP–#)

Japanese (Jpn)

Institute of Linguistics and Asian and Slavic Languages and Literatures

College of Liberal Arts

Jpn 5017. Communicative Competence for Japanese-Oriented Careers. (4 cr; SP–4041 or 4042 or #)
Effective communication using spoken and written Japanese in contexts likely to be encountered by a career-oriented professional in Japan.

Jpn 5072. Communicative Competence for Japanese-Oriented Careers. (4 cr; SP–3017 or #)
Effective communication using spoken and written Japanese in contexts likely to be encountered by a career-oriented professional in Japan.

Jpn 5160. TOPICS IN JAPANESE LITERATURE. (4 cr [max 8 cr])
Literary, historical, or cultural study of selected Japanese literature.

Jpn 5161. Women's Writing in Premodern Japan. (4 cr; SP–3162, 4061 or # when readings are in Japanese; 3162 or # when in translation; A-F only)
Works by women in premodern Japan including Genji monogatari, a lengthy narrative, Makura no soshi, a collection of vignettes, and poetry. Concerns include gendered writing system/authorship, narrative techniques, sexuality and the figure of the author, and strategies of fictionality.

Jpn 5162. Tale Literature in Premodern Japan. (4 cr; SP–3162, course from classical Japanese language sequence or #; A-F only)
Tale literature, both Buddhist and secular, presents the world of the middle- to lower-class people. Rhetoric and religion, fiction and history, gender and sexuality, the role of the supernatural/fantastic, and re-tellings of earlier texts.

Jpn 5163. PREMODERN HISTORICAL NARRATIVES. (4 cr; SP–3162, course from classical Japanese language sequence or #; A-F only)
Narratives rooted in history. Issues include the problematization of reality, the formation of national identity, the idea of divine Imperial power, oral storytelling and its relationship to written texts, and the popularization of historical writings.

Jpn 5164. READINGS IN EARLY MODERN JAPANESE LITERATURE. (4 cr; QP–Third-yr Japanese or #; SP–3032 when readings are in Japanese or #; A-F only)
An examination of the stylistic and ideological aspects of the prose fiction, poetry, and non-fiction of the period 1683 to 1945. Offered in a rotating format alternating between readings in the original language and readings in English translation.

Jpn 5165. READINGS IN POSTWAR AND CONTEMPORARY JAPANESE LITERATURE. (4 cr; QP–Third-yr Japanese or #; SP–3032 when offered in Japanese or #; A-F only)
Literary and historical exploration of selected works published between 1945 and the present. Focus may be on a writer, a period, or a theme. Offered in a rotating format alternating between readings in the original language and readings in English translation.

Jpn 5166. LITERATURE BY 20TH-CENTURY JAPANESE WOMEN. (4 cr; SP–2022 or #)
Literary and historical exploration of selected works by Japanese women writers in a variety of genres. All literary texts read in Japanese; critical readings may be in English.

Jpn 5171. WOMEN’S WRITING IN PREMODERN JAPAN IN TRANSLATION. (4 cr; SP–3162 or #; A-F only)
Genji monogatari, a lengthy narrative, Makura no soshi, a collection of vignettes, and poetry. Gendered writing system/authorship, narrative techniques, sexuality and the figure of the author, and strategies of fictionality.

Jpn 5176. LITERATURE BY 20TH-CENTURY JAPANESE WOMEN IN TRANSLATION. (4 cr)
Literary and historical exploration of selected works by Japanese women writers in a variety of genres. All literary texts read in English.

Jpn 5251. HISTORY OF THE JAPANESE LANGUAGE. (4 cr; SP–3032, 5451 or #)
Development of Japanese grammar from classical to the modern language.

Jpn 5451. STRUCTURE OF JAPANESE: SYNTAX/SEMANTICS. (4 cr; SP–3032, Ling 3001 or #)
Analysis of structure and meaning of Japanese sentence patterns.

Jpn 5452. STRUCTURE OF JAPANESE: PHONOLOGY/MORPHOLOGY. (4 cr; SP–3032, Ling 3001 or #)
Generative and nongenerative approaches to Japanese sound and word structure.

Jpn 5453. STRUCTURE OF JAPANESE: DISCOURSE CONVERSATION ANALYSIS. (4 cr; SP–3032, Ling 3001 or #)
Analysis of Japanese written texts and conversations. Emergence of grammar in discourse, discourse/conversational structural units, patterns of genre, strategies, style, and sociolinguistics variables.

Jpn 5650. PROSEMINAR IN JAPANESE LINGUISTICS. (4 cr [max 12 cr]; SP–5451 or 5452 or 5453 or #)
Selected topics in Japanese linguistics and/or contrastive analysis of Japanese and English with attention to contributions from Eastern and Western linguistic traditions.
Journalism and Mass Communication (Jour)

School of Journalism and Mass Communication
College of Liberal Arts

Jour 5541. Mass Communication and Public Health. (2-3 cr; SP–Jour major or minor or grad student, 3004, 12 cr in social or behavioral sci; A-F only)
Role, functions, and effects of mass media on public health; planned and unplanned effects. Review and analysis of literature to understand how theories, models, and assumptions of mass communication research relate to public health.

Jour 5601. History of Journalism. (3 cr; SP–Jour major or minor, 3004, A-F only)
Development of American newspapers and periodicals from beginnings in Europe to present day; rise of radio and television; relation of communications development to political, economic, and social trends.

Jour 5606. Literary Aspects of Journalism. (3 cr; SP–Jour major or minor, 3004, A-F only)
Literary aspects of journalism as exemplified in, and influenced by, works of English and American writers past and present. Lectures, discussions and weekly papers.

Jour 5741. Minorities and Mass Media. (3 cr; OP–Jour major or minor, 3004, A-F only)
Analysis of relationships between mass media and communities of color in the United States. Focuses on issues of content and control.

Jour 5771. Media Ethics: Principles and Practice. (3 cr; SP–5771) Jour major or minor, 3004, A-F only
Designed to give an understanding of what it means to act “ethically,” the tools to identify and analyze ethical issues, and knowledge of the ethical norms of print and broadcast journalism, photojournalism, public relations, and advertising.

Jour 5777. Contemporary Problems in Freedom of Speech and Press. (3 cr; SP–Jour major or minor, 3004, A-F only)
Legal and constitutional derivation of freedom of speech and press with emphasis on case law, judicial theories, doctrines, tests, and values. Symbolic, commercial, compelled speech, speech plus, petition and assembly, leading press cases, and legal research techniques.

Jour 5825. World Communication Systems. (3 cr; SP–Jour major or minor, 3004, A-F only)
Mass media systems of the world described and analyzed regionally and nationally; historical roots, social, economic, and cultural context; contemporary conditions and prospects; relevance of journalism and mass communication to international affairs.

Jour 5990. Special Topics in Mass Communication. (3-4 cr; SP–Jour or mass comm major, A-F only)
Topics specified in Class Schedule.

Jour 5993. Directed Study. (1-6 cr; SP–Jour major or minor, 3004, A, A-F only)
Directed study; projects.

Jour 8001. Studies in Mass Communication I. (3 cr; A-F only)
Historical development of mass communication studies in social sciences, humanities, and legal areas; survey of research literature utilizing individualistic and structural approaches to mass communication.

Jour 8002. Studies in Mass Communication II. (3 cr; OP–8010; SP–8001, A-F only)
Literature on history of the field, cultural and humanistic approaches to its study, and legal and ethical issues.

Jour 8211. Seminar: Advertising Research. (3 cr; OP–8251, SP–4255 or #, A-F only)
Advertising as persuasive communication. Current research and theory related to advertising decision-making process. Measurement issues in advertising and market research.

Jour 8317. Seminar: Visual Communication Research. (3 cr; OP–5316, 8010, 8002, A, SP–4316, [8001, 8002 or #, A-F only])
Theoretical approaches, analysis of research methods, development of research designs and projects.

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

Jour 8442. Seminar: Broadcast News. (3 cr; OP–5442; SP–4442 or #, A-F only)
Major issues; confrontations between federal government and network news departments; historical studies.

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

Jour 8501. Seminar: The Process of Quantitative Mass Communication Research. (3 cr; OP–12 cr social sci, stat course; SP–9 cr social sci, Ep5260 or equiv or Ep5260, A-F only)
Logic of social sciences research. Relationship between theory and research, concept explication, measurement, instrumentation, and design issues.

Jour 8502. Seminar: Mass Communication Research Design. (3 cr; OP–8501, stat course; SP–8501, Eps5260 or equiv or Ep5260, A-F only)
Principles and application of techniques of psychosocial research with reference to mass communication questions. Reliability, generalizability, and validity in their classic and contemporary senses. Survey instruments, methods, and designs.

Jour 8513. Seminar: Ethnographic Methods in Mass Communication. (3 cr; OP–8010, 8020, A, SP–8001, 8002 or #, A-F only)
Theoretical foundations in anthropology and sociology; field projects.

Jour 8514. Seminar: Mass Communication Theory. (3 cr; OP–8010, 8020, A, SP–8001, 8002, #, A-F only)
Research paradigms, concepts, and findings for developing a general theory of mass communication.

Jour 8601. Seminar: Methods in Mass Communication History Research. (3 cr; OP–5601, A, SP–5601, #, A-F only)
Critical analysis of research in journalism and communication history; research designs and research methods; development of a research project.

Jour 8602. Seminar: History of Mass Communication. (3 cr; OP–5601, A, SP–5601, #, A-F only)
Research in history and development of U.S. mass media.

Jour 8603. Seminar: Theories and Models in Mass Communication History Research. (3 cr; OP–5601, A, SP–5601, #, A-F only)
Literature on theory in historical research, uses of theoretical models in historical explanations, role of theory in historical research and debate about uses, specific works in journalism/communication history in context of theoretical models; development of a major paper examining models and theories relevant to student’s own project.

Jour 8615. Seminar: Mass Media and Social Change. (3 cr; OP–Stat course, #, SP–Ep5260 or equiv, A, A-F only)
Paradigms used in analysis of role of mass communication in social change: structural functionalism, conflict management, Marxist perspectives.

Jour 8662. Seminar: Literary Aspects of Journalism. (3 cr; OP–5606, A, SP–5606, #, A-F only)
Research in literary aspects of journalism exemplified in careers and works of American and British writers.
Courses

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

Jour 8671. Seminar: Communication Ethics—Public/Civic Journalism. (3 cr; SP–A-F only) Historical underpinnings, philosophic debate, theoretical dynamics, legal concerns, and ethical implications.

Jour 8672. Seminar: Media Management. (3 cr; QP–5726 or 5762 recommended; SP–A, 4725 or 4726 recommended; A-F only) Management issues in media organizations; relation to dynamics of organization structure, employees, markets, and economics/fi

Jour 8675. Seminar: Issues in Information Access and Communication. (3 cr; QP–5731 or equiv; Δ; SP–A-F only) Societal, industry, technological, and policy aspects and developments that affect information access, particularly through mass media.

Jour 8679. Seminar: Research Methods in Media Ethics and Law. (3 cr; SP–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 5828; or Δ; A-F only) Main problems and currents. Concepts, research, and policy relevant to global development, including issues of freedom and constraint, media technology, and 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 or Δ; A-F only) Influence and effects of mass communication, internal dynamics of media organizations, criticism and modes of reform. Theoretical frameworks for analysis.

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

Jour 8801. Seminar: Problems in International Communication Research. (3 cr; QP–5801 or 5825; Δ; SP–4801 or 5828; or Δ; A-F only) Research strategies and designs relating to telecommunications and mass communication; comparative and cross-cultural analysis and Third World developmental concerns.

Jour 8889. Thesis Credits: Doctoral. (1-18 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; SP–A-F only) Topics for seminars, specified in Class Schedule.

Jour 8993. Directed Study. (1-6 cr; SP–Grad mass comm major or minor; Δ; 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 work 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, individualized instruction plans, individualized physical education, and assessment of movement skills.

Kin 5104. Physical Activities for Persons with Disabilities. (3 cr; A-F only) Different approaches to providing physical education services for persons with disabilities. Topics: movement behavior foundations, movement skill progressions, unique considerations for specific impairments, and sport for persons with disabilities.

Kin 5106. Adapted Aquatics. (2 cr; SP–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 Med; SP–Kin or Rec grad Med; A-F only) Steps in planning and 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 Δ; 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 of chronic disease and health problems.

Kin 5124. Human Factors Physiology. (3 cr; QP–A-F only) In-depth view of the concepts, problems, and issues associated with ergonomic applications to improving the design and operation of human workspaces.

Kin 5126. Sport Psychology. (3 cr; SP–3126 or equiv or Δ) 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 Δ; phys ed lic SP–3133 or Δ; phys ed lic; A-F only) Developmental aspects of human movement behavior and learning, emphasizing life span change of motor skills.

Kin 5135. Motor Control and Learning. (3 cr; QP–3135 or Δ; SP–3133 or Δ) Focus on the main theoretical ideas and research that have advanced motor control over the 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 Exercise and Physical Performance. (3 cr; SP–FScN 1612 or equiv; SP–FSci 1112 or equiv; A-F only) Requirements and physiological 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 coronary heart disease.

Kin 5152. Curriculum Development in Physical Education. (2 cr; QP–Admission to init lic Med phys ed program or SP–Admission to init lic Med phys ed program or Δ; A-F only) Trends, issues, and challenges in early childhood and K-12 physical education studied for potential impact on the curriculum. For beginning and experienced teachers.

Kin 5171. Foundations of Kinesiology. (3 cr; SP–Kin major or Δ; 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 16 cr; QP–5100 or equiv or SP–5103 or equiv or Δ; A-F only) Observation of and participation in physical education instruction for students with disabilities; discussion of current issues in development/adapted physical education and exchange of ideas and problems.

Kin 5328. International and Comparative Sport and Physical Education: The Olympic Games. (3 cr; QP–Grad student or Δ; SP–Grad student or Δ; A-F only) Explores the role the Olympic Games has played and continues to play in the global village. Advanced insight into 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 student or Δ; SP–5126, grad student or Δ; A-F only) A study of sport, sporting processes, institutions, systems, and structures that have effect 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 participants 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 physiology 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 student, Med; SP–Kin or rec major; grad student, Med; §§5460, §§5460; A-F only) Principles of sport management including theories and techniques in administration and management of sport organizations. Organizational theory and policy with practical examples of sport management skills and strategies.
Kin 5511. Women in Sport and Leisure. (3 cr; SP–5510, 5Rec 5510, 5F-A-F only) Critically examine women’s involvement in and contributions to sport, physical activity, and leisure.

Kin 5621. Advanced Athletic Training: Evaluation of Athletic Injury. (3 cr; QP–3114, CBN 1027–3114, CBN 1027; A-F only) Theory, principles, and techniques necessary to recognize and evaluate athletic injury that occurs to all major body parts.

Kin 5622. Therapeutic Modalities in Athletic Training. (3 cr; QP–3114; SP–5114; A-F only) Theoretical and practical elements of therapeutic modalities for the management of athletic injuries in a practical setting.

Kin 5697. Student Teaching; Coaching. (3 cr; QP–SP–§3624, admission to coaching program) Student teaching experience under the supervision of a mentor coach. Required of candidates for coaching certificate.

Kin 5720. Special Topics in Kinesiology. (1-8 cr; A-F only) Upper division undergraduate or graduate student in kinesiology or related coursework in areas not normally available through regular offerings.

Kin 5722. Human Factors Physiology. (3 cr; QP–SP–A-F only) In-depth focus on various aspects of human physiology in the context of human performance and environment.

Kin 5723. Psychology of Sport Injury. (3 cr; QP–Intro psychology course; SP–intro psychology course) Psychosocial and cognitive 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/int lic or SP–Grad/int lic or SP–5123; 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 5762. Physical Education—Teaching and Trekking. (2 cr; QP–Kin major, MEd student, or SP–Kin major, MEd student, or SP–A-F only) Development of cooperative 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 5775. Physical Education—An Adventure Experience. (1 cr; QP–Kin major, MEd student, or SP–Kin major, MEd student, or SP–5123; 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 5801. Legal Aspects of Sport and Recreation. (4 cr; QP–Kin or rec major; SP–5860, 5Rec 5860; kin or rec major; A-F only) Legal issues related to recreation, park, and sport programs and facilities in both public and private sectors.

Kin 5981. Research Methodology in Kinesiology and Leisure Studies. (3 cr; SP–3150 or equiv; SP–5980; 3151 or equiv; A-F only) Defines and reviews various types of research in exercise and sport science, physical education, and recreation studies. Covers qualitative research, field studies, and methods of introspection as alternate research strategies instead of relying on traditional scientific paradigms.

Kin 5992. Readings in Kinesiology. (1-8 cr; QP–SP–A-F only) Critical examination of various aspects of kinesiology.

Kin 5995. Research Problems in Kinesiology and/or Physical Education. (1-8 cr; A-F only) Critical and contemporary literature in exercise physiology and allied disciplines, emphasizing contributions of major leaders in the field and opportunities for interdisciplinary research.

Kin 8122. Seminar: Exercise Physiology. (2-6 cr; QP–5122 or equiv; SP–5122 or equiv or SP–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 equiv; A-F only) Literature, theoretical constructs, research methodology, and design; focuses on student-selected topics and problems.

Kin 8132. Seminar: Motor Development. (3 cr; QP–5132 or equiv; SP–5132 or equiv or SP–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) Independent study under tutorial guidance.

Kin 8444. FTE: Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent) Independent study under tutorial guidance.

Kin 8607. 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 8666. Doctoral Pre-Thesis Credits. (1.18 cr; SP–Max 18 cr per semester or summer; doctoral student who has not passed preliminary exams) 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; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only]) Reporting and discussion of student and faculty research activity.

Kin 8988. Thesis Credits: Doctoral. (1.18 cr; SP–Max 18 cr per semester or summer; 24 cr required) Reporting and discussion of student and faculty research activity.

Kin 8995. Research Problems in Kinesiology. (1-9 cr; QP–5126 or SP–Kin PhD student or SP–A-F only) Critical and contemporary literature in exercise physiology and allied disciplines, emphasizing contributions of major leaders in the field and opportunities for interdisciplinary research.

For definitions of course numbers and symbols, see inside back cover.
LA 5405. Interdisciplinary Studies in Landscape Architecture (1-12 cr; SP–Grad land arch major or LA grad student or #; SP–BED accelerated status or LA grad student or #; A-F only)
Research, planning, and/or design projects. Topics vary.

LA 5413. Introduction to Landscape Architectural History (3 cr; max 3 cr; SP–One course in history at 1xxx or higher; A-F only)
Introductory course examines the multiple roots of landscape architecture by examining the making of types of landscapes over time. Emphasis on ecological and environmental issues, and issues related to political, economic, and social contexts of landscape architectural works.

LA 5571. Landscape Construction: Landform Systems and Spatial Performance. (4 cr; SP–BED major or LA grad student or #)
Theory and professional applications of landform systems for design. Topics include landform typology, representation methods, manipulation techniques, use of land survey data, earthwork construction issues, and spatial accommodation of vehicles in landscape architecture, including road design.

LA 5572. Landscape Technology: Planted Form. (3 cr; SP–5211, 5212, plant identification course or #; SP–5201, 5203, plant identification course or #; A-F only)
Lectures, presentations, field trips, readings, and projects exploring design principles related to using plants in the landscape. Explores cultural and ecological principles through design projects of various scales.

LA 5573. Landscape Technology: Introduction to Geographic Information Systems. (3 cr; SP–Jr or sr BED major or LA grad student or #; A-F only)
GIS as an analytical tool to solve geographical problems of regional landscape design and resource management. Topics include application techniques, analytical procedures, data characteristics, data sources, input/output methods, and implementation.

LA 8201. Designing Landscapes for Dwelling and Settlement. (6 cr; SP–5212, 5571, 8202; SP–5203, 5571, grad land arch major, #8202 or #A-F only)
Professional design studio. Hypothetical projects include development of schematic master plans for site layout, grading, and planting. Design for residential, commercial, and civic uses with attention to zoning and other controls, environmental quality, human behavior, marketing, project finance, and techniques. Requires concurrent registration in LA 8202.

LA 8202. Design of Planned Developments. (2-3 cr; SP–Grad land arch major or #)
Issues related to planned community developments: historical precedents, design for residential, commercial, and civic uses; role of zoning and other controls; deed restrictions; preparation of design brief; environmental quality; human behavior; market; project finance; and techniques of site development.

LA 8203. Making Regional Landscape Space. (6 cr; SP–5221, 8204; SP–5202, grad land arch major, #8204 or #A-F only)
Design exploration of landscape ecology, landscape perception, regional economics, and public policy as informants of design decision-making in regional landscapes at or exceeding township level. Geographic information systems as design tools.

LA 8204. Regional Landscape Space. (3 cr; SP–Grad land arch major or #A-F only)
Theoretical investigations and current advances in use of landscape ecology, landscape perception, regional economics, and public policy as informants of design decision-making in regional landscapes at or exceeding township level. Geographic information systems as design tools.

LA 8205. Urban Form Options: Landscape Architecture Studio. (6-8 cr; SP–Two yrs of studio, grad land arch major or #)
Urban landscape design issues, theories, and problems explored via formal/spatial inquiry in studio, reading, and the exposition of ideas in paired seminar. Urban systems, gathering spaces, ecology, infrastructure, recreation, and public space.

LA 8301. Landscape Architecture: Research Issues and Methods. (3 cr; SP–8221, grad land arch major or #; SP–8201 or 8202, grad land arch major or #A-F only)
Alternative methodological approaches to landscape architectural research and consideration of their appropriateness for contemporary research topics.

LA 8302. Professional Practice. (3 cr; SP–8231; SP–8205, grad land arch major or #A-F only)
Office and project management case studies. Organizational behavior, marketing, sales, strategic planning, financial and cost accounting, insurance, legal issues and contracts.

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

LA 8400. Topics in Landscape Architecture. (1-3 cr; max 12 cr) (SP–Grad land arch major or #)
Seminar offered by regular or visiting faculty in their area of specialization. Content varies with interest of instructor.

LA 8401. Directed Studies in Emerging Areas of Landscape Architecture. (1-6 cr; max 12 cr; SP–Grad land arch major or #A-F only)

LA 8402. Directed Studies in Landscape Architecture History and Theory. (1-6 cr; max 12 cr; SP–Grad land arch major or #A-F only)

LA 8403. Directed Studies in Landscape Architecture Technology. (1-6 cr; max 12 cr; SP–Grad land arch major or #A-F only)
Research, planning, and/or design project. Sample topics: energy efficient design, historic preservation, urban revitalization, agricultural land use, computerized land-use planning, housing.

LA 8406. Concepts of Landscape Evaluation. (3 cr; SP–Grad land arch major or #A-F only)
Philosophical basis for wide-ranging approaches to evaluating qualitative aspects of landscape. Aesthetic factors and integration of landscape evaluation into regional design decision-making.

LA 8407. Perception Manipulation in Design of Exterior Space. (3 cr; SP–Grad land arch major or #A-F only)
Historic and modern design devices that alter one’s sense of spatial control and arrangement to create illusionary situations in exterior environment. Organized to inform and test principles of perception distortion in exterior space.

LA 8408. 18th-Century Landscape Theory: Nature and the Sublime, the Beautiful, and the Picturesque. (3 cr; SP–Grad land arch major or #A-F only)
Eighteenth-century landscape architectural theory underpinned most modern western traditions in landscape architecture. These theoretical positions framed the nature of Nature in the context of human experience through treatises and works of landscape architecture.

LA 8409. Fitting Buildings to the Land. (3 cr; SP–Land arch or grad student with 1 yr grad design or # A-F only)
Exercises and projects in site manipulation to adjust structures and attendant uses and circulation to specific land parcels.

LA 8504. Project Programming. (3 cr; SP–8223; SP–8203, grad land arch major or #A-F only)
Individual research in preparation for final studio.

LA 8554. Advanced Landscape Planning and Design. (6 cr; SP–8231; SP–8205, grad land arch major or #A-F only)
Advanced studies in area of student’s choice.

LA 8574. Landscape Storm Water Management. (3 cr; SP–8221; SP–8201, grad land arch major or #)
Theory and applications of hydrology and storm water management techniques. Applied hydrology, catchment delineation, storm water runoff models, and storm water management techniques (detention ponds, swales, channels, culverts, small storm sewer systems, run-off systems, sedimentation, and erosion control systems).

LA 8575. Landscape Construction: Site Structural and Utility Systems. (3 cr; SP–Grad land arch major or #)
Design of pavements, enclosures, decks, lighting, electrical, and irrigation systems for landscape architecture. Theory and principles of design of light structures, properties and use of materials, and construction communication. Landscape integrity and economic viability as performance issues.

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

Language, Teaching, and Technology (LgTT)

Institute of Linguistics and Asian and Slavic Languages and Literatures

College of Liberal Arts

LgTT 5101. Applications of Technology in Language Teaching. (3 cr)
Explore uses of technology in language teaching; theoretical background, demonstrations, and applications.

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.

Lat 5370. Latin Literature: Satire. (3 cr [max 12 cr])
One or more appropriate authors studied each semester.
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 Divinarum, 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 period.

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. (1-4 cr [max 18 cr]; SP–#; A-F only)
Guided individual research or study.

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

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

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

Lat 8262. Survey of Latin Literature I. (3 cr)
Extensive readings in a 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–#; A-F)
Latin literature of 3rd to 6th centuries A.D., including Ammianus and Augustine.

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

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

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

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

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

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.

Liberal Studies (LS)

Graduate School

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–#)
Tutorial for qualified graduate students. 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. (2 cr; SP–MLS 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. (4 cr; SP–All MLS courses must be completed by the end of the semester)
Completion of culminating project. The last M.L.S. program course.

Linguistics (Ling)

Institute of Linguistics and Asian and Slavic Languages and Literatures

College of Liberal Arts

Ling 5001. Introduction to Linguistics. (4 cr; SP–#; §3001, §3001H; grad student or #; SP–#; §3001, §3011; grad student or #)
Phonetcs, 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; SP–#; 3001 or 3011 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.

Ling 5101. Language Types and Linguistic Universals. (3 cr; SP–#; 3001 or 3011H or 5001 or §; SP–§3001 or 3011 or 5001 or §)(SP–$3001 or 3011 or 5001)
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; SP–#; 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; SP–#; 3001 or 3011H 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; SP–#; 5201; SP–#)
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.

Ling 5205. Semantics. (3 cr; SP–#)
Analysis of sentence meaning with attention to semantic properties and relations such as analyticity, entailment, quantification, and generics. Philosophical background; formal techniques of semantic analysis; how sentence meaning depends on word meaning, syntax, and context. The role of semantics in grammatical theory.

Ling 5206. Linguistic Pragmatics. (3 cr; SP–#)
The analysis of linguistic phenomena in relation to beliefs and intentions of language users; speech act theory, conversational implication, presupposition, information structure, relevance theory, discourse coherence.

Ling 5301. Introduction to Phonetics. (4 cr; §QP–#; §3301, §3001H or 5001 or §; SP–§3301, §3001 or 5001 or § or #)

Ling 5302. Introduction to Phonology. (3 cr; §QP–#; §3011; SP–#)
Concepts and types of information needed for describing patterns in the sounds of words, for all speakers of all human languages, including current theoretical frameworks. Extensive practice identifying and analyzing phonological patterns in the words of a language.

Ling 5303. Phonological Theory. (3 cr; §QP–#; SP–#)
Further exploration of the phonology of human languages. The course will prepare students to read papers in the literature and to do informed research in phonology.

Ling 5461. Conversation Analysis. (3 cr; SP–#; 3001H or 5001 or §; SP–§; $3461; 3011 or 5001 or §)
Discourse processes. Application of concepts through conversation analysis.

Ling 5462. Field Research in Spoken Language. (3 cr; SP–#; 5461 or $Phc 5461 or §; SP–§; 5462; 5461 or §)
Transcribing and analyzing talk and movement related to talk. Applying concepts to recorded conversations.

Ling 5501. Introduction to Language Acquisition. (3 cr; SP–#; 3001 or 3011H or 5001 or §; SP–§; 3001 or 3011 or 5001 or §)
Overview of first and second language acquisition. Does not fulfill degree requirements for majors in linguistics or the MA in ESL.

Ling 5505. Introduction to Second Language Acquisition. (3 cr; SP–#; 3001 or 3011H or 5001, a course on phonological and grammatical structure of a language; SP–#; 3001 or 3011 or 5001, a course on phonological and grammatical structure of a language)
Introduction to research on the language and learning processes of second-language learners: the linguistic structure of their interlanguage, the cognitive and social factors which influence their acquisition of a new language.

Ling 5601. Introduction to Historical Linguistics. (3 cr; §QP–#; §3601; 3011 or 3001H or 5001; SP–§3601; 3011 or 3011 or 5001)
Historical change in phonology, syntax, semantics and the lexicon; linguistic reconstruction; genetic relationship among languages.

Ling 5701. Sociolinguistics. (3 cr; §QP–#; 3001H or 5001 or §; SP–#; 3001 or 3011 or 5001 or §)
Social determinants of linguistic diversity, variation, and change. Topics may include social and regional dialects, language style and register, style-shifting and code-switching, the quantitative study of speech, linguistic and social inequality.
Courses

Ling 5721. Bilingualism. (3 cr; QP–3001 or 3001H or 5001 or #; SP–3003 or 3011 or 5001 or #) Sociolinguistic theory and methods in the study of bilingualism; language ecology in multicultural societies; language and language behavior in the bilingual individual; language in ethnic conflict; implications for public policy and planning.

Ling 5801. Introduction to Computational Linguistics. (3 cr; QP–3001 or 3001H or 5001 or #; programming experience helpful; SP–3001 or 3011 or 5001 or #; programming experience helpful) Methods and issues in computer understanding of natural language. Programming languages and their linguistic applications. Lab projects.

Ling 5802. Computational Linguistics. (3 cr; QP–5401 or #; SP–5801 or #) Computer processing of natural language. Applications to such areas as speech recognition and information retrieval.

Ling 5900. Topics in Linguistics. (3 cr; SP–#) Topics vary; see Class Schedule.

Ling 5931. Fundamentals of Contemporary English. (3 cr; QP–3001 or 3001H or 5001 or #; SP–3001 or 3011 or 5001 or #) Word and sentence structure of contemporary English.

Ling 5932. Descriptive Studies of Modern English. (3 cr; QP–3001 or 3001H or 5001 or #; SP–3001 or 3011 or 5001, 5201 or 5931 or #) Studies of selected aspects of the morphology, syntax, and/or semantics/pragmatics of modern English with emphasis on analysis of written or recorded texts.

Ling 5993. Directed Study. (1-3 cr; SP–#.A.3) Directed study for Linguistics.

Ling 8005. Research Paper Workshop. (2 cr; SP–5105, 5202, 5205, 5302 or #; grad ling major; S–N only)

Ling 8200. Topics in Syntax and Semantics. (3 cr; max 9 cr; SP–5202, 5205 or #) Syntax and semantics of natural language, with particular emphasis on the interface between the two.

Ling 8210. Seminar in Syntax. (3 cr; SP–5022, 5025 or #) Current issues in syntactic theory. Topics vary.

Ling 8220. Seminar in Semantics. (3 cr; max 9 cr; SP–5202, 5206 or #) Current issues in semantics. Topics vary.

Ling 8221. Formal Semantics of Natural Language. (3 cr; QP–Phil 5201; SP–Phil 5201 or #) Truth-conditional model-theoretic semantics applied to treatment of opacity, intensionality, quantification, and related phenomena in natural language.

Ling 8300. Topics in Phonetics and Phonology. (3 cr; max 9 cr; SP–5303 or #) Current issues in phonological theory. Topics vary.

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

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

Ling 8500. Topics in Second Language Acquisition. (3 cr; max 9 cr; SP–5001, 5505)

Ling 8511. Research Methods in Language Acquisition. (3 cr; SP–5001, 5505, 5506 or #) Based on review of published research, students design and carry out their own studies, writing and presenting research reports at the end of the term. Focus on first or second language acquisition, or both, depending on instructor.

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

Ling 8777. Thesis Credits: Masters. (1-18 cr; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

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

Ling 8900. Seminar: Topics in Linguistics. (3 cr; max 9 cr; SP–#) Language-related issues in cognitive science from a linguistic perspective. Serves as elective for cognitive science minor, but only for linguistics nonmajors.

Ling 8991. Independent Study. (1-4 cr; max 15 cr; SP–#)

Logistics Management (LM)

Department of Marketing and Logistics Management

Curts L. Carlson School of Management

LM 8882. Readings in Logistics Management. (1-8 cr; max 16 cr; SP–Adviser consent or #) Readings useful to student’s individual program or objectives that are not available in regular courses.

LM 8944. Graduate Research in Logistics Management. (1-8 cr; max 16 cr; SP–Adviser consent or #) Individual research on an approved topic appropriate to student’s program and objectives.

Management (Mgmt)

Department of Strategic Management

Curts L. Carlson School of Management

Mgmt 5004. Negotiations. (2 cr; A-F only) Art and science of securing agreements between two or more parties who are interdependent and who are seeking to maximize their own outcomes; understanding individual, group, and organizational behavior in the context of these competitive situations; theory and process of negotiation applied to broad spectrum of problems faced by managers and professionals.

Mgmt 5050. Management of Innovation and Change. (2 cr; A-F only) Application of theories and research on how new organizational programs, products, and technologies are developed and implemented and what paths in these journeys lead to success and failure; diagnostic skills and useful principles in which innovation journey unfolds in wide variety of instances.

Mgmt 5101. Advanced Topics. (4 cr; A-F only) Specialized topics in management that vary and may include downsizing, ethics, trust, risk, alliances, organizational identity, organizational change, industry definition, team performance, organizational renewal, competitive advantage, hypercompetition, managing the knowledge worker, competence acquisition and preservation, and negotiation.

Mgmt 5175. Managing in Newly Emerging Global Markets. (2 cr) Understanding the institutional and cultural environments in major new emerging markets. Focus is on two or three countries from emerging markets (such as China, India, Eastern Europe, Mexico, Brazil and others), the problems and opportunities posed by these environments, and how to do business in these countries.

Mgmt 8101. Theory Building and Research Design. (4 cr; SP–Business admin PhD 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 PhD 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 PhD student or #; offered alt yrs) Overview of the field of international management research.


Mgmt 8301. Seminar in Organizational Behavior. (4 cr; SP–Business admin PhD 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 PhD 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 PhD student or #) Topics vary.

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

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

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

Mgmt 8882. Readings in Management Theory and Administration. (1-8 cr; max 16 cr; SP–Business admin PhD student or #; adviser consent) 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 PhD student or #; adviser consent) Research project on a management problem of interest to student; may be completed in cooperation with a business firm.

Management of Technology (MOT)

Institute of Technology

MOT 8111. Marketing Management in Technology-Based Organizations. (2 cr; SP–Grad MOT major; A-F only) Emphasizes marketing industrial products. Overall consideration of marketing strategy. Product strategy, including pricing, promotion, product mix, and sales and distribution decisions.

MOT 8112. Management Accounting. (2 cr; 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. Manufacturing for Competitive Advantage. (2.5 cr; SP–Grad MOT major; A-F only) Strategic framework to describe key relationships between operations and other business functions to

MOT 8114. Introduction to the Management of Technology. (1 cr; SP–Grad MOT major; S-N only) Provides a basic understanding of three areas: technology itself, technology-related management procedures, and general business disciplines and management functions. Encourages development of a macro-mindset that may be described as comprehensive, future-focused, global, and change-oriented.

MOT 8211. 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; SP–Grad MOT major; A-F only) Creation of value within the organization. Financial methods important to managers of technology-based organizations, including budgeting capital, projecting financial needs, and managing working capital.

MOT 8131. Problem Formulation and Managerial Decision Making. (1 cr; SP–Grad MOT major; A-F only) Characteristics of managerial decision making and concept of bounded rationality. General approach to defining unstructured problems encountered by upper management. Methods for problem expansion based on such lines of reasoning as cause-and-effect and systems thinking.

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 aids and design and integration.

MOT 8134. Support and Control of Manufacturing Processes. (2 cr; SP–Grad MOT major; A-F only) Overview of mechanical, microelectronic, and process industries. Discrete and continuous flow manufacturing. Impact of information technology on integration and automation of design and manufacturing. Concurrent engineering and emphasis on quality and reduced cycle time. Tools for computer-aided design, manufacturing, and standardization.

MOT 8212. 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 process for the new product. Necessary organizational interactions among marketing, research and development, and operations in design and delivery of products.

MOT 8213. Business, Government, and Macroeconomics. (2 cr; 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. Understanding and Forecasting Technology Development. (2 cr; SP–Grad MOT major; A-F only) Introduction to methods of technology assessment and forecasting. Application to study of the history of technology and industry. Technological developments and their economic, social, and industrial impacts.

MOT 8221. Project Management and Leadership. (2 cr; 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 for the 1990s. (2.5 cr; SP–Grad MOT major; A-F only) Technologies expected to play pivotal roles in future industrial development. State-of-the-art in each technology and principal barriers to commercialization of the technology as presented by an expert. Student groups develop and present concepts for applying the technology to industry. Lectures by guest experts and an international field experience.

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

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 competence.

MOT 8234. Capstone Project. (2 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: Master's. (1 cr; SP–Grad MOT major, adviser and DGS consent) Mode of completion. (0.5 cr; SP–Grad MOT major; S-N only) Theory and methods for applying conflict management techniques in organizations. Cooperative and competitive models of conflict, basics of bargaining, conflict strategies, communication styles, listening skills, dispute resolution, third-party mediation, and use of computers for conflict mediation.

MOT 8910. Corporate Responsibility. (1 cr; SP–Grad MOT major; S-N 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 cr; SP–Grad MOT major; A-F only) Understanding the contribution of science and technology to economic growth and development. The role of the federal government in science and technology; R&D and government policy. How Congress operates in science and technology areas and how to participate in workings of Congress.
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-Trail Multi-Method, exploratory factor analysis, and confirmatory factor analysis.

Mktg 8851. Seminar: Marketing Management and Strategy. (4 cr; QP–MBA 8045 or MBA 8210 or equiv; SP–MBA 6210 or equiv; business admin PhD 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 MBA 8210 or equiv; SP–MBA 6210 or equiv; business admin PhD student or # offered alt yrs)
Current topics and problems of interest considered in depth. Topics vary.

Mktg 8892. Readings in Marketing. (1-8 cr [max 16 cr]; QP–MBA 8045 or MBA 8210 or equiv; SP–MBA 6210 or equiv; business admin PhD student or #)
Readings useful to student’s individual program and objectives that are not available in regular courses.

Mktg 8894. Graduate Research in Marketing. (1-6 cr [max 16 cr]; QP–MBA 8045 or MBA 8210 or equiv; SP–MBA 6210 or equiv; business admin PhD student or #)
Individual research on an approved topic appropriate to student’s program and objectives.

Master of Business Taxation (MBT)

Department of Strategic Management
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 Health Care. (2 cr; A-F only)
Social and psychological components of health and medical care. Organization and delivery of health-care services, their problems and perspectives; focus on the patient, provider of care, and environment in which health-care services are dispensed.

MHA 8762. Contemporary Problems in Health Care. (2 cr; SP–PhD student; A-F only)
Current concepts, problems, principles, and future developments of health care; health care by selected 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–PhD 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–PhD 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 Health Care 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 statistical methods and its application to health care delivery and research.

MHA 8782. Research Practicum. (2 cr; SP–PhD student; A-F only)
Field experience in health-care research. Supervised independent and team research on selected topics and problems.

MHA 8790. Seminar: Political Aspects of Health Care. (2 cr; SP–Health Services and Policy Analysis grad major or #A-F only)
Interrelationships between government, politics, and health care; political and social basis of health legislation and community decision making in provision and modification of health services.

Materials Science (MatS)

Department of Chemical Engineering and Materials Science
Institute of Technology

MatS 5521. Thin Films and Interfaces. (3 cr; QP–MatS 5013 or #; upper div IT or grad student; 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 student; SP–MatS 5011 or #; upper div IT or grad student)
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 8001. Structure and Symmetry of Materials. (3 cr; A-F only)

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 8003. Electronic Properties. (3 cr; SP–A-F only)

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 an advanced level. 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 epilayers. 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 1st or 2nd yr) Introduction to polymer physical chemistry. Chain conformations; thermodynamics of polymer solutions, blends, and copolymers; light, neutron, and X-ray scattering; dynamics in dilute solutions and polymer characterization; dynamics of melts and viscoelasticity; rubber elasticity, networks, and gels; glass transitions; crystallization.

**MatS 8212. Solid State Reaction Kinetics.** (3 cr; QP–B112; SP–B2002) 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, reactions at interfaces, practical examples drawn from oxidation and solid/solid reactions of ceramics.

**MatS 8213. Electronic Properties of Materials.** (3 cr; SP–A-F only) Band theory, studied by tight binding, pseudopotential, K.P. and KKR techniques. Optical and transport properties. Experimental techniques for characterizing electronic properties, including photoemission, Auger spectroscopy, and optical spectroscopy. Microelectronic materials, metal-semiconductor, and other interface phenomena.

**MatS 8214. Electronic Properties and Applications of Organic Materials.** (3 cr; SP–A-F only) Introduction to geometric and prospective applications of organic materials in electronic, electronic, and ionic conductors, dielectric behavior; ferroelectric, piezoelectric, pyroelectric, and electrooptic 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 friction 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 8217. 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 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.


**Math 5335. Geometry I.** (4 cr; QP–5215 or 5261; SP–2243 or 2263) First in a two-course sequence. Advanced Euclidean geometry; axiomatic and analytic hyperbolic geometry; projective geometry; symmetry and geometric transformations and their connection to linear algebra, group theory, and complex arithmetic; finite geometries; convex geometric figures.

**Math 5336. Geometry II.** (4 cr; SP–5335) Second in a two-course sequence. Advanced Euclidean geometry; axiomatic and analytic hyperbolic geometry; projective geometry; symmetry and geometric transformations and their connection to linear algebra, group theory, and complex arithmetic; finite geometries; convex geometric figures.

**Math 5345. Introduction to Topology.** (4 cr; QP–Soph sequence or SP–5285) Set theory; Euclidean and metric spaces; basics of general topology, including compactness and connectedness.

**Math 5378. Differential Geometry.** (4 cr; QP–3252, 3262 or equiv; SP–2263, 2283) Basic geometry of curves in the plane and in space, including Frenet formulas; theory of surfaces; differential forms and Riemannian geometry.

**Math 5385. Introduction to Computational Algebraic Geometry.** (4 cr; QP–3252 or equiv; SP–2263 or equiv) Geometry of curves and surfaces defined by polynomial equations. Emphasis on concrete computations with polynomial equations using computer packages and on the interplay between algebra and geometry. Abstract algebra presented as needed; no algebra prerequisite.

**Math 5467. Introduction to the Mathematics of Waves.** (3 cr; QP–5261 or SP–5243) Background theory and experience in wavelets. Inner product spaces, operator theory, and Fourier transforms applied to Gabor transforms, multi-scale analysis, discrete wavelets, and wavelet analysis, and self-similarity. Computing techniques.

**Math 5481. Mathematics of Industrial Problems I.** (4 cr; QP–Two yrs calc, familiarity with some programming language, SP–2243, 2263, familiarity with some programming language) Industrial problems such as coastal precipitation, air quality modeling, color film developing, electron beam lithography. Theoretical foundations and computational methods involving ordinary and partial differential equations, calculus of variations, and numerical analysis.

**Math 5482. Mathematics of Industrial Problems II.** (4 cr; QP–Two yrs calc, familiarity with some programming language, SP–2243, 2263, familiarity with some programming language) Industrial problems such as coastal precipitation, air quality modeling, color film developing, electron beam lithography. Theoretical foundations and computational methods involving ordinary and partial differential equations, calculus of variations, and numerical analysis.
beams lithography. Theoretical foundations and computational methods. Ordinary and partial differential equations, calculus of variations, and numerical analysis.

Math 5485. Introduction to Numerical Methods I. (4 cr; QP–3261 or equiv; some computer skills recommended; SP–2243 or equiv; some computer skills recommended)


Math 5486. Introduction to Numerical Methods II. (4 cr; SP–3548)


First in two-course sequence. Numerical methods for the partial differential and integral equations of engineering and science. Methods include finite element, finite difference, spectral, and boundary integral. Applications to fluid flow, elasticity, and electromagnetism. Recommended for engineering and science graduate students.

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

Second in two-course sequence. Numerical methods for the partial differential and integral equations of engineering and science. Methods include finite element, finite difference, spectral, and boundary integral. Applications to fluid flow, elasticity, and electromagnetism. Recommended for engineering and science graduate students.

Math 5525. Introduction to Ordinary Differential Equations. (4 cr; QP–3261, 3262; SP–2243, 2283)

Ordinary differential equations, solution of linear systems, qualitative and numerical methods for nonlinear systems. Linear algebra background. Fundamental matrix solutions, variation of parameters, existence and uniqueness theorems, phase space, rest points and their stability, periodic orbits, Poincaré–Bendixson theory and strange attractors.

Math 5535. Dynamical Systems and Chaos. (4 cr; QP–3252; SP–2243, 2263)

Dynamical systems theory emphasizing iteration of one-dimensional maps. Fixed points, periodic points, stability, bifurcations, symbolic dynamics, chaos, fractals, Julia and Mandelbrot sets.

Math 5583. Complex Analysis. (4 cr; QP–5553, 3252 or equiv; SP–3574, 2263 or equiv)


Math 5587. Elementary Partial Differential Equations. (4 cr; QP–3252; 3261; SP–2243, 2263)


Math 5615. Honors:Introduction to Analysis I. (4 cr; QP–3252, 3262 or equiv; SP–2243, 2263, 2283)


Math 5616. Honors:Introduction to Analysis II. (4 cr; QP–SP–5615)


Same as Stat 5101. Linear development of probability and some basic issues in statistics. Probability spaces, random variables and their distributions and expected values, law of large numbers and central limit theorem, generating functions, sampling, sufficiency, and estimation.

Math 5652. Introduction to Stochastic Processes. (4 cr; QP–SP–2243, 5651 or Stat 5101)

Random walks, Markov chains, branching processes, martingales, queuing theory, Brownian motion.

Math 5654. Prediction and Filtering. (4 cr; QP–SP–2243, 5651 or Stat 5101)


Math 5705. Combinatorics I. (4 cr; QP–Soph math course, some linear algebra recommended; SP–2243 or 2263)

Basic enumeration, inclusion-exclusion, recurrence relations, generating functions (ordinary and exponential), elementary asymptotics, partitions, trees, listing algorithms, algorithmic matchings, bijections and involutions, Polya theory. Optional topics include extremal set theory, symmetric functions, and partially ordered sets.

Math 5707. Combinatorics II. (4 cr; QP–Soph math course, some linear algebra recommended; SP–2243 or 2263)

Combinatorics A is not a prerequisite. Elementary graph theory, including related algorithms, flows and networks, matching theory, and combinatorial optimization. Optional topics include designs, Latin squares, permanents, linear programming, Ramsey theory, coding theory and finite fields, and matroids.

Math 5711. Linear Programming and Combinatorial Optimization. (4 cr; QP–Linear algebra; SP–2243 or equiv)

Simplex method; connections to geometry; duality theory; sensitivity analysis; applications to cutting stock; allocation of resources, and scheduling problems; flows; matching and transportation problems; spanning trees, distance in graphs; integer programs; branch and bound; cutting planes; heuristics; applications to traveling salesman and knapsack problems.

Math 8000. Preparation for College Teaching. (3 cr; SP–Math PhD student beyond 1st yr in good standing, #; A-F only)

New approaches to teaching/learning, issues in mathematics education, components and expectations of a college mathematician professor.

Math 8141. 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, computational 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; #; 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 8151. Axiomatic Set Theory. (3 cr; QP–5162-5163-5164-SP– #; A-F only)

Axiomatic development of basic properties of ordinal and 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. Axiomatized Set Theory. (3 cr; QP–8150; SP–8151, #; 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–Grad math major; #; A-F only)

Analysis of concept of computability, including various equivalent definitions; primitive recursive, recursive, and partial recursive functions; oracle Turing machines; Kleene Normal Form Theorem; recursive and recursively enumerable sets; degrees of unsolvability; the arithmetic hierarchy.

Math 8167. Recursion Theory. (3 cr; QP–8166; #; A-F only)

Sample topics: complexity theory, recursive analysis, generalization of recursion theory, the analytical hierarchy, constructive ordinals.

Math 8172. Model Theory. (3 cr; SP–Grad math major; #; A-F only)

Interplay of formal theories and their models. Elementary equivalence, quantifier elimination, model completeness, model completeness, model completeness, model completeness, model completeness, model completeness. Sample topics: complexity theory, recursive analysis, generalization of recursion theory, the analytical hierarchy, constructive ordinals.

Math 8173. Model Theory. (3 cr; QP–8172; #; 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– #; offered for one year or one semester as circumstances warrant; #; A-F only)

Math 8201. General Algebra. (3 cr; QP–5xxx algebra or equiv; SP–4xxx algebra or equiv; #; A-F only)

Groups through Sylow, Jordan-Hölder theorem, structure of finitely generated Abelian groups. Rings and algebras, including Gauss theory of factorization. Modules, including projective and injective modules, chain conditions, Hilbert basis theorem, and structure of modules over principal ideal domains.

Math 8202. General Algebra. (3 cr; SP–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 algebras. 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)

Zeta and L-functions, prime number theorem. Dirichlet’s theorem on primes in arithmetic progressions, class number formulas; Riemann hypothesis; modular forms and associated L-function; Eisenstein series; Hecke operators, Poincaré series, Euler products; Ramanujan conjectures; Theta series and quadratic forms; waveforms and L-functions.

Math 8208. Theory of Modular Forms and L-Functions. (3 cr; QP–8207 or #; A-F only)

Applications of Eisenstein series: special values and analytic continuation and functional equation of L-functions. Trace formulas. Applications of representation theory. Computations.

Math 8211. Commutative and Homological Algebra. (3 cr; QP–8202; SP–8202 or #; A-F only)

Selected topics.

Math 8212. Commutative and Homological Algebra. (3 cr; SP–8211, #; A-F only)

Selected topics.
Math 8245. Group Theory. (3 cr; QP–8202; SP–8202 or #; A-F only)
Permutations, Sylow’s theorems, representations of groups on groups, semi-direct products, solvable and nilpotent groups, generalized Fitting subgroups, p-groups, co-prime action on p-groups.

Math 8246. Group Theory. (3 cr; QP–8245; SP–8245 or #; A-F only)
Representation and character theory, simple groups, free groups and products, presentations, extensions, Schur multipliers.

Math 8251. Algebraic Number Theory. (3 cr; QP–8202; SP–8202 or #; A-F only)
Algebraic number fields and algebraic curves. Basic commutative algebra. Completions: p-adic fields, formal power series, Puiseux series. Ramification, discriminant, different. Finiteness of class number and units theorem.

Math 8252. Algebraic Number Theory. (3 cr; QP–8206; SP–8252 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–8253 or #; A-F only)

Math 8270. Topics in Algebraic Geometry. (1-3 cr; max 12 cr; SP–Math 8201, Math 8202; offered for one yr or one semester as circumstances warrant; 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; homogeneouse spaces.

Math 8272. Lie Groups and Lie Algebras. (3 cr; QP–8202; SP–8202 or #; A-F only)
Solvable and nilpotent Lie algebras and Lie groups; Lie’s and Engel’s theorems; semisimple Lie algebras; cohomology of Lie algebras; Whitehead’s lemmas and Levi’s theorem; classification of complex semisimple Lie algebras and compact Lie groups; representation theory.

Math 8280. Topics in Number Theory. (1-3 cr; max 12 cr; SP–# offered for one yr or one semester as circumstances warrant; A-F only)
Math 8300. Algebraic Topology. (3 cr; QP–8300, #; SP–8301, A-F only)
Singular homology and cohomology theory with coefficients. Eilenberg-Steenrod axioms. Mayer-Vietoris theorem.

Math 8307. Algebraic Topology. (3 cr; QP–8306, #; SP–8306, A-F only)
Basic homotopy theory, cohomology rings with applications. Time permitting, some 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; SP–8301, #; offered for one yr or one semester as circumstances warrant; A-F only)
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, Meyer’s theorem, Cartan-Hadamard theorem.

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

Math 8370. Topics in Differential Geometry. (1-3 cr; max 12 cr; SP–8365 or 8300, #; SP–8365 or 8301, #; offered for one yr or one semester as circumstances warrant; A-F only)
Math 8380. Topics in Advanced Geometry. (1-3 cr; max 12 cr; SP–8365, 8303, #; offered for one yr or one semester as circumstances warrant; A-F only)
Math 8385. Calculus of Variations and Minimal Surfaces. (3 cr; QP–5xxx partial differential equations; SP–4xxx partial differential equations or #; A-F only)

Math 8386. Calculus of Variations and Minimal Surfaces. (3 cr; QP–8560, SP–8595 or #; A-F only)
Theory of multiple integrals. Geometrical differential equations, i.e., theory of minimal surfaces and related structures (surfaces of constant or prescribed mean curvature, solutions to variational integrals involving surface curvatures), all extremals for variational problems of current interest as models for interfaces in material materials.

Math 8387. Mathematical Modeling of Industrial Problems. (3 cr; QP–5xxx numerical analysis, some computer experience, #; SP–4xxx numerical analysis, some computer experience, #; A-F only)
Mathematical models from physical, biological, and social systems, emphasizing industrial applications. Modeling of deterministic and probabilistic, discrete and continuous processes; methods for analysis and computing.

Math 8388. Mathematical Modeling of Industrial Problems. (3 cr; QP–8365, #; SP–8307 or #; A-F only)
Techniques for analysis of mathematical models. Asymptotic methods; design of simulation and visualization techniques. Specific computation for one-dimensional models.

Math 8390. Topics in Mathematical Physics. (1-3 cr; max 12 cr; SP–# offered for one yr or one semester as circumstances warrant; A-F only)
Math 8402. Mathematical Modeling and Methods of Applied Mathematics. (3 cr; QP–8401, #; SP–8401, A-F only)

Math 8431. Mathematical Fluid Mechanics. (3 cr; QP–5xxx numerical analysis of partial differential equations; SP–4xxx numerical analysis of partial differential equations or #; A-F only)
Equations of continuity and motion. Bernoulli’s theorem, stream function, and velocity potential. Applications of conformal mapping.

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

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

Math 8442. Numerical Analysis and Scientific Computing. (3 cr; QP–8441, SP–8441 or #; SP–447 or 447 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 solution of resulting linear systems by direct and iterative methods.

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

Math 8450. Topics in Numerical Analysis. (1-3 cr; max 12 cr; SP–# offered for one yr or one semester as circumstances warrant; A-F only)
Math 8470. Topics in Mathematical Theory of Continuum Mechanics. (1-3 cr; max 12 cr; SP–# offered for one yr 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 8520. Topics in Dynamical Systems. (1-3 cr [max 12 cr]; QP–8520; SP–8520, offered for one or one semester as circumstances warrant; A-F only)

Math 8530. Topics in Ordinary Differential Equations. (1-3 cr; QP–8520; SP–8520, #; offered for one or one semester as circumstances warrant; A-F only)

Math 8571. Theory of Evolutionary Equations. (3 cr; QP–8571; SP–8571, #; 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, #; A-F only)
Dynamics of the Navier-Stokes equations, strong and weak solutions, global attractors. Chemically reacting fluid flows. Dynamics in infinite dimensions, unstable manifolds, center manifolds perturbation theory. Inertial manifolds and finite dimensional structures. Dynamical theories of turbulence.

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

Math 8581. Applications of Linear Operator Theory. (3 cr; QP–5000; applied mathematics, #; SP–4000; applied mathematics, #; A-F only)

Math 8582. Applications of Linear Operator Theory. (3 cr; QP–8406, #; SP–8581, #; A-F only)

Math 8583. Theory of Partial Differential Equations. (3 cr; QP–Some 5xxx PDE; 8601; SP–Some 4xxx PDE; 8601 or #; A-F only)
Classification of partial differential equations and characteristics. Laplace, wave and heat equations, some mixed problems.

Math 8584. Theory of Partial Differential Equations. (3 cr; QP–8585; SP–8551, #; A-F only)
Fundamental solutions and distributions, Sobolev spaces, regularity, advanced elliptic theory (Schauder estimates, Garding’s inequality), hyperbolic systems.

Math 8590. Topics in Partial Differential Equations. (1-3 cr; QP–8602; SP–8590, #; offered for one or one semester as circumstances warrant; A-F only)

Math 8600. Topics in Advanced Applied Mathematics. (1-3 cr [max 12 cr]; SP– offered for one or one semester as circumstances warrant; S-N only)

Math 8601. Real Analysis. (3 cr; QP–5613 or equiv; SP–4613 or equiv or #; A-F only)
Set theory and fundamentals, including axiom of choice, measures and measure spaces, Borel and Lebesgue measures and integration, Fundamental convergence theorems, Riesz representation.

Math 8602. Real Analysis. (3 cr; QP–8600; SP–8600, #; SP–8601, #; A-F only)

Math 8640. Topics in Real Analysis. (3 cr [max 12 cr]; QP–8602; SP–8602, #; offered for one or one semester as circumstances warrant; A-F only)

Math 8641. Spatial Ecology. (3 cr; QP–Three qtrs calculus; three qtrs calculus on 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 A-F 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 8651. Theory of Probability Including Measure Theory. (3 cr; QP–5613; SP–4613 or #; A-F only)

Math 8652. Theory of Probability Including Measure Theory. (3 cr; QP–8656; SP–8651 or #; A-F only)
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 8654. Fundamentals of Probability Theory and Stochastic Processes. (3 cr; QP–8654 or 8662; SP–8651 or #; A-F only)
Review of basic theorems of probability for independent random variables; introductions to Brownian motion process, Poisson process, conditioning, Markov processes, stationary processes, martingales, super- and sub-martingales, Doob-Meyer decomposition.

Math 8655. Stochastic Calculus with Applications. (3 cr; QP–8654 or 8662; SP–8654 or 8659 or #; A-F only)
Stochastic integration with respect to martingales, Ito’s formula, applications to business models, filtering, and stochastic control theory.

Math 8659. Stochastic Processes. (3 cr; SP–8652 or #; A-F only)
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 8660. Topics in Probability. (1-3 cr [max 12 cr]; SP– #; offered for one or one semester as circumstances warrant)

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

Math 8668. Combinatorial Theory. (3 cr; SP–A-F only)
Basic enumeration, including sets and multisets, permutation statistics, inclusion-exclusion, integer and set partitions, involutions and Polya theory; partially ordered sets, including lattices, incidence algebras, and Mobius inversion; generating functions.

Math 8669. Combinatorial Theory. (3 cr; QP–8668; SP–8668 or #; 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 8680. Topics in Combinatorics. (1-3 cr [max 12 cr]; SP– #; offered for one or one semester as circumstances warrant; A-F only)

Math 8701. Complex Analysis. (3 cr; QP–5613; SP–4613 or #; A-F only)
Foundations of holomorphic functions of one variable; relation to potential theory, complex manifolds, algebraic geometry, number theory, Cauchy’s theorems; Poisson integral. Singularities; series and product representations. Hyperbolic geometry; isometries. Covering surfaces, Riemann-Hurwitz formula. Schwarz-Christoffel polygonal functions. Residues.

Math 8702. Complex Analysis. (3 cr; QP–8700; #; SP–8701, #; A-F only)

Math 8777. Thesis Credits: Master’s. (1-18 cr; SP–Max 18 cr per semester of sum; 10 cr total required [Plan A only])

Math 8790. Topics in Complex Analysis. (1-3 cr [max 12 cr]; QP–8702; #; 8702, #; offered for one or one semester as circumstances warrant; A-F only)

Math 8801. Functional Analysis. (3 cr; QP–8602; SP–8602 or A-F only)
Motivation in terms of specific problems (Fourier series, eigenfunctions, etc.). Theory of compact operators. Basic theory of Banach spaces, including Hahn-Banach, open mapping, and closed graph theorems. Frechet spaces.

Math 8802. Functional Analysis. (3 cr; QP–8800; SP–8801 or #; A-F only)
Spectral theory of operators, theory of distributions (generalized functions), Fourier transformations and applications. Sobolev spaces and pseudo-differential operators. C-star algebras (Gelfand-Naimark theorem) and introduction to von Neumann algebras.

Math 8888. Thesis Credits: Doctoral. (1-18 cr; SP–Max 18 cr per semester or sum; 24 cr required)

Mathematics Education (MthE)

Department of Curriculum and Instruction
College of Education and Human Development

MthE 5011. Arithmetic Structures in School Mathematics. (3 cr; SP–Enrollment in math init lic program or tchg exper)
Pedagogy, content, and instructional strategies for teaching arithmetic. Content and issues relevant to the K-8 mathematics curriculum. Instructional materials and technology appropriate for elementary or middle school arithmetic. Credit hours and targeted level vary with particular classes.

MthE 5021. Algebraic Structures in School Mathematics. (3 cr; SP–Tchg exper or #)
Pedagogy, content, and instructional strategies for teaching arithmetic. Content and issues relevant to the algebra curriculum. Instructional materials and technology appropriate for arithmetic. Each offering of the course will focus on either elementary/middle or middle/secondary grade levels.

MthE 5031. Geometric Structures in School Mathematics. (3 cr; SP–Enrollment in math init lic program)
Pedagogy, content, and instructional strategies for teaching school geometry. Content and issues relevant to the geometry curriculum. Instructional materials and technology appropriate for geometry. Each offering will focus on either elementary/middle or middle/secondary grade levels.

MthE 5100. Topics in Mathematics Education. (1-3 cr [max 9 cr])
Issues, materials, and instructional techniques focusing on a single current topic of particular relevance to secondary school and college mathematics teachers.
Courses

MthE 5101. Teaching Elementary School Mathematics. (3 cr; SP–Tchg license or student elem ed MEd or special ed or #)
Modern trends, methods, and materials used to convey mathematical ideas.

MthE 5155. Rational Number Concepts and Proportionality. (3 cr; QP–Ed student or #; SP–Ed student or #)
The relationship between the development of rational number concepts and proportional reasoning skills. Examination of how newer school curricula treat these concepts. Application of materials in the classroom and analysis of results. Reading and responding to current research.

MthE 5161. Developing Leadership in School Mathematics. (3 cr; SP–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 underpinnings 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 classes. Pedagogical experiences to prepare teachers to integrate quantitative literacy accurately and effectivly 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 developing an 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 new 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 ed MEd 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–Tchg license or student 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 8501. Theory and Classical Research in Mathematics Education. (3 cr; SP–Grad math ed 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–5313, 8501)
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 ed PhD student)
Problems of mathematics instruction from kindergarten through junior college; opportunity to develop proposals and design models for empirical research.

MthE 8995. Problems: Mathematics Education. (1-3 cr, max 12 cr; SP–PhD math ed major with math ed concentration)
Students survey most recent literature and design and prepare research reports on special topics.

Mechanical Engineering (ME)

Department of Mechanical Engineering Institute of Technology

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

ME 5090. Advanced Engineering Problems. (4 cr; SP–Subject to approval of department form; SP–ME 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, combined gas turbine—vapor cycle systems.

ME 5103. Thermal Environmental Engineering. (4 cr; OP–IT or grad student; ME 3303, 5342; SP–IT upper div or grad student; 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 or grad student; ME 3303, ME 5342; SP–IT upper div or grad student; ME 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.

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

ME 5116. Cleanroom Technology and Particle Monitoring. (4 cr; SP–IT upper div or grad student, ME 3303 or #; SP–IT upper div or grad student; A-F only)
Fundamentals of cleanroom technology for microelectronics manufacturing; airborne and liquidborne particulate contaminants; particle monitors; optical and condensation particle counters, wafer surface scanner, microscopy; filter performance and testing; cleanroom design and operation; high purity systems; particle detection in processing equipment.

ME 5133. Aerosol Measurement Laboratory. (4 cr; SP–IT upper div or grad student; ME 3303, 3322, AEM 3031, CSci 1113, Mats 5001; A-F only)

ME 5221. Computer-Assisted Product Realization. (4 cr; QP–IT or grad student; ME 3260 or equiv; SP–3221, AEM 3031, CSci 1113, Mats 5001; 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; ME 3260 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, ME 3200, AEM 3016, ME 3251, FORTAN SP–IT upper div or grad student; AEM 3031, CSci 1113, Mats 5001; 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; ME 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, ME 3200, 3203, 3205; SP–IT upper div or grad student; ME 3222, CSci 1113 or equiv; A-F only)
Apply computer-aided engineering to mechanical design. Engineering design projects and case studies using computer-aided design and finite element analysis software; design optimization and computer graphical presentation of results.
ME 5243. Advanced Mechanism Design. (4 cr; QP–IT or grad student, 5281 or equiv; SP–Upper div IT student, 3222; A-F only)

Analytical methods of kinematic, dynamic, and kinetostatically 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 3321 or equiv; SP–Upper div IT student, 3281)

Apply vibration theory to design; optimize isolators, detuning mechanisms, viscoelastic suspensions and structures. Use frequency and analysis methods 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, stabilization, poles and zeros; transient responses; Nyquist and Bode diagrams; root locus; lead-lag and PID compensators, Nichols-Ziegler design method. Digital implementation aliasing, molder-designed and analysis of 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 student, 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. Analysis and simulation of equations of motion. Multiport 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–IT upper div or grad student, 3321, 3322; A-F only)

Examples of 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 5348. Heat Transfer in Electronic Equipment. (4 cr; QP–IT or grad student, 5342; SP–Upper div IT or grad student, 3322 or 5241)

Technology trends and packaging needs of microelectronic components; thermal characteristics, heat transfer mechanisms, and thermal failure modes of modern electronic and microelectronic 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–IT 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 transient phenomena. Stationary 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–MatS 5561, 5310; upper div 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 micromachining processes.

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


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


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

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

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 thermochromical regeneration. Axial and radial flow compressors and turbines; combustor designs, energy analysis, emissions, and noise. Turbojet, fanjet, turboprop engines. Elementary power plants, vehicular propulsion, hybrid vehicles.

ME 5813. Advanced Aerosol/Particle Engineering. (4 cr; QP–5613, 5614, 5615; SP–IT grad student or A-F only)

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

ME 8221. New Product Design and Business Development I. (4 cr; SP–Elect 6087; IT grad student, some design experience; 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 development, marketing, introduction strategy, and profit forecasting. Sponsoring company intends to bring product to market. ME 8222 must be taken in sequence with the same year.

ME 8222. New Product Design and Business Development II. (4 cr; SP–8250; §Elect 6087; ME 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 ME 8221 the same year.

ME 8228. Finite Elements in Multi-Disciplinary Flow/Thermal and Stress/Structural Manufacturing Applications. (4 cr; QP–5277, AEM 8516, AEM 8522, programming; SP–3222, 5341, AEM 3031, Csci 1113; A-F only)

Multi-disciplinary and coupled effects involving flows/heat transfer/stress. In-depth study of dynamics of modeling and analysis in each discipline. Coupling multi-disciplines for engineering problems. Applications to manufacturing and process modeling or, e.g., metals, alloys, polymers.

ME 8229. Finite Element Methods for Computational Mechanics/Transient/Dynamic Problems. (4 cr; QP–5277, programming; SP–5282 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 algorithms, convergence issues; linear/nonlinear situations. Implicit, explicit, mixed, and variable time discretization approaches; modal-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; applications 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, MatS 3011; A-F only)


ME 8266. 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–5281, 5250; SP–IT grad student; A-F only)


ME 8287. Digital Control and Signal Processing. (4 cr; QP–5283, 5281; A-F only)


ME 8333. FTE: Master’s. (1 cr; SP–Master’s student, advanced and DSQ exempt)

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

Planning experiments; uncertainty, qualification, 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.

MED 8343. Convective Heat Transfer. (3 cr; QP–3342, 8331; SP–3321, 3322 or equiv; 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.

MED 8344. Boiling Heat Transfer and Two-Phase Flow. (3 cr; QP–3342, 8341 or IT grad student) 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.


MED 8346. Radiation Heat Transfer. (3 cr; QP–3342; SP–3342, 8341, IT grad student; 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.

MED 8361. Introduction to Plasma Technology. (3 cr; QP–5342, 8360; SP–IT grad student; A-F only) Methods for characterizing thermal plasmas by modeling and diagnostics. Several plasma applications described in detail.

MED 8362. Advanced Plasma Technology. (3 cr; QP–8360, 8361; SP–8361, IT grad student; A-F only) Fundamentals of modern physics as they apply to understanding of thermal plasmas, including introduction to atomic theory, gaseous electronics, irreversible thermodynamics, plasma properties, and generation of plasmas.

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

MED 5185. Principles of Biomolecular Simulation. (3 cr; QP–Chem 5521 or SP–Chem 3502 or #) Molecular simulation for students in medicinal chemistry, pharmaceutics, biochemistry, and chemical physics

MED 5200. The New Drug Development Process. (1 cr; SP–IT grad student; A-F only) New drug development process in the U.S. pharmaceutical industry.

MED 5202. Research and Development Process of Pharmaceutical Products. (2 cr; SP–IT grad student; A-F only) New drug development process in the U.S. pharmaceutical industry.

MED 5494. Advanced Methods in Quantitative Drug Analysis. (3 cr; QP–Chem 4933; SP–Chem 4933 or #) 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.

MED 5495. Vistas in Medicinal Chemistry Research. (1 cr; SP–IT grad student; A-F only) Selected topics of contemporary interest in medicinal chemistry.

MED 5600. General Principles of Medicinal Chemistry. (3 cr; QP–Pharm 690, Bio5001L, SP–MedC grad student or #; A-F only) Fundamental principles of drug receptors as therapeutic targets, drug-receptor interactions, enzyme inhibitors, drug metabolism and disposition.
Courses

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 catalytic metabolism as it pertains to biodegradation of environmental pollutants; biocatalysis for specialty chemical synthesis; display of this information on the World Wide Web.

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

MicE 8777. Thesis Credits: Master’s. (1-18 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 discussions by invited speakers.

Microbiology (MicB)
Department of Microbiology

MicB 5352. Applied Microbial Biochemistry. (3 cr; QP–Biol 3021 or BioC 5331 or MicB 5321, Biol 5013/MicB 5105 or #; SP–Bioc 5352, Biol/Bioc 5021 or BioC 4331 or MicB 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.

Microbiology, Immunology, and Molecular Pathobiology (MIMP)
Department of Microbiology

MIMP 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.

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

MIMP 8002. Structure, Function, and Genetics of Bacteria and Viruses. (4 cr; QP–beginning biochem, cell bio, general bio, micro, organic chem; SP–8001 or #; A-F only)
Structure, function, and metabolism of microorganisms; microbial genetics; molecular virology.

MIMP 8003. Immunity and Immunopathology. (4 cr; QP–§Path 8216, §Path 8217, §Path 8218; Biol 5001 or equiv, MicB 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 autoimmunity.

MIMP 8004. Cellular and Molecular Pathobiology. (4 cr; QP–#Mdbc 5100, #Mdbc 5101 or [Mdbc 5100, #Mdbc 5101] [or Mdbc 5103, Mdbc 5104] [or #Cbn 5103, #Cbn 5104]; SP–8001 or Gcb 8132 or #; A-F only)
Fundamental concepts in cellular, molecular, and genetic basis of disease. Lecture topics range from molecular basis of inflammation and cancer metastasis to genetic basis for inherited disorders and gene therapy. Molecular mechanisms of pathogenesis.

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

MIMP 8006. Protein Sequence Analysis. (3 cr; QP–Biochem course and knowledge of UNIX operating system recommended; SP–Biochem course and 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.

MIMP 8007. Cell Biology and Biochemistry of the Extracellular Matrix. (3 cr; QP–Mdbc 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.

MIMP 8008. Mammalian Gene Transfer and Expression. (2 cr; SP–#)
Current gene transfer technology and applications of genetic modifications in animals, particularly transgenic animals and human gene therapy.

MIMP 8009. Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death. (2 cr; QP–Path 8109, undergrad biochem, cell bio; SP–8004 or #; Bioc 5021, 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.

MIMP 8094. Research in Microbiology, Immunology, and Molecular Pathobiology. (1-18 cr; SP–#; Grad MIMP major; S-N only)
To provide credit for first-year MIMP students for one-on-one research training from a faculty adviser during a laboratory rotation.

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

MIMP 8844. FTE: Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)

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

Middle Eastern Languages and Cultures (MELC)

Institute of Linguistics and Asian and Slavic Languages and Literatures
College of Liberal Arts

MELC 5311. Medieval Sages. (3 cr; SP–§CAS 5311; background in Iranian, Central Asian, or Islamic studies recommended)
Study and discussion of the intellectual life of the region from the rise of the Ghaznavids (A.D. 1000) to the fall of the Timurids (A.D. 1500). Ibn Sina (Avicenna), al-Biruni, al-Ghazali, Rumi, Sa’di, and Ferdowsi are among the sages whose lives are examined.

MELC 5526. Islam and Communism. (3 cr; SP–§CAS 5526)
Development of medieval Islamic culture in Transoxiana; formation of Sufi orders; rise and development of Communist ideology; introduction of socialist principles into Central Asia; clash of Islamic principles with Communist dicta; Pan-Islamism; Pan-Turkism.

MELC 5532. Russia and Central Asia. (3 cr; SP–§CAS 5532)
Rise and fall of the Mongol Empire, formation of the Chaghatai Khanate and the Golden Horde. Russian expansion into Central Asia and rivalry with Britain. Russia and the Central Asian republics during and after the Soviet period.

MELC 5601. Fiction of Iran and Central Asia. (3 cr; SP–§CAS 5601)
Social, political, and religious thought of Iranian and (Soviet) Central Asian writers of fiction since the early years of the 20th century, emphasizing themes of tradition, modernization (Westernization and Sovietization), women’s rights, and secularization.

MELC 5602. Persian Poetry. (3 cr; SP–§CAS 5602)
Major poetic works of Iran dealing with life at the medieval courts, Sufic poetry, and “new” poetry are studied. Rudaki, Khayyam, Rumi, Hafiz, Youshij, and Farrukhзад are among the poets whose works are examined.

MELC 5993. Directed Studies. (1-10 cr; SP–#, ¤, ✓)

MELC 5994. Directed Research. (1-10 cr; SP–#, ¤, ✓)
Molecular, Cellular, Developmental Biology and Genetics (MCDG)

Graduate School

MCDG 8008. Mammalian Gene Transfer and Expression. (2 cr; SP–#)
Current gene transfer technology and applications of genetic modifications in animals, particularly transgenic animals and human gene therapy.

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; 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; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

MCDG 8888. Thesis Credits: Doctoral. (1-18 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 Δ; S-N only)
Presentation and discussion of student thesis research.

MCDG 8910. Journal Presentations. (1 cr [max 2 cr]; SP–Grad MCDG major or Δ; 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 Δ)

MCDG 8950. Teaching Practicum. (1 cr [max 2 cr]; SP–Grad MCDG major or Δ; S-N only)
Supervised experience in classroom, laboratory, and/or recitation instruction; development of skills in effective use of instructional techniques, materials, tests, and measurements.

MCDG 8993. Directed Studies. (1-5 cr [max 15 cr]; SP–Grad MCDG major or Δ)

MCDG 8994. Research. (1-5 cr [max 10 cr]; SP–Grad MCDG major or Δ; S-N only)
Independent research determined by student’s interests, in consultation with faculty mentor.

Molecular Veterinary Biosciences (MVB)

Department of Veterinary Pathobiology
College of Veterinary Medicine

MVB 8100. Research Rotation in Molecular Veterinary Biosciences. (4 cr [max 8 cr]; SP–First-yr grad MVB major)
Directed research laboratory rotations required of first-year students. Laboratory experimentation, supplemental reading, and research presentations under guidance of faculty member who is potential thesis adviser.

MVB 8201. Mechanisms of Animal Health and Disease I. (3 cr; SP–#)
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 8202. Mechanisms of Animal Health and Disease II. (3 cr; SP–#; SP–Grad MVB major)
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. FTE: Master's. (1 cr; SP–Master's student, adviser and DGS consent)

MVB 8335. Molecular Biology Techniques. (3 cr; SP–Biol 5001, Biol 5003 or equiv or #)
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.

MVB 8351. Drug-Receptor Interactions. (2 cr; SP–Chem 1011-1012 or equiv, CVM 6055 or equiv, calculus through differential equations or #; A-F only)
Dynamics of interaction between drugs and their receptors. Historical development of drug-receptor theory, factors affecting drug concentration in receptor compartment, determination of agonist and antagonist activity, pharmacodynamics of recombinant receptors, and functional receptor classification.

MVB 8361. Neuro-Innate Interactions. (3 cr; SP–MicB 5219 or equiv, NSc 5111 or equiv)
Regulatory systems (neuroendocrine, cytokine, and autonomic nervous systems) linking brain and immune systems in brain-immune axis. Functional effects of bidirectional brain-immune regulation.

MVB 8394. Research in Comparative Biomedical Sciences. (1-8 cr [max 18 cr]; SP–Grad MVB major)
Directed research determined by student’s interests, in consultation with faculty mentor.

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

MVB 8494. Research in Molecular Mechanisms of Disease. (1-6 cr [max 18 cr]; SP–Grad MVB major)
Directed research determined by student’s interests, in consultation with faculty mentor.

MVB 8550. Molecular Veterinary Biosciences Seminar. (1 cr [max 8 cr]; SP–Biol sciences grad student; S-N only)
Student and faculty presentations of their own research or a directed topic.

MVB 8560. Research and Literature Reports. (1 cr [max 5 cr]; SP–Grad MVB major or #; S-N only)
Current developments in cellular and molecular mechanisms of animal health and disease.

MVB 8570. Food Animal Biotechnology Seminar. (1 cr [max 6 cr]; SP–Biol sciences grad student; S-N only)
Weekly seminar by outside speakers discussing current issues.

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

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

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

Music (Mus)

School of Music
College of Liberal Arts

Mus 5101. Piano Pedagogy I. (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 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, s or grad student; 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, s or grad student; 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 in 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.

MSt 5012. Museum Practices. (3 cr; QP–8010; SP–5011 or #; A-F only)
Practical aspects of museum work. Standards, practices, responsibilities, and issues, all set in greater museum context. Curatorial and educational duties, collections management, security, funding, boards, public relations, installation, and budgeting.

MSt 5020. Internship. (1-4 cr [max 32 cr]; SP–5011, 5012, Δ; S-N only)
Students arrange to perform a professional-level task in a museum of good standing under close supervision of a member of the museum’s professional staff. Instructor must approve a work plan and report.
Courses

Mus 5151. Organ Literature I. (3 cr; SP- 3502, 3603, or grad student 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, or grad student or #; A-F only)
Organ literature of J. S. Bach and 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 [max 4 cr]; SP-Accomp major; 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 concerti, 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. (1 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, Men’s Chorus, Concert Choir and Choral Union. Choruses participate in a variety of programs exploring both Western and non-Western repertoires 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)
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]; QP-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 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. (1 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 programming, 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 5280. Opera Theatre. (2 cr [max 16 cr]; SP-Audition, #; A-F only)

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 after 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 5310. Jazz Rhythm Section Techniques. (1 cr [max 8 cr]; SP-Audition, #; 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 of 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 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 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 orchestra 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)
Concentrated study of cello teaching methods. Provides students with the strategies for teaching cello privately, develops analytical skills, and increases knowledge of cello repertoire. Designed for practical application in conjunction with the string technique class.

Mus 5466. Guitar Pedagogy. (2 cr; 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, Iznaola, Dodgson, and Brindle.
Mus 5470. Woodwind Chamber Ensemble. (1 cr; max 8 cr; SP–Audition, #) 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 repertoire 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 student in music major #; A-F only) Principles of trumpet pedagogy. Discussion of literature, history, and current teaching aids.

Mus 5485. Transcription for Winds. (2 cr; SP–3502 or #; A-F only) 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 I. (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 student #; A-F only) Repertoire derived from orchestral and band literature for snare drum, timpani, mallet instruments, and various percussion techniques. 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 student #; A-F only) Repertoire derived from orchestral and band literature for snare drum, timpani, mallet instruments, and various percussion accessories. Major works of the 20th century written for solo percussion, percussion ensemble, and chamber groups of percussion and non-percussion instruments.

Mus 5501. Intensive Theory and Analysis of 20th-Century Music. (4 cr; SP–3502 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 procedures and 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. (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, Parcell, Buxtehude, Fischer, and Bach.

Mus 5542. Counterpoint II. (4 cr; SP–5541, #; A-F only) Advanced work in imitative 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; 3511 or grad student; #; 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–3561; 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–3501 or 3502; #; A-F only) Theory and analysis of tonal music using principles developed by Heinrich Schenker. Basic concepts, notation, and their application to excerpts and short pieces from the 18th and 19th centuries.

Mus 5572. Chromaticism in Tonal Music. (3 cr; SP–3502) Exploration of harmonic and tonal practices through analysis of selected repertoire, completion of written exercises (figured bass, harmonization of melodies, modal composition), ear-training, and keyboard exercises.

Mus 5591. Electronic Music: History, Literature, Principles. (3 cr; #; A-F only) In-depth survey of electroacoustic music repertoire from tape and analog music through computer-generated compositions. Basic principles of acoustics, electronic sound generation and manipulation, and digital signal processing techniques. Intro to programming languages useful for digital sound synthesis. Work with editing software and MIDI applications.

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. (2 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.

Mus 5644. Music in 20th-Century American Culture. (3 cr; SP–3603, 5501 or #; A-F only) Stylistic and cultural bases of cultivated and vernacular traditions and their interactions. Topics include folk and ethnic musics, ragtime, city blues and jazz, rock, musical theater, impact of technology, modernism, nationalism, new accessibility.

Mus 5647. 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 the 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 student or #; A-F only) A study of selected music traditions from 5 to 7 world cultures. Genres, social institutions, concepts, styles, instruments, and usage.

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, #; A-F only) Guided individual reading or study.

Mus 8110. Sonata Seminar. (2 cr; max 8 cr; SP–Accompanying emphasis, strings and winds by audition; #; A-F only) Performance in standard Baroque, Classical, and Romantic sonatas for piano and violin, cello, viola, flute, clarinet, or oboe.

Mus 8170. Advanced Vocal Accompanying Skills and Repertoire. (2 cr; max 8 cr; SP–[French, German, Italian diction], accompanying or DMA voice emphasis or MM voice emphasis by audition; #; A-F only) Advanced performance (Lieder, melodie, opera) emphasizing coaching techniques and performance skills of pianists and singers.

Mus 8237. Score Study: Choral. (3 cr; SP–#; A-F, #; A-F only) Analysis of various choral scores ranging from Renaissance through 20th century. Reading of choral and choral/orchestral scores at piano, including scores with C clefs and transposing instrument.

Mus 8255. Choral Literature: Baroque Era to the Present. (3 cr; SP–#; A-F only) Survey of sacred and secular choral works.

Mus 8299. Performance in Choral Conducting. (3 cr; SP–#; A-F only) Preparation and performance of choral conducting recital, with supporting paper.

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

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

Mus 8471. Wind Ensemble/Band Conducting I. (4 cr; SP–Wind conducting emphasis or #; A-F only) Seminar in wind band repertoire of 18th, 19th, and 20th centuries emphasizing stylistic and period practices; techniques of score study, analysis, and interpretation. Practical conducting experience.
Mus 8472. Wind Ensemble/Band Conducting II. (4 cr; SP—Wind conducting emphasis or #; A-F only) Seminar in study of small wind ensembles and Harmoniemusik tradition; rehearsal techniques and strategies. Music since 1960; contemporary notation systems, rehearsal techniques and strategies. Practical conducting experience.

Mus 8479. Performance and Document: Wind Ensemble/Band Conducting. (2 cr; SP—8472, #; A-F only) Preparing and performing full wind ensemble or band conducting program with supporting document.

Mus 8480. Orchestral Conducting. (4 cr [max 16 cr]; SP—#; A-F only) Seminar in orchestral conducting techniques, including work with diverse orchestral, operatic, choral, and dance repertoires of differing styles and periods; 17th century to present.

Mus 8489. Performance and Document: Orchestral Conducting. (3 cr; SP—#; A-F only) Preparing and performing full orchestral conducting program with supporting document.

Mus 8501. Music Theory Pedagogy. (3 cr; SP—Undergrad music degree or #; A-F only) Compositions of pedagogical philosophies/methods in music theory; examination of pedagogical literature; practice teaching; curriculum design.

Mus 8550. Composition. (3 cr [max 12 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 [max 12 cr]; SP—#; A-F only) Seminars on major theoretical text or group of interrelated textual, postonal, 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 jungle 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 résumé and grant writing and concert production.

Mus 8571. Composers’ Laboratory. (3 cr [max 12 cr]; SP—8570; 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 [max 12 cr]; SP—Grad music major who has completed all undergrad requirements in tonal theory and analysis; #; 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 I. (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: 18th Century. (3 cr [SP—8581 or #; A-F only]) Application of Schenkerian theory to 18th-century music, coordinated with critical study of major music treatises 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—Musicology or theory emphasis or #; A-F only) Topics vary; readings, research, strategies, and methods.

Mus 8644. Seminar: Advanced Research in Historical Musicology. (3 cr; SP—Undergrad music degree; #; 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—Musicology or theory emphasis or #; 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. Stemmatics, editorial judgment and method, presentation of text.

Mus 8651. Sonata Theory. (3 cr; SP—#; 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; SP—Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

Mus 8777. Thesis Credits: Master’s. (1-18 cr; SP—8666 or Max 18 cr per semester or summer; 10 cr total required [Plan A only])


Mus 8888. Thesis Credits: Doctoral. (1-18 cr; SP—Max 18 cr per semester or summer; 24 cr required)

Mus 8999. Recital Credits: Doctoral. (4 cr [max 20 cr]; SP—DMA student; #; A-F only) Registration for recital credits coincides with performance of D.M.A. recital (five recitals for 20 credits).
MusA 5302. Harpsichord—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5303. Organ—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5304. Voice—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5305. Violin—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5306. Viola—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5307. Celli—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5308. Double Bass—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5309. Flute—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5311. Oboe—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5312. Clarinet—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5313. Saxophone—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5314. Bassoon—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5315. French Horn—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5316. Trumpet—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5317. Trombone—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5318. Euphonium—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5319. Tuba—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5321. Percussion—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5322. Harp—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5323. Guitar—Major. [2-4 cr (max 16 cr); SP-Audition, A-F only] Private instruction.
MusA 5401. Piano—Secondary. [2-4 cr (max 24 cr); SP-Audition, A-F only] Private instruction.
MusA 5402. Harpsichord—Secondary. [2-4 cr (max 24 cr); SP-Audition, A-F only] Private instruction.
MusA 5403. Organ—Secondary. [2-4 cr (max 24 cr); SP-Audition, A-F only] Private instruction.
MusA 5405. Violin—Secondary. [2-4 cr (max 24 cr); SP-Audition, A-F only] Private instruction.
MusA 5406. Viola—Secondary. [2-4 cr (max 24 cr); SP-Audition, A-F only] Private instruction.
MusA 5407. Cello—Secondary. [2-4 cr (max 24 cr); SP-Audition, A-F only] Private instruction.
MusA 5409. Flute—Secondary. [2-4 cr (max 24 cr); SP-Audition, A-F only] Private instruction.
MusA 5411. Bassoon—Secondary. [2-4 cr (max 24 cr); SP-Audition, A-F only] Private instruction.
MusA 5413. Saxophone—Secondary. [2-4 cr (max 24 cr); SP-Audition, A-F only] Private instruction.
MusA 5414. Bassoon—Secondary. [2-4 cr (max 24 cr); SP-Audition, A-F only] Private instruction.
MusA 5416. Trumpet—Secondary. [2-4 cr (max 24 cr); SP-Audition, A-F only] Private instruction.
MusA 5417. Trombone—Secondary. [2-4 cr (max 24 cr); SP-Audition, A-F only] Private instruction.
MusA 5418. Baritone—Secondary. [2-4 cr (max 24 cr); SP-Audition, A-F only] Private instruction.
MusA 5419. Tuba—Secondary. [2-4 cr (max 24 cr); SP-Audition, A-F only] Private instruction.
MusA 5421. Percussion—Secondary. [2-4 cr (max 24 cr); SP-Audition, A-F only] Private instruction.
MusA 5422. Harp—Secondary. [2-4 cr (max 24 cr); SP-Audition, A-F only] Private instruction.
MusA 5423. Guitar—Secondary. [2-4 cr (max 24 cr); SP-Audition, A-F only] Private instruction.
MusA 8301. Piano—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8302. Harpsichord—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8303. Organ—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8304. Voice—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8305. Violin—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8306. Viola—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8307. Cello—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.

MusA 8308. Double Bass—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8309. Flute—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8311. Oboe—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8312. Clarinet—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8313. Saxophone—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8314. Bassoon—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8315. French Horn—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8316. Trumpet—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8317. Trombone—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8318. Euphonium—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8319. Tuba—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8321. Percussion—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8322. Harp—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8323. Guitar—Major. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.
MusA 8324. Accompanying/Coaching. [2-4 cr (max 48 cr); SP-Audition, A-F only] Private instruction.

Music Education (MuEd)

School of Music
College of Liberal Arts


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; uses of assessment and measurement in the classroom and in research.
Courses

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; choral 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 current 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 or music therapy major or grad student, #; 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--PhD 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 8323. FTE: Master's. (1 cr; SP--Master's student, advisor and DGS consent)

MuEd 8880. Master's Research Project. (1-5 cr; SP--Grad music ed major, #; A-F only)
Individual Plan B projects.

MuEd 8994. Directed Research. (1-8 cr [max 8 cr]; SP-- #; A-F only)

Natural Resources and Environmental Studies (NRES)

College of Natural Resources

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

NRES 5001. Colloquium: Perspectives on Treaty Rights. (2 cr [max 2 cr])
Readings and class discussion about the nature of treaty rights reserved by indigenous Americans with respect to utilization of natural resources. Special emphasis on Midwest issues. This Web-assisted course meets with 3001.

NRES 5002. Colloquium: Restoration of Aquatic Systems. (1 cr)
Key concepts and techniques in restoration, common factors of restoration projects, and threats to health of aquatic ecosystems. Meets with NRES 3002.

NRES 5021. Plant Resource Management and the Environment. (3 cr; QP--Grad student; SP--§3021; grad student)
World vegetation management practices, extent, and implications. Emphasis on forest management, agriculture, and agroforestry; historical, current, and prospective practices; environmental and societal implications.

NRES 5061. Water Quality: Management of a Natural Resource. (3 cr; QP--Grad student; SP--§3021; grad student)
Biophysical water quality in the context of today’s management concerns. Active learning approaches, and global and ecological perspectives toward understanding the management of surface and groundwater resources.

NRES 5202. Environmental Leadership and Ethics. (3 cr; QP--Grad student or #; SP--Grad student or #; A-F only)
Study of philosophy, art, science, and practice of leadership and its relationship to management and environmental ethics. Leadership models, traits, behaviors, style, and group process. Development of personal leadership philosophy.

NRES 5241. Natural Resource Policy and Administration. (3 cr; QP--ApEc 1101 or Econ 1101, grad student or #; SP--§3241; ApEc 1101 or Econ 1101; grad student or #)
Basic concepts of political and administrative processes important to natural resource policy and program development. Focus on policy process, participants in policy development and public programs. Use of case studies.

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

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

NRES 5575. Wetlands Conservation. (3 cr; QP--Sr or grad student or #; SP--§3575; sr or grad student or #)
Freshwater wetland classification, wetland biota, context and future status of wetlands, and the value of wetlands. National, regional, and Minnesota wetlands conservation strategies and the ecological principles used in wetland management are emphasized.

NRES 5703. Agroforestry: Role in Watershed Management. (2 cr; QP--Bio 1006 or Bio 1011; Chem 1001 or Chem 1051; SP--Bio 1009 or Bio 1011; Chem 1011 or Chem 1021)
Agroforestry practices, what they are, their intended purpose, and production and watershed protection benefits derived from such practices. Role of agroforestry in sustainable development. Agroforestry examples/case studies presented from North America and developing countries.

Neuroscience (NSc)

College of Biological Sciences

Nsc 5031. Perception. (3 cr; QP--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; QP--Psy 3031 or grad student or #; SP--Psy 3031 or #)
Analysis of the properties and biological bases of visual perception and visual perception. Topics include color vision, visual sensitivity and adaptation, nerve cells and circuits in the eye, structure and function of the visual brain.

Nsc 5037. Psychology of Hearing. (3-4 cr; QP--Psy 3031 or #; SP--Psy 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.

Nsc 5101. Itasca Summer Neurobiology Laboratory. (2 cr; A-F only)
Concepts in cellular neurosciences in lab environment for advanced undergraduates in the sciences. Basis of membrane properties including ionic and molecular mechanisms of resting, action, and synaptic potentials. State-of-the-art equipment and contemporary techniques used to examine experimental evidence.

Nsc 5111. Human Neuroscience. (4 cr; SP--#; A-F only)
Lecture and lab course surveying molecular, cellular, and systems neuroscience.

Nsc 5201. Computational Neuroscience I: Membranes and Channels. (3 cr; SP--Calculus through differential equations)
Comprehensive examination of membrane and ion channels using UNIX workstations to simulate their properties. Hodgkin-Huxley model, nonlinear dynamic systems, voltage- and ligand-gated ion channels, impulse propagation.
Courses

Nsc 5202. Computational Neuroscience II: Neural Systems and Information Processing. (3 cr; QP–Phsl/Nsc 5201 or equiv; understanding of UNIX; SP–Phsl/Nsc 5201 or equiv; understanding of UNIX) Comprehensive investigation of computational properties of single neurons and locally connected cell networks. Linear cable theory; compartmental modeling of single neuron properties; spatio-temporal interactions between synaptic inputs and neuronal dendritic trees; computational properties of passive and active dendritic spines and spine clusters; quantitative interpretation of whole-cell voltage-clamp data; and dynamics of locally connected cell networks.

Nsc 5461. Cellular and Molecular Neuroscience. (4 cr; SP–#) A contemporary cellular and molecular approach to the study of the nervous system. Includes problem sets designed to teach important physiological concepts and discussion of original research papers. Required for first-year Neuroscience students and appropriate for other graduate students.

Nsc 5462. Neuroscience Principles of Drug Abuse. (2 cr; QP–#; $#–#) Current research on drugs of abuse; their mechanisms of action, characteristics shared by various agents, and neural systems affected by them.

Nsc 5481. Invertebrate Neurobiology. (2 cr; SP–Ent 5480) Fundamental principles and concepts underlying cellular bases of behavior and “systems” neuroscience. Particular invertebrate preparations discussed.

Nsc 5551. Itasca Cell and Molecular Neurobiology Laboratory. (4 cr; SP–Neuroscience grad student or #; A-F only) Intensive lab introduction to cellular and molecular aspects of research techniques in contemporary neurobiology; held at Itasca Biological Station. Electrophysiological investigations of neuronal properties, neuropharmacological assays of transmitter action, and immunohistochemical studies in experimental preparations.

Nsc 5661. Behavioral Neuroscience. (3 cr; QP–Nsc major or minor or #; SP–Nsc major or minor or #; A-F only) The neural coding and representation of movement parameters, and the neural mechanisms underlying higher order processes such as memorization, memory scanning, and mental rotation. Emphasis on experimental psychological studies in human subjects, single cell recording experiments in subprimate and artificial neural network modeling.

Nsc 8026. Neuro-Immune Interactions. (3 cr; SP–S111 or equiv, Micb 5218 or equiv) Regulatory systems (neuroendocrine, cytokine, and autonomic nervous systems) linking brain and immune systems in brain-immune axis. Functional effects of bidirectional brain-immune regulation.


Nsc 8037. Psychophysics and Audition. (3 cr; SP–Grad major or #) Modern and classical psychophysics. Psychophysical and physiological correlates of audition. Theories of hearing.

Nsc 8124. Recent Advances in Chemoreception Science. (1 cr; SP–#) Current issues addressed comparatively through directed reading and discussion of current literature. Primarily for advanced students studying neural basis of taste, smell, and the common chemical sense. All aspects of chemoreception from molecular biology to behavior.

Nsc 8207. Seminar: Psychopharmacology. (1 cr; SP–#; S-N only) Faculty and postdoctoral fellows interested in psychotrophic drugs and chemicals participate. Some seminars devoted to biomedical ethics. Neurochemistry, pharmacology, and behavior as antecedent or consequential variables.


Nsc 8216. Selected Topics in Autonomic and Neuroendocrine Regulation. (1 cr; QP–#; CBN 5111; Phsl 5112 or equiv or #; SP–16002 or #) Advanced seminar dealing with selected topics in autonomic and neuroendocrine regulation.

Nsc 8217. Systems and Computational Neuroscience. (2 cr; SP–CBN 5111 or #; S-N only) Advanced seminar.

Nsc 8221. Neurobiology of Pain and Analgesia. (2 cr; SP–#) Neuropathic pain, pain processing, and pain modulation.

Nsc 8222. Central Regulation of Autonomic Function. (3 cr; SP–CBN 5111; A-F only) Neural and hormonal sensory pathways affecting central autonomic nuclei involved in maintenance of homeostasis. Current research on physiological control systems at cellular, organ, and integrative levels.


Nsc 8248. Directed Readings in Auditory Physiology. (1-2 cr; SP–#) Current research on biophysics and physiology of auditory system; topics selected for each student. Written reviews prepared and discussed.

Nsc 8320. Readings in Neurobiology. (1-4 cr [max 4 cr]; SP–#) Topics in neurobiology and neurophysiology.

Nsc 8334. Laboratory Neuroscience. (1-3 cr [max 10 cr]; SP–Grad Nsc major; S-N only) Guided research.

Nsc 8401. Neurobiology of Disease. (2 cr; SP–S461, CBN 5111 or #) Major neurological diseases; pathogenic mechanisms; potential applications of basic neuroscience to human disease.

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

Nsc 8451. Teaching in Neuroscience. (1 cr [max 4 cr]; SP–#; S-N only) Practical teaching course. Graduate students serve as primary instructors for Nsc 5150 and work with fellow students and faculty mentors to design curriculum, classroom sessions, exams, and course evaluations.

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

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

Nurs 5170. Research Topics. (1-16 cr [max 16 cr]; QP–#; SP–#) Exploration of research topic to meet individual student needs.

Nurs 5171. SPSS Programming and Data Analysis. (2 cr; QP–Inferential statistics, grad or professional student, #for undergrads; SP–Inferential statistics, grad or professional student, #for undergrads) Focus on skills needed to properly collect and analyze data using SPSS for Windows. While learning the basic skills for analysis, statistics are reviewed to ensure appropriate analysis and correct interpretation of output.

Nurs 5200. Holistic Health Assessment and Therapeutics for Advanced Practice Nurses. (3 cr; SP–Admission to advanced practice nursing or #) Health assessment knowledge and skills for advanced nursing practice with patients across the age span, including pregnancy. Selection of nursing interventions and complementary therapies are examined for their application to specific populations and illnesses.

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

Nurs 5222. Advanced Physiology. (3 cr; SP–Grad in nurse practitioner or midwifery, #for undergrads) Systems approach to human physiology and pathophysiology to focus on physiologic changes across the life span. Emphasis on 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 student or #) Advanced concepts from nursing theory and research, social and cultural, neuropsychiatry, and psychopathology 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 student, #; SP–Grad student, #) 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 student or #) Advanced concepts in neuroscience, psychopharmacology, and clinical management related to psychopharmacologic treatment of psychiatric disorders and symptoms. Current scientific knowledge of psychopharmacology and its application to patients seen in a variety of clinical settings.

Nurs 5300. Health Behavior Intervention: Theory and Application. (3 cr; SP–Grad student 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 student or #) Theoretical concepts and research findings from the areas of group therapy and dynamics are applied in the development of a model 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 profession, professional organization including certification, legislation, ethical dimensions, public policy, and clinical practice issues.

Nurs 5520. Women’s Issues: A Health Perspective. (3 cr; SP–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, historical, sociocultural, feminist, nursing and medical. Topics include health promotion and reproductive health issues across the life span.
Courses

Nurs 5601. School Nursing in the Educational System and the Community. (3 cr; QP – SP – nurs grad student or RN; SP – Nurs grad student or RN; SP – CPsy 5303 or equiv or #) Development of one-on-one health assessment and intervention strategies appropriate for working with teenagers. Integrate 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; 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 5802. Spirituality and Nursing Practice. (2 cr; QP – For undergrad cr: nurs cr or RN; for grad cr: RN with baccalaureate; SP – For undergrad cr: nurs cr 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 grad student RN – 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 5810. 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 5810. Developing Nursing Knowledge. (2 cr; SP – Nurs PhD student or # S-N only) Philosophical perspectives and research methodologies for developing nursing knowledge.

Nurs 5812. 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 5813. Theory Development in Nursing. (3 cr; QP – 8110; SP – 8100 or equiv, 8112 or # S-N only) Strategies for theory development; synthesis of theoretical formulations in nursing using selected inductive and deductive theory development strategies.

Nurs 5810. Phenomenon of Health. (3 cr; SP – Grad nurs major, #) Prevailing and emerging views of health from different belief systems and methods of inquiry. Philosophical, theoretical, and methodological implications for development of a nursing paradigm based on evolving perspectives of “humanism.”

Nurs 5812. 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 – 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 – 8010; 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 health care. Applies family health theories to selected phenomena of interest in health care.

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 Science. (3 cr; QP – 8011 or equiv; SP – Grad nurs major, 8140 or #) Interactions among research and theory in moral judgment and behavior, applied ethics, and nursing.

Nurs 8170. Research in Nursing. (3 cr; QP – Inferential course; SP – Descriptive and inferential course within past 2 yrs) Research process and methods appropriate for research problems relevant to nursing. Critique of research studies and proposed development are primary methods for developing knowledge and skills necessary to understand the research process.

Nurs 8171. Qualitative Research in Nursing and Health Care. (3-4 cr; SP – 8170, 8100 or equiv grad theory and research courses or #) Characteristics of key qualitative research methods and nature of knowledge generated. Relevance to health care and development 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 8xxx grad methods course, 2 grad stat 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 test, comp sci course; SP – 8170 or equiv, advanced inferential and nonparametric test, 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 – Research course, # SP – Grad research course) Selected conceptual models of decision making. Related studies concerning decision making about health care. Research proposals formulated to investigate decision making about health care by health-care professionals, health-care policy makers, patients/clients, and/or families.

Nurs 8187. Advanced Nursing Research Practicum. (1-4 cr; SP – Nurs PhD 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 – 8520, 8114 or equiv; SP – 8124, 8114 or equiv or #) Conceptual and methodological approaches in study of family health phenomena from nursing perspective. Research designs formulated to study questions in this area.

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; S-N only) Individual study of a nursing problem or phenomenon. For Plan B projects, student must register S-N.

Nurs 8240. Professional Issues for Advanced Practice Nursing Roles. (3 cr; QP – Admission to advanced practice area of study or #) Most relevant current professional and health-care issues affecting advanced practice nursing roles, including interdisciplinary team function, reimbursement, certification, and scope of advanced nursing practice.

Nurs 8241. Health Care Leadership for a Changing World. (3 cr; SP – 1st year graduate nursing students or #) Application of leadership theory and research to strengthen students’ capacity to positively change the health-care delivery system.

Nurs 8242. Population-Based Health Care. (3 cr; SP – Grad nurs major or #) Epidemiological principles of population-based health care. Health-care delivery systems, principles of individual-focused health promotion and prevention, cultural sensitivity, case management, interdisciplinary models of care. Overview of health planning process as applied to populations.


Nurs 8301. Oncology Clinical I. (3 cr; QP – 5954 or 5954, 5953, SP – 8300, grad nurs major, Minnesota RN lic) 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. Theories of Acute Health Needs and Care: Metabolic and Sensory Processes (3 cr; SP–5200, 5224, 8120, 8170, course in advanced physiology or pathophysiology or immunobiology) Evaluate responses to acute symptoms or disruptions in adult metabolism and research to support clinical decision making within the context of the health experience is explored for metabolic, alimentary, and sensory phenomena.

Nurs 8305. Research-based Clinical Reasoning and Management in Acute/Critical Care II. (1-3 cr; SP–5200, 5224, 8101, 8170, course in advanced physiology or pathophysiology or immunobiology) Synthesis and utilization of knowledge and research in care of adults with acute/critical illness. Advanced clinical decision making and management of responses to acute alterations in metabolic, alimentary, and sensory functions using a multidimensional and systematic approach.

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 #; grad nurs major, Minnesota RN lic) 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 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 majors; core courses, #; A-F only) Exploration of functional patterns of health, and evaluation of theories/research as related to physiological, psychological, and social functions 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, psychosocial, and pharmaceutical interventions. Age-related, cultural, family and community variations will be incorporated into the analysis, implementation, and evaluation of interventions.

Nurs 8323. Advanced Nursing Care of the Elderly II: For Nurse Practitioners. (5-8 cr; QP–5945, 5944, #; SP–5322, 8000 advanced gerontological nurs course, #; SP–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 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, 8012; SP–5200, 5224, 8125, 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, #; 8240, #) 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 health-care settings.

Nurs 8360. Advanced Clinical Nursing. (1-5 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.

Nurs 8402. Primary Care: Assessment and Management of Health for Advanced Practice Nurses. (2-8 cr; QP–5810, 5933; SP–Admission to advanced pract nurs area of study, 5200, 5224, 8140, courses in holistic health assessment and therapeutics for advanced pract nurs; pharmacotherapeutics, pathophysiology, structure 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 8420. Childbearing-Childrearing Family Nursing. (4 cr; QP–8010, 8011; SP–8100, 8150; grad nurs major or #) Maintenance, promotion, and restoration of health for clients in the childbearing-childrearing family. Theories and concepts related to parents, children, and families. Practicum includes conferences, written assignments, and use of grounded theory methods of investigation.

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

Nurs 8450. Primary Care: Health Assessment and Care of Well Children. (3 cr; SP–5200, 5224, 8451) Study of age-specific and family-centered assessment, prevention, and health promotion nursing interventions for infants through adolescents. Emphasis on theories and concepts related to comprehensive health supervision. Stresses the use of critical thinking for clinical decision making to implement and evaluate advanced practice nursing interventions.

Nurs 8451. Primary Care Practicum: Health Assessment and Care of Well Children. (3 cr; SP–5810, #; SP–5200, #) Focus on age-specific, family-centered nursing assessment and interventions to promote wellness of children, infants through adolescence. Emphasis on compiling and evaluating advanced nursing interventions for disease prevention and health promotion of children and families. Practicum includes exposure to models of primary prevention.

Nurs 8452. Primary Care:Common Acute Health Conditions Affecting Children. (2 cr; QP–5923, 5924, #; 5923, #; SP–8501, 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, SP–8411, 8442, #; 8452, #) Focus on age-specific, family-centered nursing assessment and intervention of minor acute and chronic conditions of children within family context. Emphasis on nursing intervention strategies include 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–5923, 5926; SP–8452, 8453) Research-based knowledge synthesis to effectively intervene with common pediatric physical and psychosocial alterations 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 health-care needs, emphasizing growth and development, pathophysiology, specific conditions, and holistic, family-centered, community-based, culturally competent, and coordinated approach to assessment and intervention.


Nurs 8457. Assessment and Intervention Models in Families of Children With Special Health-Care Needs. (4 cr; QP–5917, 5920, #; SP–8214 or equiv; 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 families of functioning in families of children with complex health care needs.


Nurs 8502. Reproductive Health Care for Women at Risk. (2-8 cr; QP–Physiology course; SP–1850 or 8520) Theoretical and research-based practice of advanced practice nursing care of women and infants at risk for medical and/or psychosocial problems. Selected high-risk perinatal and complicated gynecological and neonatal conditions.

Nurs 8503. Nurse-Midwifery Care of the Childbearing Family. (3-8 cr; QP–5834, 8030; SP–1850, A-F only) Theoretical and research-based nurse-midwifery intrapartum care, management, and support of women and their families. Labor, birth, immediate postpartum period, and newborn care. Development and implementation of nurse-midwifery care draws from research providing basis for practice.
Courses

Nurs 8520. Advanced Concepts in Women's Health for the Nurse Practitioner. (3-8 cr; [SP-]5834, 8030; SP-1, 8501, A-F only) Theoretical and research basis for women's health-care 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. (3 cr; SP- Grad nurs major or nurse grad student) Foundations emphasizing conceptual frameworks for advanced practice. Application of research and advanced public health nursing management concepts.

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, and research 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 Interventions 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; SP- Max 18 cr per semester or summer; doctoral student who has not passed preterm oral) Nurs 8701. Nursing and Health-Care Systems Administration I. (4 cr; [SP-] 8030, A-F only) Intensive study of nursing and health-care administration and leadership. Application of nursing, organization, care delivery, and population health improvement theories to health 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, A-F only) Intensive development of competencies associated with skilled administration of health-care services. Application of organization, nursing, political, and economic theories to organizationalizing and evaluating administrative and leadership practice of nurses in health-care delivery systems.

Nurs 8720. Teaching and Learning Nursing. (3 cr; [QP]- 8010, 8011, 8012, EpHy 5112 or EpHy 5114 or EpHy 5115 or Psy 5012 or Psy 5013 or Psy 5014 or Psy 5015; SP-5200, 8100, 8140) Theories of curriculum, teaching, learning, and nursing used to develop conceptual framework for teaching nursing that is then used as the model for teaching nurses in simulated classroom situations.

Nurs 8721. The Nurse Educator in Higher Education. (4 cr; [QP]- 8720, educational measurement class [e.g. EpHy 5202 or 5221] 8241, 8242, 8720, educational measurement course, nurs PhD student) Teaching practice, 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; 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-] 5900, 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.

Nurs 8888. Thesis Credits: Doctoral. (1-18 cr; SP- Max 18 cr per semester or summer; 24 cr total required)

Nutrition (Nutr)
Graduate School

Nutr 8333. FTE: Master's. (1 cr; SP- Master's student, adviser and DGs consent)

Nutr 8344. FTE: Doctoral. (1 cr; SP- Doctoral student, adviser and DGs consent)

Nutr 8610. Nutrition Graduate Seminar. (1 cr; SP- Grad nutr major; S-N only) Presentation of thesis (M.S. or Ph.D.) or plan B project work in a public seminar.

Nutr 8612. Advances in Nutrition: Diet and Chronic Disease. (2 cr; [max 4 cr; SP- Grad student in nutr or related field) Recent research on relationship of diet to development and treatment of chronic diseases, including cancer, diabetes, and osteoporosis. Clinical, animal, and cell culture studies examined epidemiologically, as appropriate. Instructor varies with topic.

Nutr 8613. Advances in Nutrition: Lipoproteins, Cholesterol, and Atherosclerosis. (2 cr; SP- Grad student in nutr 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 nutr 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 nutr 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 nutr or related field) Free radical chemistry, cellular biology, and micronutrient nutrition considered in roles of oxidants and antioxidants in human diseases and aging. Current understanding of biological action of free radicals and roles of micronutrients in antioxidant protection in humans and animals.

Nutr 8620. Advances in Nutrition. (2 cr; max 6 cr; SP- Grad student in nutr or related field) Recent research or special topics not covered by other nutrition special topics courses (e.g., obesity, vitamin biochemistry, nutrition education). Topics vary with instructor and student interest.

Nutr 8621. Presentation Skills. (1 cr; SP- New grad nutr major; S-N only) Orientation to nutrition graduate program and training in presenting scientific seminars, including use of electronic presentation programs and equipment.

Nutr 8666. Doctoral Pre-Thesis Credits. (1-18 cr; SP- Max 18 cr per semester or summer; doctoral student who has not passed preterm oral) Nutr 8888. Thesis Credits: Doctoral. (1-18 cr; SP- Max 18 cr per semester or summer; 24 cr required)

Nutr 8900. Advancement in Nutrition: Advanced Lifestyle Nutrition. (2 cr; SP- Grad student in nutr or related field) 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.

Oriental 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; 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

Curts 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 environment. Simulation models and animations demonstrating actual operation of models. Planning, analysis, and interpretation of simulation experiment results.

OMS 5851. Experimental Design. (4 cr; SP- 8650 or MBA 8120 or equiv; SP- MBA 6120 or equiv or business admin PhD student or 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. (4 cr; SP- MBA 8120 or equiv; SP- MBA 6120 or equiv; business admin PhD student or 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. (4 cr; SP- 5160 or equiv; SP- Business admin PhD 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. (4 cr; SP- Business admin PhD student or A-F only) A treatment of underlying probabilistic and statistical aspects of computer simulation. Random number generators, variance and process generation, statistical analysis of simulation output, ranking and selection of simulation models, and variance reduction techniques.
Courses

Otolaryngology (Otol)

Department of Otolaryngology

Otol 5101. Introduction to the Basic Sciences in Otolaryngology I: Ear. (2 cr; SP–Otol major or #)

Multidisciplinary introduction to the basic sciences of the ear. Acoustics and psychoacoustics, temporal bone anatomy, external and middle ear mechanisms, cochlear physiology, auditory neurophysiology, ear embryology, ear biochemistry, immunology, fine structures, vestibular mechanisms and measurement. S–N grading option for nonmajors only.

Otol 5102. Introduction to the Basic Sciences in Otolaryngology II: Head and Neck. (2 cr; SP–Otol major or #)

Multidisciplinary introduction to the basic sciences of the head and neck. Laryngeal anatomy and physiology, nasal anatomy and physiology, immune biology, embryology of head and neck. S–N grading option for nonmajors only.

Otol 5993. Directed Studies. (1–12 cr [max 12 cr]; SP–)

Directed readings and preparation of reports on selected topics.

Otol 8230. Clinical Otorhinolaryngology. (4 cr; SP–Grad otol major; A–F only)

Diagnostic and management instruction and experience in all phases of clinical otorhinolaryngology. Both inpatient and outpatient services are provided at Fairview-University Medical Center, St. Paul Ramsey Medical Center, Veterans Administration Medical Center, and Hennepin County Medical Center. Clinical practicums 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 otorhinolaryngology provided at Fairview-University Medical Center, St. Paul Ramsey Medical Center, Veterans Administration Medical Center, and Hennepin County Medical Center. Clinical practicums and weekly special group conferences.

Otol 8232. Maxillofacial Surgery. (1 cr; SP–Grad otol major; A–F only)

Basic science and management principles of maxillofacial diseases. Problems of maxillofacial trauma. Experience with these problems in the hospitals of the training program, especially the county hospitals.

Otol 8233. Plastic and Reconstructive Surgery: Head and Neck. (1 cr; SP–Otol major; A–F only)

Otolaryngologic cosmetic surgery emphasizing rhinoplasty and otoplasty.

Otol 8234. Anatomy of the Head and Neck and Temporal Bone Dissection. (2 cr; SP–Grad otol major or #)

Head and neck anatomy studied from cadaver through programmed learning. Temporal bones dissected to learn anatomy and to practice otologic surgical procedures. S–N for nonmajors only.

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 project.

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 immunology; plaque formation, composition, metabolism, and clinical control; biochemistry of connective tissues; biochemistry and physiology of oral mucosal tissues 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 relating 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 masticatory 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 #)

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 synthesis; salivary and salivary gland disease activity; role of IgA 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 such effects? 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)

Biochemical 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; SP–M–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

OBio 8888. Thesis Credits: Doctoral. (1–18 cr; SP–M–Max 18 cr per semester or summer; 24 cr required)

OBio 8777. Thesis Credits: Masters. (1–18 cr; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

OBio 8888. Thesis Credits: Doctoral. (1–18 cr; SP–M–Max 18 cr per semester or summer; 24 cr required)
Otol 8235. Roentgenology of the Head and Neck. (1 cr; SP-Grad otol major; A-F only) Principles and procedures in roentgenology for otolaryngologic and head and neck problems.

Otol 8236. Pharmacology in Otolaryngology. (1 cr; SP-Grad otol major; A-F only) Principles of pharmacology as they relate to otolaryngology.

Otol 8237. Endoscopy. (1 cr; SP-Grad otol major; A-F only) Didactic and practical instruction in laryngoscopy, esophagoscopy, bronchoscopy, and mediastinoscopy. General management principles emphasized.

Otol 8238. Pathology of the Ear, Nose, and Throat. (1 cr; SP-Grad otol major; A-F only) Gross cross histopathology of diseases of the ear, nose, throat, and related regions.

Otol 8239. Otoeurology. (1-2 cr; SP-Grad otol major or #) Instruction and experience in diagnosis and management of otoneurologic problems, including training in electroystagmographic analysis of vestibular function.

Otol 8240. Allergy. (1 cr; SP-Grad otol major; A-F only) Concepts and management of otolaryngologic allergy.

Otol 8241. Cancer of the Head and Neck. (1 cr; SP-Grad otol major; A-F only) Clinical head and neck oncology; etiology, treatment (both surgical and nonsurgical), and other principles of management.

Otol 8242. Audiology and Speech Pathology. (2 cr; SP-Grad otol major or #) Clinical audiology and speech-language pathology, including diagnosis and treatment of conductive, sensorineural, and central hearing loss; voice disorders; swallowing disorders; velopharyngeal insufficiency related to cleft lip/palate and craniofacial anomalies; alaryngeal speech; and speech disorders related to head and neck cancer.

Otol 8243. Introduction to Research Methodology. (1 cr; SP-Grad otol major or #) Statistical methods, experimental design, and execution of otolaryngologic research. Ethics of research with human and animal subjects.

Otol 8244. Seminar: Current Literature. (1 cr; SP-Grad otol major or #) Presentation and discussion of selected articles. Required for all otolaryngology graduate students.

Otol 8247. Anatomy and Physiology of Hearing and Balance. (3 cr; SP-#) Structure and function of auditory and vestibular systems. Network analysis of middle and inner ear mechanics, hair cell biophysics, auditory nerve and CNS electrophysiology, information processing, neural mechanisms subserving balance and gaze, cellular morphology, and computer models.

Otol 8248. Directed Readings in Auditory Physiology. (1-2 cr; SP-#) Current research on biophysics and physiology of auditory system; topics selected for each student. Written reviews prepared and discussed.

Otol 8249. Current Topics in Cochlear Anatomy. (1 cr; SP-#) Review of current research papers concerning cochlear anatomy and pathology.

Otol 8250. Advanced Biochemistry of the Auditory System. (1 cr; SP-MdSc 6100, MdSc 6101 or equiv or #) Review of recent progress in biochemical aspects of auditory end organs.

Otol 8262. Advanced Clinical Audiology. (2 cr [max 2 cr]; SP-Grad otol major; 8242 or #) Comprehensive reading and practicum in auditory evaluation of patients. Assumes basic knowledge of clinical audiology. Each session devoted to aspect of auditory evaluation or aural rehabilitation, including behavioral audiometry, electrophysiologic evaluation, hearing aid selection, and cochlear implants.

Otol 8333. FTE: Master’s. (1 cr; SP-Master’s student, adviser and DGS consent) Otol 8444. FTE: Doctoral. (1 cr; SP-Doctoral student, adviser and DGS consent)

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

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

Otol 8888. Thesis Credits: Doctoral. (1-18 cr; SP-Max 18 cr per semester or summer; 24 cr required)

Pharmaceuticals (Phm)

Phm 8100. Seminar: Pharmaceutics. (1 cr [max 4 cr]; SP-Grad Phm major; S-N only)

Phm 8110. Readings in Pharmaceutics. (1 cr [max 4 cr]; SP-Grad Phm major; S-N only) Current literature.

Phm 8150. Pharmacokinetics Research Seminar. (1 cr; SP-Max 12 cr; SP-Grad Phm major; S-N only) Current concepts and literature review.

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 chemical course survey; SP-Physical and organic chemical course surveys) Application of physicochemical principles (e.g., chemical kinetics) to elucidate and minimize stability problems in pharmaceutical systems.

Phm 8421. Advanced Pharmacokinetics. (4 cr; SP-#; A-F only) Topics in kinetics of drug absorption, distribution, metabolism, and excretion.

Phm 8441. Solid-State Properties of Drugs. (2 cr; SP-Physical chemical survey course; SP-Physical chemical survey course or #; A-F only) Physical and physicochemical properties of drugs in solid state as related to drug delivery.

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

Phm 8511. Industrial Pharmacy. (2 cr; SP-#) Design, manufacture, and evaluation of modern pharmaceutical dosage forms and delivery. Preformulation studies; oral liquid and solid pharmaceutical dosage forms and optimization. Pulmonary, transdermal, and parenteral deliveries, including veterinary drug delivery systems.

Phm 8641. Solubility Behavior of Drugs and Other Organic Compounds. (3 cr; SP-QP-Physical chemical survey course; SP-Physical chemical survey course or #; A-F only) Thermodynamics and kinetics of solubility and partitioning. Intermolecular interactions in pure state and in solution. Measurement and prediction of solubility and partitioning behavior. Functional group contributions. Molecular complexation and ion-pairing in solution.

Phm 8711. Biological Approaches to Drug Targeting and Mechanisms of Drug Transport. (1-4 cr; SP-QP-Survey courses in biochem, physical chem, cell biol, differential equations; SP-Survey courses in biochem, physical chem, cell biol, differential equations; A-F only) Characteristics of drug absorption with physiology and properties of drugs. Concept of drug targeting. Thermo-statistical basis of site-specific drug delivery systems. Therapeutic applications and critical evaluation of major drug carrier systems.

Phm 8999. Thesis Credits: Doctoral. (1-18 cr; SP-Max 18 cr per semester or summer; 24 cr required)

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. (1-18 cr; SP-Max 18 cr per semester or summer; 24 cr required)

Pharmacology (Phcl)

Phcl 5109. Problems in Pharmacology. (1-18 cr; SP-Upper div or grad student or #; SP-Upper div or grad student or #) Research projects and special problems by arrangement.

Phcl 5462. Neuropsychopharmacology of Abused Drugs. (3 cr; SP-Psych 5208; Phcl 6112, Psy 5062 or #) Principles of pharmacology and methodologies used to study relationships between drugs and biochemical, behavioral, and neurophysiological variables. Functional biogenic amine, peptidergic and other pathways; and theories of tolerance and/or dependence on stimulants, hallucinogens, depressants, and opiates.

Phcl 8110. Advanced Pharmacology I. (3 cr; SP-Biochem and physiology background, 6110 or 6111 or #; A-F only) Supplement to Phcl 6110 and 6111. Contemporary research concepts and experimental approaches in the different areas of investigative pharmacology. Mechanisms of action of drugs on systems (whole animal), organ, and cellular levels.

Phcl 8111. Advanced Pharmacology II. (3 cr; SP-Biochem and physiolgy background, 6110 or 6111 or #; A-F only) Supplement to Phcl 6110 and 6112. Contemporary research concepts and experimental approaches in the different areas of investigative pharmacology. Mechanisms of action of drugs on cellular and molecular levels.

Phcl 8200. Seminar: Selected Topics in Pharmacology. (1 cr [max 8 cr]; SP-6112 or #) Student-presented seminars.

Phcl 8207. Seminar: Psychopharmacology. (1 cr; SP-#; S-N only) For graduate students and postdoctorals interested in studies and research associated with psychotropic drugs and chemicals. Neurochemistry, pharmacology, and behavior as antecedent or consequential variables. Some seminars devoted to biomedical ethics.

Phcl 8217. Problems in Investigative Pharmacology. (1 cr; SP-#; S-N only) Presentation and discussion of contemporary research problems, investigative approaches, and methodologies in experimental pharmacology. Related to cardiovascular, renal, endocrine, and autonomic pharmacology; neuropharmacology; psychopharmacology; chemotherapy; toxicology; and molecular pharmacology.

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

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

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)
Philosophy (Phil)
Department of Philosophy
College of Liberal Arts

Phil 5201. Symbolic Logic I. (4 cr; SP-1001 or #)
Study of syntax and semantics of sentential and first-order logic. Symbolization of natural-language sentences and arguments. Development of deductive systems for first-order logic: Metathematic proofs and methods, including proof by mathematical induction and proof of consistency and completeness.

Phil 5202. Symbolic Logic II. (4 cr; SP-5201 or #)
Elements of set theory, including the concepts of enumerability and nonenumerability. Turing machines and recursive functions; the results of Church, Gödel, and Tarski and the philosophical significance of those results.

Phil 5211. Modal Logic. (3 cr; SP-5201 or #)
Axiomatic and semantic treatment of propositional and predicate modal logics; problems of interpreting modal languages.

Phil 5221. Philosophy of Logic. (3 cr)
Attempts to answer the question, “What is logic?” Topics include the scope of logic; disputes about alternative logics; various theories concerning the nature of logical truth (e.g., conventionalism, the view that logical truths are contingent).

Phil 5222. Philosophy of Mathematics. (3 cr; SP-5202 or Sxxx math course)
Major philosophical questions arising in connection with mathematics: What is mathematics about? How do we know the mathematics we do? What is the relation between mathematics and the natural sciences. Selected readings of leading contributors such as Frege, Dedekind, Russell, Hilbert, Brunner, Gödel, and Quine.

Phil 5325. Biomedical Ethics. (3 cr; SP- # 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)
Problems of interpretation in ordinary (nonrelativistic) 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 philosophy or #)
Philosophical problems on contemporary interest. Topics specified in Class Schedule.

Phil 5993. Directed Studies. (1-3 cr; SP- #, A, D)
Guided individual reading or study.

Phil 8010. Workshop in Epistemology and Metaphysics. (1 cr; SP- 4xxx epistemology or metaphysics course, #)
Phil 8100. Workshop in Epistemology and Metaphysics. (3 cr; SP- 4101 or #)
Topics specified in Class Schedule.

Phil 8130. Seminar: Epistemology. (3 cr; SP- 4105 or #)
Problems in the theory of knowledge. Topics specified in Class Schedule.

Phil 8131. Epistemology Survey. (3 cr)
Phil 8180. Seminar: Philosophy of Language. (3 cr; SP- 4231 or #)
Topics specified in Class Schedule.

Phil 8200. Workshop in Logic and Philosophy of Mathematics. (1 cr; SP- [4xxx or 5xxx course in logic or phi 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 significance of Inuitive metatheorems (Gödel, et al.), assessment of major foundational programs (set theoretic, modern Hilbertian, constructivist), modal and structuralist alternatives to standard Platonism.

Phil 8300. Workshop in Moral and Political Philosophy. (1 cr; SP- [4xxx moral or political 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, maternal/fetal 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 advanced political science, history, or sociology majors or minors.

Phil 8420. Seminar: Political Philosophy. (3 cr; SP- 4414 or 4421 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- 4521 or #)
Topics specified in Class Schedule.

Phil 8600. Workshop in the Philosophy of Science. (1 cr; SP- [4xxx or 5xxx phil of sci course], #)
Phil 8601. Seminar: Scientific Inquiry. (3 cr; SP- #)
Philosophical theories of the nature 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- #)
Contemporary issues concerning representation and explanation of scientific facts.

Phil 8605. Seminar: History of the Philosophy of Science. (3 cr; SP- #)
History of 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- #)
Aims and goals of medicine; concepts of health, illness, and disease; nature of reasoning in clinical medicine; theoretical evolution in medicine; and role of values in practice of medicine and health care.

Phil 8610. Seminar: Philosophy of the Physical Sciences. (3 cr; SP- #)
Topics specified in Class Schedule.

Phil 8620. Seminar: Philosophy of the Biological Sciences. (3 cr; SP- #)
Topics specified in Class Schedule.

Phil 8640. Seminar: Philosophy of the Cognitive Sciences. (3 cr; SP- #)
Phil 8660. Seminar: Social and Cultural Studies of Science. (3 cr; SP- #)
Review of recent work; analysis of theoretical and methodological differences among practitioners; selected responses from historians and philosophers of science.

Phil 8666. Doctoral Pre-Thesis Credits. (1-18 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- #)
Topics specified in Class Schedule.

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

Phil 8888. Thesis Credits: Doctoral. (1-18 cr; SP- Max 18 cr per semester or summer; 24 cr required)

Phil 8993. Directed Study. (1-3 cr; SP- #)

Phil 8994. Directed Research. (1-3 cr; SP- #)

Physical Medicine and Rehabilitation (PMed)
Department of Physical Medicine and Rehabilitation

Medical School
PMed 5100. Seminar I: Overview of Rehabilitation Science. (2 cr; SP- #; A-F only)
History and future of physical rehabilitation, health-care models, epidemiology of physical disorders, research on treatment outcomes, measurement issues, clinical evaluation of traditional vs. nontraditional rehabilitation strategies.

PMed 5135. Pathokinesiology. (2 cr; SP- A-F only)
Lecture and lab emphasizing anatomical, physiological, and biomechanical aspects of normal and pathological human motion, including analysis techniques.

PMed 5161. Theory of Physical Medicine and Rehabilitation Applied to Medical Sciences. (3 cr; QP- Regis OT or PT student or #; SP- Regis OT or PT student or #; A-F only)
Clinical science lectures focusing on diagnostic procedures and medical, surgical, and rehabilitation management of patient problems in orthopedics, surgery, pediatrics, dermatology, medicine, cancer, and speech. Includes correlation to current practice and presentation of patients.

PMed 5182. Functional Neuroanatomy/Neuropathology. (4 cr; QP- Regis OT or PT student or #; SP- Regis OT or PT student or #; A-F only)
Neuroanatomical structures as functional systems and basic neuropathologic concepts with emphasis on applications for understanding and treating physical dysfunctions.

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 health-care

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

198

coworkers. 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 health-care coworkers. 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 health-care coworkers. Patient handling techniques, communication skills, awareness of cultural differences, psychological aspect of disability, and use of community resources.

PMed 5221. Therapeutic Procedures. (3 cr; SP-Regis PT student; A-F only)
Theory and techniques, therapeutic massage, ultraviolet radiation, medical and athletic bandaging, asepsis and isolation, thermotherapy, hydrotherapy, positive pressure devices, volumetric measurements.

PMed 5223. Electrotherapy and Electrophysiological Testing. (2 cr; SP-Regis PT student; A-F only)
Theory and technique of movement analysis and treatment using electrophysiological testing and therapeutic devices.

PMed 5231. Biomechanics. (3 cr; SP-Regis PT student; A-F only)
Forces and structures internal and external to the body responsible for both normal and abnormal human movement, including analysis techniques and independent assignments. Muscle function, palpation, posture, and gait of normal individuals with analysis to detect deviation from the norm.

PMed 5255. Clinical Internship I. (1 cr; SP-Regis PT student; S-N only)
Five-week, full-time internship. Select and perform physical therapy evaluation techniques, interpret results, define rationale for physical therapy service, develop a care plan, implement treatment program, and communicate patient/client care process as a physical therapy professional.

PMed 5260. Professional Issues in Physical Therapy. (3 cr; SP-Regis PT student; A-F only)
Current professional issues, dilemmas, and trends in health care. Evaluation and treatment skills in physical therapy specialty areas.

PMed 5281. Therapeutic Exercise I. (3 cr; SP-Regis PT student; A-F only)
Principles of skeletal muscle, connective tissue, and collagen physiology, physics, and neurology as basis for therapeutic exercise. Exercise physiology and related microanatomy of the musculoskeletal and respiratory systems as they relate to rehabilitation problems. Tissue response to treatment for loss of mobility and endurance and strength training.

PMed 5282. Therapeutic Exercise II. (3 cr; SP-Regis PT student; A-F only)
Principles of neuromusculoskeletal, neurology, motor control, and motor learning as basis for therapeutic intervention in motor dysfunction.

PMed 5283. Musculoskeletal I. (4 cr; SP-Regis PT student; A-F only)
First of two-course sequence. Problem-solving approach to evaluating, treating, and preventing selected musculoskeletal conditions across the life span. Chart review, history taking, strength testing, functional testing, gait and posture examination, special orthopedic tests. Therapeutic exercises, orthopedic ambulation, joint mobilization, splinting, patient education.

PMed 5284. Musculoskeletal II. (4 cr; SP-Regis PT student; A-F only)
Second of two-course sequence. Problem-solving approach to evaluating, treating, and preventing selected musculoskeletal conditions across the life span. Chart review, history taking, strength testing, functional testing, gait and posture examination, special orthopedic tests. Therapeutic exercises, orthopedic ambulation, joint mobilization, splinting, patient education.

PMed 5287. Neurorehabilitation I. (4 cr; SP-Regis PT student; A-F only)
Assessment and rehabilitation of patients with neurological conditions (e.g., cerebral vascular disease, traumatic brain injury, multiple sclerosis, Parkinson’s disease, amyotrophic lateral sclerosis). Using treatment procedures, orthotics, and equipment to improve function and prevent, stabilize, or decrease impairments.

PMed 5288. Neurorehabilitation II. (4 cr; SP-Regis PT student; A-F only)
Assessment and rehabilitation of patients with neurological, immunological, and vascular conditions.

PMed 5290. Administration and Teaching Practicum. (4 cr; SP-Regis PT student; A-F only)
Learning experiences and special assignments related to physical therapy administration.

PMed 5293. Research Design in Physical Therapy. (3 cr; SP-Regis PT student; A-F only)
Predictive research, elementary statistical concepts, analysis of scientific literature, research proposal.

PMed 5294. Independent Study in Physical Therapy. (1-3 cr; SP-Regis PT student; A-F only)

PMed 5295. Clinical Education. (12 cr; SP-Regis third-year PT student; A-F only)
Students must demonstrate proficiency in communication skills, team participation, and evaluation and treatment skills; predict outcomes and manage a variety of patient diagnoses/problems consistently with good and safe judgment; and have successfully completed all previous clinical education experiences.

PMed 5300. Concepts for Occupational Therapy Practice. (3 cr; QP-Regis OT student or #; SP-Regis OT student or A-F only)
Critical thinking, ethics, professional resources/or organizations, patient-therapist relationship. Level I fieldwork experience.

PMed 5313. Therapeutic Occupation. (3 cr; QP-Regis OT student or #; SP-Regis OT student or A-F only)
Occupational therapy philosophy, history, and function of reference. Activity analysis applied to purposeful, therapeutic activities for individuals and groups.

PMed 5340. Human Growth and Development. (2 cr; SP-Regis PT student; A-F only)
Development process throughout the life span, including physical, social, cognitive, and personality development and how they may be influenced by genetic and environmental factors.

PMed 5341. Introduction: Evaluation and Intervention I. (4 cr; QP-SP-5393 or #; SP-5393 or A-F only)
Assessment concepts and techniques applied to patient populations with both mental and physical disabilities. Treatment planning and documentation.

PMed 5342. Compensatory Rehabilitation: Evaluation and Intervention II. (4 cr; SP-SP-5300, 5370 or #; SP-5300, 5313 or A-F only)
Assessment of daily living performance areas; adaptation techniques to compensate for performance deficits. Level I fieldwork experience.

PMed 5343. Specialty Topics: Evaluation and Intervention III. (4 cr; QP-SP-5342 or #; SP-SP-5342 or A-F only)
Critical thinking model applied to assessment of and intervention related to selected patient populations with mental and physical problems requiring specialized approaches. Focus on habilitation and rehabilitation of populations with multiple performance deficits.

PMed 5344. Neurorehabilitation: Evaluation and Intervention IV. (5 cr; QP-SP-5343 or #; SP-5343 or A-F only)
Assessment and intervention related to perception, cognition, reflexes, sensory integration, and motor control. Application to individuals with multiple performance deficits.

PMed 5360. Dynamics of Group Models. (2 cr; QP-SP-5312 or #; SP-5313 or A-F only)
Application of group/team dynamics in diverse professional settings.

PMed 5370. Theory of Occupation. (2 cr; SP-Regis OT student or #; A-F only)
Occupational therapy frames of reference, role of activity, and historical development of profession.

PMed 5375. Community Resources and Health-Care Issues. (2 cr; QP-SP-5300, 5342 or #; SP-5300, 5342 or A-F only)
Analysis of community health-care systems, including cultural and family influences on individual health and decision-making. Students identify current trends in health care and determine responses to them at the social, political, or legislative level.

PMed 5376. Adult Education and Planning. (1 cr; QP-SP-5311, 5312 or #; SP-SP-5311 or A-F only)
Skills needed to plan, implement, and evaluate adult educational programs and materials for patient/family education, peer/professional education, and education of others to carry out therapeutic interventions.

Student teaching unit and community-based activity.

PMed 5380. Management of Occupational Therapy Services. (3 cr; QP-SP-5360, 5375, 5376 or #; SP-5360, 5375, 5376 or A-F only)
Principles of administering and managing occupational therapy services within a managed care environment. Medicare, HMOs, TQM, communication, human resources, promotion of the profession. Emphasis on program development in current organizational structures.

PMed 5391. Occupation Throughout the Life Span. (3 cr; QP-SP-5375, 5376 or #; SP-SP-5375, 5376 or A-F only)
The well elderly, school therapy, and work-related injuries/industrial rehabilitation. Fieldwork experience.

PMed 5392. Research in Occupational Therapy. (3 cr; QP-SP-5370 or #; SP-SP-5370 or A-F only)
Analyze scientific literature and develop research proposals.

PMed 5393. Functional Anatomy and Kinesiology. (4 cr; QP-Regis OT student or #; SP-Regis OT student or A-F only)
Gross human anatomy emphasizing skeletal, muscular, circulatory, and peripheral nervous systems of the extremities and trunk. Includes cadaver lab prosections. Analyzing functional human movement from a biomechanical perspective.

PMed 5394. Orthotics. (3 cr; QP-SP-5341 or #; SP-SP-5341 or A-F only)
Analysis, design, and construction of orthotic devices.

PMed 5395. Independent Study in Occupational Therapy. (1-4 cr [max 16 cr]; QP-Regis OT student or #; SP-Regis OT student or #)

PMed 5813. Cardiopulmonary Physical Therapy. (2 cr; SP-Regis PT student; A-F only)

PMed 5814. Aging, Exercise, and Rehabilitation. (2 cr)
Theory and application of kinesiological EMG and other common instruments used to measure human motion.
Courses

PMed 8101. Seminar II: Issues in Musculoskeletal Rehabilitation. (3 cr; SP–A–F only) Science of musculoskeletal rehabilitation; associated research methodologies.

PMed 8102. Seminar III: Issues in Neurorehabilitation. (2 cr; SP–A–F only) Problems in neurorehabilitation; associated research methodologies.

PMed 8103. Physical Therapy Clinic. (1-4 cr; SP–Physical therapist; A–F only) Adult and pediatric rehabilitation.

PMed 8105. Current Literature Seminar. (1 cr; SP–Grad PT major or #; A–F only) Critical review of the literature to evaluate efficacy of selected physical therapy interventions.

PMed 8111. 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 in physical rehabilitation.

PMed 8112. Research Seminar in Physical Therapy II. (1 cr; SP–Grad PT major; A–F only) Small group discussion of journal readings focused in selected research area. Demonstration of and experience with experimental methods. Development of research proposal.

PMed 8115. 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. Papers required.

PMed 8185. Problems in Physical Therapy. (1-3 cr; SP–5203 or 8192 or #; A–F only) Research project on selected topic designed to make students familiar with systematic literature search, critical analysis of scientific literature, specific measurement systems, data collection and data reduction methods of on-going 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/lab teaching.

PMed 8192. Research Design in Physical Therapy. (2 cr; SP–Grad PT major; A–F only) Critical appraisal of current medical literature; fundamentals of research design and techniques of medical writing.

PMed 8193. Research Problems in Physical Therapy. (4 cr; SP–Grad PT major or #; A–F only) Designing a research project to answer scientific question in physical therapy, collecting data, analyzing data, interpreting results, and defending the work to an examining committee.

PMed 8300. Research Seminar in Occupational Therapy. (1 cr; QR–SP–5392 or #; SP–5392 or #; S–N only) Critical review of research literature in occupational therapy, issues related to ethical and successful conduct/publication of research, development of Plan A research proposal or Plan B project outline.

PMed 8310. Research Problems in Occupational Therapy. (1-4 cr; SP–5392; SP–Plan B student; 5392 or #) Individual, concentrated study of occupational therapy problem. Completion of Plan B project.

PMed 8320. Fieldwork Education in Occupational Therapy I. (3 cr; SP–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 III: Optional. (2 cr; SP–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 8322. Fieldwork Education in Occupational Therapy III: Optional. (1-3 cr; SP–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 8233. FTE: Master’s. (1 cr; SP–Master’s student, adviser and DSG consent) Final thesis credits: Master’s.

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

Physics (Phys)

School of Physics and Astronomy

Institute of Technology


Phys 5002. Quantum Mechanics II. (4 cr; QR–SP–5151 or #; 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; QR–SP–5022, 5024, advanced calc or #; SP–5001, 4002 or #) Classical mechanics: Lagrangian and Hamiltonian mechanics, orbital dynamics, rigid body motion, special relativity.


Phys 5024. Introduction to Electric and Magnetic Fields–Transitional Course. (2.67 cr; QR–SP–5023; A–F only) Classical theory of electromagnetic fields using vector algebra and vector calculus. This is a transitional course taught in fall 1999 only. It is open to students who completed Phys 5023 under quarters and need to finish the sequence under semesters.

Phys 5041. Analytical and Numerical Methods of Physics I. (4 cr; QR–SP–Two Sxxx Math courses; SP–Grad student 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; QR–SP–SP–5041 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; QR–Gen physics, no cr for physics grad student or grad physics minor; SP–Gen physics, # no cr for physics grad student or grad physics minor) In-depth examination of a 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. Physics for Biology and Medicine I: Mechanisms Systems. (3 cr; QR–General phys, calculus; SP–1301 or 1401) Forces in the musculoskeletal system, flow in the circulatory system, exponential processes in populations and physiologic compartments, scaling, statistical physics, diffusion, neural membranes, feedback, and chaos in biological systems.

Phys 5402. Physics for Biology and Medicine II: Electromagnetic Systems. (3 cr; QR–General phys, calculus; SP–1302 or 1402) Propagation of the action potential in nerve and muscle; exterior potential and the electrocardiogram; biomagnetics; electricity and magnetism at the cellular level. Least squares and signal analysis.

Phys 5403. Physics for Biology and Medicine III: Radiation and Imaging. (3 cr; QR–General phys, calculus; SP–2303 or 2403) Forming images; atoms and light; interaction of photons and charged particles with matter; medical x-rays; nuclear physics and nuclear medicine; magnetic resonance imaging.

Phys 5701. Solid-State Physics for Engineers and Scientists. (4 cr; QR–SP–1254, 3512, grad student or advanced undergrads in physics or engineering or the sciences or #; SP–Grad student or advanced undergrad in physics or engineering or the sciences) Crystal structure and binding; diffraction; phonons; thermal and dielectric properties of insulators; free electron model; band structure; semiconductors.

Phys 5702. Solid-State Physics for Engineers and Scientists. (4 cr; QR–SP–5231 or #; SP–5701 or #) Diagnomagnetism and paramagnetism; ferromagnetism and antiferromagnetism; optical phenomena; lasers; superconductivity; surface properties; ferroelectricity.

Phys 5950. Colloquium Seminar. (1 cr; QR–Grad student or advanced undergrad in physics; Δ; SP–Grad student or advanced undergrad in physics, Δ) Introduction to the research activities of the School of Physics and Astronomy.

Phys 5953. Directed Studies. (1-5 cr [max 15 cr]; QR–#; Δ; SP–#) 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]; QR–JT, JS; SP–JT, JS) Research problems, experimental or theoretical, of special interest to students. Written reports.

Phys 8001. Advanced Quantum Mechanics. (3 cr; QR–SP–5153, 5502 or #) Topics in non-relativistic quantum mechanics; second quantization. Introduction to Dirac formalism and Green’s function techniques and to relativistic wave equations. Application of relativistic perturbation theory to particle interactions with electromagnetic field. Invariant interactions of elementary particles.

Phys 8012. Quantum Field Theory II. (3 cr; QP-8381; SP-8011 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 instants in gauge theories.

Phys 8013. Special Topics in Quantum Field Theory. (3 cr; QP-8382; SP-8012 or #) Includes non-perturbative methods in quantum field theory, supersymmetry, two-dimensional quantum field theories and their applications, lattice simulations of quantum fields, topological quantum field theories, quantum field theories 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 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 tool for using symmetry to help understand behavior of physical systems. Applications made to atomic, molecular, nuclear, condensed-matter, and elementary particle physics.

Phys B333. 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 nuclei 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 arranged between student and instructor. Written report required.

Phys 8501. General Relativity and Cosmology I. (3 cr; QP-5053; SP-5012 or #) Tensor analysis and differential geometry. Special relativity leading to formulation of principles of general relativity and Einstein’s equations. Tests of general relativity and thorough discussion of various black hole solutions, including Schwarzschild, Reissner-Nordstrom, and Kerr solutions.

Phys 8502. General Relativity and Cosmology II. (3 cr; QP-8801; SP-8501 or #) Gravitational radiation. Applications of general relativity to stellar structure of white dwarfs and neutron stars, action principle, and symmetric spaces. Big-bang cosmology, strongly emphasizing particle physics.

Phys 8600. Seminar: Space Physics. (1 cr [max 6 cr]; SP-# S-N only) Current topics in space physics and plasma physics.

Phys 8601. Plasma Physics I. (3 cr; QP-5162; SP-4621; 5012 or #) Theory of plasma waves and instabilities in plasmas, magnetohydrodynamics, nonlinear waves in plasmas, wave propagation in inhomogeneous plasmas.

Phys 8602. Plasma Physics II. (3 cr; QP-8163; SP-8601 or #) Theory of plasma waves and instabilities, collisions, radiation, transport, nonlinear wave-particle and wave-wave interactions, instabilities in inhomogeneous plasmas.

Phys 8611. Cosmic Ray and Space Physics. (3 cr; QP-5102 or 5053; SP-5012 or #) Properties of energetic particles in heliosphere and in astrophysical environments; solar physics, including radiation and magnetic effects; solar wind and magnetospheric physics; physics of radiation belts.

Phys 8650. Advanced Topics in Space and Plasma Physics. (3 cr [max 9 cr]; QP-5022; 5024; SP-8602 or 8611 or #) Topics in plasma waves and instabilities, solar physics, cosmic ray physics, atmospheric physics or planetary physics.

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

Phys 8700. Seminar: Condensed Matter Physics. (1 cr [max 6 cr]; SP-#) Current research.


Phys 8702. Statistical Mechanics and Transport Theory II. (3 cr; QP-8121; SP-8701 or #) Equilibrium properties of macroscopic classical and quantum systems. Phase transitions and Renormalization Group. Transport theory. Applications to soft condensed matter systems.


Phys 8750. Advanced Topics in Condensed Matter Physics. (3 cr [max 9 cr]; QP-8222; SP-5712 or #) Sample research topics: magnetism, superconductivity, low temperature physics, superfluid helium.

Phys 8777. Thesis Credits: Master’s. (1-18 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-#) Current research topics.

Phys 8801. Nuclear Physics I. (3 cr; QP-5151 or 5151; SP-5001 or SP-5001) 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, nucleus-nucleus 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 temperatures and density applied to many-body problems, especially nuclear matter and quark-gluon plasma. Applications to lepton and hadron scattering, nucleus-nucleus collisions, astrophysics and cosmology.

Phys 8850. Advanced Topics in Nuclear Physics. (3 cr [max 9 cr]; SP-8802 or #) Research topics.

Phys 8888. Thesis Credits: Doctoral. (1-18 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 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.

**Physics (Phsl)**

**Department of Physiology**

**Medical School**

Phsl 5061. Principles of Physiology for Biomedical Engineering. (4 cr; QP-Biomedical engineering grad student, one yr college chem and physics and math through integral calculus; SP-Biomedical engineering grad student, one yr college chem and physics and math through integral calculus.) Human physiology with emphasis on quantitative aspects. Organ systems (circulation, respiration, renal, gastrointestinal, endocrine, muscle, central and peripheral nervous systems), cellular transport processes, and scaling in biology.

Phsl 5094. Research in Physiology. (1-5 cr [max 20 cr]; QP-Physiology undergrad major, 3055, 3056, SP-Physiology undergrad major, 3071, SP-Physiology undergrad major, 3071) Independent lab research project in physiology, supervised by physiology faculty.

Phsl 5095. Problems in Physiology. (1-5 cr [max 20 cr]; QP-Physiology undergrad major, 3055, 3056, SP-Physiology undergrad major, 3071, SP-Physiology undergrad major, 3071) Individualized study in physiology. Students address a selected problem in physiology through library or lab research, supervised by physiology faculty.

Phsl 5201. Computation and Neuroscience I. Membranes and Channels. (3 cr; QP-Calculus through differential equations; SP-Calculus through differential equations) Neural excitation (ion channels, excitation models, effects of neural morphology) using UNIX workstations to simulate empirical results. Includes the Hodgkin-Huxley model, nonlinear dynamic systems analysis, voltage and ligand gated ion channels, ion transport theories, and impulse initiation and propagation.
Aspects of recombinant DNA technology and other techniques in plant and molecular biology. Appropriate for those without extensive background in these areas but who wish to understand the potential uses of current cell and molecular technologies in the plant sciences.

PBio 5416. Plant Morphology, Development, and Evolution. (4 cr; QP–Biol 1103 or Biol 3012 or Biol 3812, SP–Biol 2022 or Biol 3002 or Biol 3007) Evolutionary history of land plants. Morphological changes in vegetative and reproductive structures. Morphology of green algal ancestors, non-vascular land plants, and spore bearing and seed bearing vascular plants are analyzed in an evolutionary framework.

PBio 5640. Discussions in Plant Molecular Biology. (2 cr; max 4 cr) QP–Biol 3012, Biol 5003, GCB 5034, SP–PBio 5414; Biol 3002, Biol 4003, GCB 5043 or GCB 5034) Selected topics in plant molecular biology for students with a strong interest in the subject. Classical and recent papers that have led to current understanding of transposable elements, genomic structure and function, mechanisms of hormone action and gene regulation.

PBio 5960. Special Topics. (1-3 cr; max 6 cr) QP–Biol 1103 or Biol 3012 or Biol 3812; SP–Biol 2022 or Biol 3002 or Biol 3007) In-depth treatment of specialized topics in plant biology.

PBio 8081. Current Topics in Plant Biology: Molecular Biology-Phylogeny-Cell Biology. (1 cr; A-F only) Background information and review of selected current literature. For first-year students in plant biological sciences and other biological science graduate programs.

PBio 8082. Current Topics in Plant Biology: Structure-Evolution-Ecology. (1 cr; A-F only) Background information and review of selected current literature. For first-year students in plant biological sciences and other biological science graduate programs.

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

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

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

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

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

**Plant Biology (PBio)**

Department of Plant Biology
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) Diversity of fungi and their interactions with other organisms. Pathogenic and mutualistic interactions with animals and plants. Use of fungal systems for drug discovery and understanding pathogenicity, signal transduction, morphogenesis, and evolution.

PBio 5221. Molecular Evolution. (2 cr; QP–Biol 5003 or GCB 3022; SP–Biol 4003 or GCB 3022; A-F only) Molecular basis of evolutionary change. Current ideas of selection and neutral evolutionary processes. Construction of phylogenies as determined from DNA sequence data. Evolution of multigene families, organelle genomes, novel gene function, and their relationship to development and organismal evolution.

PBio 5412. Plant Physiology. (3 cr; QP–Biol 1103 or Biol 3012 or Biol 3812, Biol 5001 or Biol C 3021 or Biol 5331; SP–Biol 2022 or Biol 3002 or Biol 3007, Biol/Biol C 3021 or Biol 4331) Physiological and biochemical bases of plant systems with emphasis on higher plants.

PBio 5414. Plant Cell and Molecular Biology. (3 cr; QP–Biol 1103 or Biol 3012 or Biol 3812, Biol 5001 or Biol C 3021 or Biol 5003 or GCB 3022; SP–Biol 2022 or Biol 3007 or Biol 3002, Biol/Biol C 3021 or Biol 4003 or GCB 3022) Principles and concepts of plant disease caused by selected viruses, bacteria, fungi, nematodes, and environmental factors. Pathogen biology, interaction of pathogens and the environment; epidemiology and control measures appropriate to plant disease.

PIPa 5202. Field Plant Pathology. (2 cr; QP–S–SP–A) Characteristics of a variety of plant diseases. Field trips to observe symptoms and effects of diseases, and to learn about prevention and control of diseases in field, forest, golf course, greenhouse, nursery, orchard, and urban environments.

PIPa 5203. Biology and Ecology of Fungi. (3 cr; QP–Biol 1009 or equiv; SP–Biol 1010 or equiv) Major groups of fungi, their roles in ecosystems and human society, environmental and nutritional needs, and modes of dissemination and survival. Representative species of fungi observed and manipulated.

PIPa 5999. Special Workshop in Plant Pathology. (1-4 cr)

Workshops on a variety of topics in plant pathology located at locations other than the Twin Cities campus. See Class Schedule or department for current offerings.

PIPa 8005. Supervised Classroom or Extension Teaching Experience. (2 cr; SP–S–N only) Teaching experience in one of the following departments: Biosystems and Agricultural Engineering; Agronomy and Plant Genetics; Horticultural Science; Soil, Water, and Climate; or Plant Pathology. Discussions about effective teaching to strengthen skills and develop a personal teaching philosophy.

PIPa 8090. Advanced Procedures and Research in Plant Pathology. (1-8 cr) Special assignment in lab and field problems in pathological research.

PIPa 8100. Professional Internship Experience. (2-4 cr; max 4 cr; SP–S–N only) Individually arranged internships in private industry, government agencies, or university outreach programs (including the University’s Plant Disease Clinic).

PIPa 8101. Causal Organisms of Plant Disease. (3 cr; QP–5201 or equiv; SP–5201 or equiv) Lab-based intensive examination of bacteria, viruses, and nematodes as causal agents of plant disease.

PIPa 8102. Epidemiology and Plant Disease Resistance. (3-4 cr; QP–5201 or equiv; SP–5201 or equiv) Quantitative study of plant disease epidemics in time and space. Ecology and genetics of plant-microbe interactions in agricultural and non-agricultural settings.

PIPa 8103. Physiological and Molecular Plant-Microbe Interactions. (3 cr; SP–Intro course in biochem or plant physiology or equiv) Genetics, physiology, and molecular biology of plant-microbe interactions. Communication between plants and microbes, signal transduction, control of gene expression, symbiosis and parasitism, plant host response mechanisms, and plant disease physiology.

PIPa 8200. Seminar. (1-2 cr; A-F only) Critical review and presentation of current problems and progress in plant pathology.

PIPa 8300. Plant Pathology Project. (1-6 cr; max 6 cr; SP–S) Lab or library projects for Plan B master’s students in plant pathology.

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

PIPa 8400. Case Studies in Plant Pathology. (2-4 cr; max 4 cr; SP–S) Students develop case study of recent or historical plant disease epidemic; research scientific, economic, regulatory, social, and environmental issues associated with the epidemic; and prepare written paper and present final case summary to the department.
Courses

PIPa 8444. FTE:Doctoral. (1 cr; SP- Doctoral student, advised by Director)  
PIPa 8500. Perspectives in Plant Pathology. (2 cr [max 4 cr]; SP- A-F only)  
Integrative overview of the field. For Ph.D. students nearing end of formal classroom experience.
PIPa 8666. Doctoral Pre-Thesis Credits. (1-18 cr; SP- Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)  
PIPa 8777. Thesis Credits: Master's. (1-18 cr; SP- Max 18 cr per semester or summer; 18 cr total required [Plan A only])  
PIPa 8888. Thesis Credits: Doctoral. (1-18 cr; SP- Max 18 cr per semester or summer; 24 cr required)

Polish (Plsh)

Institute of Linguistics and Asian and Slavic Languages and Literatures

College of Liberal Arts

Plsh 5900. Topics. (3 cr)  
Topics specified in Class Schedule.
Plsh 5993. Directed Readings. (1-3 cr)  
Guided individual reading or study in Polish language, literature, and culture.

Political Science (Pol)

Department of Political Science

College of Liberal Arts

Pol 5251. Greeks, Romans, and Christians: Ancient and Medieval Political Thought. (4 cr; SP-§ 3251)  
Politics and ethics in Greece, Rome, Christendom; Thucydides, Socrates, Plato, Aristotle, Cicero, Augustine, Aquinas, Marsilius.
Pol 5252. Renaissance, Reformation, and Revolution: Early Modern Political Thought. (4 cr; SP-§ 3252)  
Thinkers, themes, and discourses from the Renaissance to the French Revolution. Renaissance Humanists; Machiavelli; More; Reformation; Luther; Calvin; Natural Law; Grotius; Divine Right; Common Law; Bacon; English Revolutionaries; Hobbes; Locke; Hobbes; Enlightenment; Rousseau; French Revolutionaries; Hume; Burke; Wollstonecraft.
Pol 5253. Modernity and its Discontents: Late Modern Political Thought. (4 cr; SP-§ 3253)  
Theoretical responses to and rival interpretations of Western communist, fascist, populist, and democratic culture in the modern age; theories of history; class struggle; end of metaphysics and death of God; technology and bureaucracy; psychology of culture in Hegel, Marx, Toqueville, Mill, Nietzsche, Weber, Freud.
Pol 5441. Politics of Environmental Protection. (3 cr; SP-§ 3441; non-pol sci grad student or #)  
How the American political system deals with environmental issues, how third world countries deal with problems of environmental protection and economic growth, and the way the international community deals with global environmental problems.
Pol 5872. Global Environmental Politics. (3 cr; SP-§ 3872; non-pol sci grades only)  
Emergence of the environment as a key aspect of the global political agenda. Non-governmental and governmental international organizations. Politics of protection of the atmosphere, rain forests, seas and other selected issues. International security and the environment.
Pol 8101. Introduction to Political Science. (4 cr; SP- Grad pol sci major or A-F only)  
History, scope, and methods of political science as a discipline; current subfields; major research programs (including statism, pluralism, institutionalism, realism, behaviorism, rational choice, and critical theory); problems of theory; interpretation, concept-formation; comparison, measurement and experimentation; designs for research.
Pol 8122. Positive Theory. (3 cr; SP- Grad pol sci major or #)  
Survey of positive political theory and rational-choice models. Information and transaction costs; institutions; models of elections, voting, coalitions.
Pol 8123. Regression Analysis. (3 cr; SP- Grad pol sci major or A-F only)  
Principles of regression analysis and use of regression model in political science.
Pol 8124. Game Theory. (3 cr; SP- Grad pol sci major or #)  
Game theory and application of noncooperative game theory in political science. Equilibrium concepts, bargaining, repeated games, games of incomplete information, signaling games, reputation, learning in games.
Pol 8126. Qualitative Methods. (3 cr; SP- Grad pol sci major or #)  
Broad introduction to qualitative methods in social science. Practical, hands-on training through fieldwork projects devised and carried out during the semester. Interviewing, participant observation, narrative interpretation, ethical problems, and issues of gender and race in fieldwork.
Pol 8131. Advanced Methods and Models. (3 cr; SP- Grad pol sci major or 6 cr 81xx seminars or #)  
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.
Pol 8160. Topics in Models and Methods. (3 cr; SP- Grad pol sci major or 3 cr)  
Seminars on selected topics.
Pol 8201. Understanding Political Theory. (4 cr; SP- Grad pol sci major or A)  
Key concepts and major approaches.
Pol 8215. Philosophy of Political Inquiry. (3 cr; SP- Grad pol sci major or #)  
Major schools of philosophy of science as applied to political inquiry: pragmatism, positivism, hermeneutics, critical rationalism, critical theory, realism. Themes of political inquiry: explanation, interpretation, theory, criticism. Political issues raised by philosophy of science: liberalism, democracy, control, multiculturalism.
Pol 8225. American Political Thought. (3 cr; SP- Grad pol sci major or #)  
Colonial era to present: Puritans, American Revolution, Constitution, rise of individualism, pro-and anti-slavery arguments, civil war and reconstruction, industrialization, westward expansion, Native Americans, immigration, populism, socialism, social Darwinism, growth of corporations and unions; Great Depression; growth of American power at home and abroad.
Pol 8235. Democratic Theory. (3 cr; SP- Grad pol sci major or #)  
Competing models of democracy; classical, republican, liberal, radical, Marxist, neo-Marxist, pragmatist, populist, pluralist, postmodern, participatory. Domestic and international struggles over meaning of “democracy”; social science models of and findings on democracy.
Pol 8251. Ancient and Medieval Political Thought. (3 cr; SP- Grad pol sci major or #)  
Pol 8252. Early Modern Political Thought. (3 cr; SP- Grad pol sci major or #)  
Theorists and texts from Renaissance to French Revolution. Selectively includes Machiavelli, More, Calvin, Luther, Grotius, Bodin, Hobbes, Winstanley, Harrington, Locke, Montesquieu, Rousseau, Hume, Smith, Burke, and Wollstonecraft; key debates over liberty, law, power, and knowledge.
Pol 8253. Late Modern Political Thought. (3 cr; SP- Grad pol sci major or #)  
Theoretical responses to and rival interpretations of Western economy, society, politics, and democratic culture in the modern age; theories of history; class struggle; the end of metaphysics and the death of God; technology and bureaucracy; psychology of culture, in Hegel, Marx, Toqueville, Mill, Nietzsche, Weber, Freud.
Pol 8260. Topics in Political Theory. (3 cr [max 6 cr]; SP- Grad pol sci major or A-F only)  
Readings and research in special topics or problems.
Pol 8275. Contemporary Political Thought. (3 cr; SP- Grad pol sci major or #)  
From approximately World War II to the present. Survey of range of texts or intensive focus on such authors as Adorno, Arendt, Derrida, Foucault, Habermas, Horkheimer, Rawls, Said. Sample topics: feminism, postmodernism, communitarianism, Frankfurt School, postcolonialism.
Pol 8301. American Politics. (4 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 and 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 a democracy.
Pol 8307. Proseminar in Political Science I. (1 cr; SP- Grad pol sci major or pol psychology minor or #; S-N only)  
Readings, discussion, and guest speakers. Topics vary.
Pol 8308. Proseminar in Political Science II. (1 cr; SP- Grad pol sci major or pol psychology minor or #; S-N only)  
Readings, discussion, and guest speakers. Topics vary.
Pol 8311. Political Psychology and Socialization. (3 cr; SP- Grad pol sci major or pol psychology 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 study of 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) Selection of local leadership; relationship of political system to governmental forms and social institutions; role and impact of political institutions; policymaking at local level; studies in policy problems; the emerging metropolis.

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: incrementism, 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 cause and nature of welfare state development in context of four American social policies: social security, welfare, education, and health care.

Pol 8360. Topics in American Politics. (3 cr; SP – Grad pol sci major or #) Readings and research in special topics or problems.

Pol 8401. International Relations. (4 cr; SP – Grad pol sci major or #) Basic theories and approaches to study of international politics; survey of representative work and central issues of scholarship.

Pol 8402. Conflict Dynamics and Security. (3 cr; SP – Grad pol sci major or #) Introduction to contending theories of international conflict and national 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. Institution of sovereignty; rational choice versus constructivist perspectives; role of international law, international organizations, and non-governmental organizations; and international society and transnational cultural norms.

Pol 8404. International Hierarchy. (3 cr; SP – Grad pol sci major or #) Asymmetric structures and processes of international relations; systemic conditions and implications of informal empire and structures of hegemony; cultural productions of difference and inequality.

Pol 8405. International Political Economy. (3 cr; SP – Grad pol sci major or #) 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. Policies of International Finance. (3 cr; SP – Grad pol sci major or #) Relationship between workings of the international political system and that of international markets for currency and capital.

Pol 8407. Morality in World Politics. (3 cr; SP – Grad pol sci major or #) Approaches to normative theorizing and empirical research on moral norms in world politics. Theoretical topics: realism, communitarianism, consequentialism, constructivism, postmodernism, cultural relativism. Substantive issue areas: famine and foreign aid, just war theory, nuclear weapons, moral implications of technology, case study on war (Gulf War).

Pol 8408. International Relations of the Environment. (3 cr; SP – Grad pol sci major or #) Theory and practice of international environmental politics. Emergence of environment as major issue of international relations. Diversities of agendas and politics. Imperatives, templates, resistance in global efforts to forge an applied politics of environmental sustainability. Selected cases.

Pol 8411. Political Psychology and Foreign Policy. (3 cr; SP – Grad pol sci major or #) Foreign policy theories about decision makers and audiences. Impact of human nature, formal institutions, cultural and cross-cultural settings, and kinds of issues on foreign policy choice, control, and justification.

Pol 8412. American Foreign Policy. (3 cr; SP – Grad pol sci major or #) U.S. policy toward foreign states and peoples; heritage, motivations, policy processes, what the public generally knows and wants, specific policies. Rise of intermestic issues and decline of enemy-focused internationalism; implications for process and content of U.S. foreign policy.

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

Pol 8460. Topics in International Relations. (3 cr [max 6 cr]; SP – Grad pol sci major or #) Readings and research on 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 or #) Main theoretical approaches and issues: comparative method, the state and class; political culture; development, democratisation, rational choice, social movements.

Pol 8603. European Governance and Politics. (3 cr; SP – Grad pol sci major or #) Main theories and approaches used to interpret European politics. Many of these theories have broad relevance for comparative politics, for example, theories about the state, cleavages and coalitional bases, parties and social movements, and constitutional structures and institutions have broad relevance for the field of comparative politics.

Pol 8605. Governance and Politics in Africa. (3 cr; SP – Grad pol sci major or #) Theoretical and methodological approaches to study of African politics, focusing on pre-colonial and colonial legacies for post-colonial reality. Local politics, social construction of identities, political economy of peasantry and working class, political development and decay, social movements, and prospects for democracy.

Pol 8606. Government and Politics of Russia and the Commonwealth of Independent States. (3 cr; SP – Grad pol sci major or #) Framework for understanding politics of change underway in the former Soviet Union. Roots of current transformation, including causes of economic liberalization. Russian revolution and creation of the Soviet Union. Issues in current transformation, including nationalism, economic reform, and democratization. Prior knowledge of basic Soviet politics is assumed.


Pol 8615. The Political Economy of Contemporary Japan. (3 cr; SP – Grad pol sci major or #) Major political and economic issues confronting the Japanese system; situation of Japanese case within comparative politics literature concerning role of the state in formulating economic and social policy making. Review of literature and regulations in key industries, welfare reform, tax reforms.

Pol 8619. Latin American Politics. (3 cr; SP – Grad pol sci major or #) Major bodies of theory on development, democracy and redemocratization, social movements, civil society, the state, and transnational linkages.

Pol 8633. Comparative Sociopolitical Change. (3 cr; SP – Grad pol sci major or #) Critical evaluation of literature and theoretical perspectives; comparative examination of social and political change and interrelationship between both processes; structure/agency nexus.

Pol 8637. Comparative Political Economy. (3 cr; SP – Grad pol sci major or #) 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 #) Examined from a cross-national perspective. Development of political participation, mobilization and its effects, development of political cleavages and political parties as vehicles of conflict, modes of political behavior under varied systems of representation and varied party systems.

Pol 8643. Comparative Political Organizations. (3 cr; SP – Grad pol sci major or #) Structure and behavior of various political organizations in different settings; theoretical approaches and comparative frameworks.

Pol 8660. Topics in Comparative Politics. (3 cr; SP – Grad pol sci major or #) Readings in advanced topics or problems; supervised research and research training.

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

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

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

Pol 8990. Directed Readings and Research in Political Science. (1-7 cr [max 7 cr; SP – 18 cr max pol sci courses, #])

203
### Portuguese (Port)

**Department of Spanish and Portuguese**

**College of Liberal Arts**

**Port 5520. Portuguese Literary and Cultural Studies.** (3 cr; max 9 cr) SP – #
- Study of origins and development of modern Portuguese (late 15th to 20th century) using literature, cultural and literary criticism, history, sociology) and various media (film, art, music, internet). Main cultural problematics pertaining to Portugal as well as fundamental literary texts.

**Port 5530. Brazilian Literary and Cultural Studies.** (3 cr; max 9 cr) SP – #
- Study of origins and development of modern Brazilian nation (late 16th to 20th century) using literature, cultural and literary criticism, history, sociology) and various media (film, art, music, internet). Main cultural problematics pertaining to Brazil as well as fundamental literary texts.

**Port 5540. Literatures and Cultures of Lusophone Africa.** (3 cr; max 9 cr) SP – #
- Study of origins and development of Lusophone Africa (Angola, Mozambique, Cape-Verde, Guinea-Bissau, and Sao Tome and Principe) using literature, cultural and literary criticism, history, sociology) and various media (film, art, music, internet).

**Port 5910. Topics in Lusophone Cultures.** (3 cr; max 9 cr) SP – #
- Cultural manifestations in Portuguese-speaking world (Portugal, Brazil, Lusophone Africa); literature, history, film, intellectual thought, critical theory, popular culture. Topics include: Portuguese colonialism; post-colonial narratives in Lusophone world; Lusophone women writers; Luso-Brazilian (post)modernity.

**Port 5920. Figures in Lusophone Literatures.** (3 cr; max 9 cr) SP – #
- One Portuguese, Brazilian, or other major Portuguese-speaking writer or group of writers whose work has had impact on thought, literature, or social problems (e.g., Machado de Assis, Fernando Pessoa, Clarice Lispector). Figures specified in Class Schedule.

**Port 5930. Topics in Brazilian Literature.** (3 cr; max 9 cr) SP – #
- Major issues of Brazilian literature; focuses on important authors, movements, current genres. Problems, socio-economic questions, literary techniques related to Brazilian themes. Topics specified in Class Schedule.

**Port 5970. Directed Readings.** (3 cr; max 9 cr) SP – MA or PhD candidate, #, A, L
- Lusophone studies (Portuguese-speaking Africa, Brazil, Portugal). Areas not covered in other courses. Students submit reading plans for particular topics, figures, periods, or issues.

**Port 5990. Directed Research.** (1-4 cr; max 9 cr) SP – A, L
- Graduate-level research in literatures and cultures of the Portuguese-speaking world. Topics vary.

**Port 8333, FTE: Master’s.** (1 cr; SP-Master’s student, advisor and DGS consent)

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

**Port 8920. Seminar: Lusophone Literatures and Cultures.** (3 cr; max 9 cr)
- Problems pertaining to Portuguese, Brazilian, and/or Lusophone African cultures and literatures. Topics specified in Class Schedule.

### Psychology (Psy)

**Department of Psychology**

**College of Liberal Arts**

**Psy 5012. Psychology of Conditioning and Learning.** (3 cr; SP-3011 or # except for graduates)
- Review and evaluation of key questions, methods, theories, and data about classical conditioning, instrumental learning, and elementary cognitive processes. Emphasis on animal models.

**Psy 5013. Laboratory in Conditioning and Learning.** (3 cr; SP-3005 except grad students, 5012 or #)
- Lab exercises exploring forms of animal conditioning and learning. A combination of both prepared exercises and independent exercises.

**Psy 5014. Psychology of Human Learning and Memory.** (3 cr; SP-3011 or 3051, 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; SP-3001 or 3014, except for honors or grad; SP-3051 except for honors or grad)
- Human cognitive abilities, such as perception, memory, and attention, from different perspectives, e.g., the cognitive psychological approach, emphasizing behavioral/functional research, and the cognitive neuroscience approach, emphasizing a theoretical integration of cognitive, neuroscientific, and computational approaches.

**Psy 5031. Perception.** (3 cr; SP-3011 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-3011 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.

**Psy 5036. Computational Vision.** (3 cr; SP-3011 or 3051 or #)
- Applications of psychology, neuroscience, and computer science to understanding the design principles underlying visual perception, visual cognition, and action. Compare biological and physical processing of images with respect to image formation, perceptual organization, object perception, recognition, navigation, and motor control.

**Psy 5037. Psychology of Hearing.** (3 cr; SP-3011 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 5038. Introduction to Neural Networks.** (3 cr; SP-3001 or 3061, Math 2621 or equiv or SP-3061 or 5061, Math 2621 or #)
- Introduction to parallel distributed processing models in neural and cognitive science. Topics include linear models, Hebbian rules, self-organizing neural networks, optimization, and representation of information. Applications to sensory processing, perception, learning, and memory.

**Psy 5051. Psychology of Human-Machine Interaction.** (3 cr; SP-3011 or 3051 or #)
- Psychological perspectives on human-machine interaction and factors that limit performance. Cognitive and perceptual aspects of computer, use, telepresence, and design and evaluation of sensory aids.

**Psy 5054. Psychology of Language.** (3 cr; QP-3001 except for honors and grad; SP-3005 or # except for honors and grad)
- Theories and experimental evidence in past and 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 neuroanatomical mechanisms underlying behavior of animals, including humans. Neural basis of learning and memory, sleep, wakefulness, and attention processes. Effects of drugs on behavior.

**Psy 5062. Cognitive Neuropsychology.** (3 cr; SP-3031 or 3051)
- Consequences of different types of brain damage on human perception and cognition. Neurological mechanisms of normal perceptual and cognitive functions. Vision and attention disorders, split brain, language deficits, memory disorders, central planning deficits. Emphasis on function and phenomenology with minimal amount of brain anatomy.

**Psy 5101. Personality Psychology.** (3 cr; QP-3101; 5862 or 5860, honors or grad student; SP-3101, 3005, honors or grad student)
- Theories and major issues and findings on personality functioning, personality structure, and personality assessment. A presentation of historically important and currently influential perspectives.

**Psy 5121. History and Systems of Psychology.** (3 cr; QP-8 cr of 3xxx courses in psychology or equiv or grad student or # SP-6 cr of 3xxx courses in psychology or #)
- 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 the role of psychology in the historical and philosophical context.

**Psy 5135. Psychology of Individual Differences.** (3 cr; QP-3135; 3801 or equiv, 5862 or # SP-3135; 4801 or equiv, 5862 or #)
- Differential methods in the study of human behavior. Overview of the nature of psychological traits and the influence of age, sex, heredity, and environment in causation of individual and group differences in ability, personality, interests, and social attitudes.

**Psy 5136. Human Abilities.** (3 cr; QP-3135 or 5135, 5862 or # SP-3135 or 5135 or equiv, 5862 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; SP-3135 or 5135 or # SP-4801 or equiv or #)
- Overview of genetic methods for studying human and animal behavior. Emphasis on the nature and origin of individual differences in behavior. Twin and adoption methods as well as more modern methods like cytogenetics, molecular genetics, and linkage and association studies.

**Psy 5138. Psychology of Aging.** (3 cr; QP-3135 or 5135, 5862 or # SP-3005 or equiv)
- Theories and findings concerning age-related changes in mental health, personality, cognitive functioning, and productivity. Reviewed and interpreted within the context of the multiple biological, social, and psychological changes that accompany age.

**Psy 5202. Attitudes and Social Behavior.** (3 cr; SP-3201 or # SP-3201 or #)
- Traditional and current theory and research in social psychology on the psychology of attitudes.

**Psy 5204. Psychology of Interpersonal Relationships.** (3 cr; QP-3201 or # except for honors in sequence and grad; SP-3201 or #A-F only)
- Introduction to interpersonal relationship theory and research findings, with emphasis on conceptual and methodological issues in relationship research.
Psy 5205. Applied Social Psychology. (3 cr; SP- 3201 or grad student, #) Applications of social psychology research and theory to such domains as physical and mental health, education, the media, desegregation, the legal system and other institutions, energy conservation, and public policy.

Psy 5206. Social Psychology and Health Behavior. (3 cr; SP- 3201 or grad student; A-F only) Survey of social psychological theory and research pertaining to the processes by which people develop beliefs about health and illness; the relationship between these beliefs and the adoption of health-relevant behavior; and the impact of psychological factors on physical health.

Psy 5207. Personality and Social Behavior. (3 cr; SP- 3201 or 2021 or # except for honors and grad students; A-F only) Conceptual and methodological strategies for scientific study of individuals and their social worlds; applications of theory and research to issues of self, identity, and social interaction.

Psy 5501. Vocational Psychology. (3 cr; SP- 3801 or #) Survey of the concepts, theories, methods, and findings of vocational psychology. Topics include history; individual differences; vocational development, device, adjustment; vocational assessment; vocational counseling.

Psy 5604. Abnormal Psychology. (4 cr; SP- § 3604; honors major or # for grad students) Comprehensive review of psychopathological disorders. Etiology, diagnostic criteria, and clinical research findings emphasized.

Psy 5606. Clinical Psychophysiology. (3 cr; SP- 3005 or equiv, 5001 or 5061, 3604 or 5604 or #) 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; SP- 3005 or 4801 or equiv, 3711 or #) The application of psychological research and theory to issues in personnel recruitment and selection, and measurement of job performance. Apply principles of individual differences and psychological measurement to decision making in organizations; recruitment, selection, and performance appraisal.

Psy 5702. Psychological Foundations of Individual Behavior in Organizations. (3 cr; SP- 3801 or equiv, 8 cr psychology or # SP- 3711, 4801 or equiv or #) Theory and research in human behavior and performance in organizations. Organizational socialization processes across the career span, leadership styles and processes, work team structures and characteristics, problem-solving and decision-making processes, group dynamics, and inter-group relations.

Psy 5703. Psychology of Organizational Training and Development. (3 cr; SP- 3711, 4801 or equiv or #) Theory and methods, and research pertaining to 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; SP- 3801 or equiv, 3711 or # SP- 4801 or equiv, 3711 or #) Motivation issues related to the behavior and performance of individuals in organizational settings. Contemporary work motivation theories and practices that relate person factors and environmental factors to skill acquisition and job performance, organizational citizenship behavior, and job satisfaction.

Psy 5862. Psychological Measurement: Theory and Methods. (3 cr; SP- 3801 or equiv, honors or grad student or # SP- 4801 or equiv, honors or grad student or #) Types of measurements (tests, scales, inventories) and their construction; theory and measurement of reliability and validity.


Psy 5960. Topics in Psychology. (1-4 cr; SP- 1001, #) Special classes or seminars offered infrequently for juniors, seniors, and graduate students. Topics listed in the psychology office.

Psy 8004. Philosophical Psychology. (2 cr; SP- Logic or phi course; SP- Logic or phi course, psychology or phi PhD student; A-F only) Selected philosophical and methodological problems.

Psy 8010. Advanced Topics in Learning. (2 cr; SP- 5012-5013; SP- 5012 or # A-F only) Contemporary topics in learning and behavior theory.

Psy 8020. Seminar in Conditioning and Learning. (2 cr; SP- 5011 or 5012 or SP- 5012 or grad psychology major or # A-F only) Review and discussion of ongoing research and perspectives on future research.

Psy 8026. Neuro-Immune Interactions. (3-23 cr; SP- 8026; 5012 or equiv or #; NSc 5111 or equiv; SP- 5112 or #; NSc 5026; MIB 3128 or equiv; NSc 5112 or equiv; SP- 5112 or equiv or #) Neuro-immune systems (neuroendocrine, cytokine, and autonomic nervous systems) linking brain and immune systems in brain-immune axis. Functional effects of bidirectional brain-immune regulation.


Psy 8037. Psychophysics and Audition. (3 cr; SP- Grad psychology major or #) Modern and classical psychophysics. Psychophysical and physiological correlates of audition. Theories of hearing.

Psy 8055. Seminar: Cognitive Neuroscience. (3 cr; SP- 5015 or #) Recent advances in analysis of neural bases of cognitive functions.

Psy 8056. Seminar: Psychology of Language. (3 cr; SP- 5054; SP- Grad psychology major or #; A-F only) Selected topics in psycholinguistics.

Psy 8070. Seminar: Psychopharmacology. (1-3 cr; SP- max 12 cr) Lectures and student presentations on basic issues and contemporary research.

Psy 8107. Cross-Cultural Study of Personality. (3 cr; SP- 5011; 5064 or equiv; SP- 5011, 5064 or equiv or #; A-F only) Methodological issues and status of current research.

Psy 8111. Psychopathology I. (3 cr; SP- Clinical psychology grad student; A-F only) Descriptive psychopathology. Theory and research; evaluation of current experimentation in various behavior disorders.

Psy 8112. Psychopathology II. (3 cr; SP- 8111. clinical psychology grad student; A-F only) Descriptive psychopathology. Theory and research; evaluation of current experimentation in various behavior disorders.

Psy 8201. Social Cognition. (3 cr; SP- Psychology PhD candidate; A-F only) Theory and research in stereotyping, social inference, and person memory.

Psy 8202. Close Relationships. (3 cr; SP- 5204 or # A-F only) Recent theory and research.

Psy 8203. Impression Management. (3 cr; SP- 8208 recommended; SP- Grad psychology major; # 8208 recommended) Classic and contemporary theory and research concerning interpersonal strategies of impression management and interplay between private and public self.

Psy 8205. Proseminar: Research in Social Psychology. (2 cr; max 8 cr; SP- Psychology PhD student; A-F only) Contemporary theoretical positions and related research.

Psy 8206. Proseminar: Research in Social Psychology. (2 cr; max 6 cr; SP- Psychology PhD student, 8205; A-F only) Contemporary theoretical positions and related research.

Psy 8207. Social Psychology History and Systems. (3 cr; SP- Psychology PhD candidate in soc psychology or #; A-F only) Classic theories and research that have shaped contemporary social psychology.

Psy 8208. Social Psychology: The Self. (3 cr; SP- Psychology background especially in social psychology; A-F only) Social psychological theory and research concerning the self and social behavior.

Psy 8209. Research Methods in Social Psychology. (3 cr; SP- 5002 or 8201; SP- Grad psychology major; A-F only) Experimental and quasi-experimental methods suitable for research in social psychology. Statistical, interpretive, operational, and ethical issues.

Psy 8211. Proseminar in Political Psychology I. (1 cr; SP- Grad pol psychology minor; S-N only) Readings, discussion, and guest speakers. Topics vary.

Psy 8212. Proseminar in Political Psychology II. (1 cr; SP- Grad pol psychology minor; S-N only) Readings, discussion, and guest speakers. Topics vary.

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) Lectures and discussions in 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 psychology grad student or #) Introduction to history of counseling psychology and to primary theoretical orientations used by counseling psychologists. For each theory: basic principles, application to counseling practice, and research support.

Psy 8502. Assessment in Counseling Psychology. (3 cr; SP- Counseling psychology grad student, 8501 or #) Principles and practice, emphasizing psychometric assessment. History, foundations in measurement, basic methods, survey of instruments, test interpretation evaluation, ethics.

Psy 8503. Interviewing and Intervention. (3 cr; SP- 8501, 8502; SP- 8501, 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 psychology grad student, 8501, 8502, 8501 or equiv; S-N only) Beginning applied experiences in counseling psychology settings.

Psy 8511. Counseling Psychology Beginning Practicum: General. (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.

For definitions of course numbers and symbols, see inside back cover.
Psyc 8512. Counseling Psychology Beginning Practicum I. [1-6 cr; SP] Counseling psychology grad student; 8501, 8502, 8503 or equiv, #; S-N only) Beginning applied experiences in counseling psychology settings.

Psyc 8514. University Counseling Practicum I. [6-7 cr; SP] Counseling psychology grad student, 8501, 8502, 8503 or equiv, #; S-N only) Integrates science with supervised practice in University Counseling and Consulting Services (UCCS) involving career, academic, and personal counseling clientele.

Psyc 8515. University Counseling Practicum II. [6-7 cr; SP] Counseling psychology grad student, 8501, 8502, 8503 or equiv, #; S-N only) Integrates science with supervised practice in University Counseling and Consulting Services (UCCS) involving career, academic, and personal counseling clientele.

Psyc 8541. Seminar: Multicultural Issues in Counseling Psychology. (2 cr; SP) Increases counselors’ sensitivity to cultural biases they bring to their work, including those that derive from professional training. Counseling strategies for diverse populations. Lectures, guest speakers, videos, group discussions, oral and written presentations; includes professional development action plan.

Psyc 8542. Ethics in Psychology. (2 cr; SP) Ethical principles and codes of conduct for psychologists. Ethical dilemmas faced by researchers, practitioners, and teachers.

Psyc 8544. Counseling Psychology: Research Seminar I. [2 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.

Psyc 8545. Counseling Psychology: Research Seminar II. [2 cr; SP] Counseling psychology grad student, 8501, 8502, 8503 or equiv, #; S-N only) Introduction to methods and content domains, including research design, methodological issues, analogue research, and process and outcome research.

Psyc 8550. Assessment: WAIS-R. (2 cr; SP) Skills acquisition for administering, scoring, and summarizing WAIS-R scaled scores and raw scores, and developing interpretation of results.

Psyc 8554. Assessment: Vocational Interest and Career Instruments. (2 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.

Psyc 8560. Counseling Psychology Advanced Practicum I: 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 seminar that may include guest speakers, readings, and student presentations on topics relevant to clients and settings of practice experiences.

Psyc 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 seminar that may include guest speakers, readings, and student presentations on topics relevant to clients and settings of practice experiences.

Psyc 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 seminar that may include guest speakers, readings, and student presentations on topics relevant to clients and settings of practice experiences.

Psyc 8564. Vocational Counseling for Work Adjustment. [1 cr; SP] Counseling psychology grad student or #; A-F only) Topics and problems. Research, operationalization, and application of theory of work adjustment to vocational counseling.

Psyc 8565. Counseling Psychology Advanced Practicum I: 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 and vocational testing, assessment, and decision making.

Psyc 8566. Counseling Psychology Advanced Practicum II: 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 and vocational testing, assessment, and decision making.

Psyc 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 and vocational testing, assessment, and decision making.

Psyc 8571. Counseling Psychology Internship. [1-12 cr; SP] Counseling psychology grad student, PhD candidate, #; S-N only) Field experience in professional work in clinical settings.


Psyc 8612. Assessment II. [4 cr; SP] Clinical psychology grad student; A-F only) Theory and practice in clinical application of assessment techniques and interviewing. Lab: observations, administration, scoring, interpretation.

Psyc 8620. Clinical Psychology Practicum. [1-18 cr; SP] Clinical psychology grad student; S-N only) Field experience in professional work in clinical settings.

Psyc 8621. Clinical Intervention I. [1 cr; SP] Clinical psychology grad student; A-F only) Individual and group treatment techniques. Lectures and demonstrations of contemporary theories of methods of intervention with adults and children.

Psyc 8622. Clinical Intervention II. [1 cr; SP] Clinical psychology grad student; A-F only) Theories of intervention and applications of clinical methods.

Psyc 8640. Research Seminar. [2 cr; SP] Clinical psychology grad student; S-N only) Current topics for first-year clinical psychology graduate students.


Psyc 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.

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

Psyc 8701. Seminar in Industrial and Organizational Psychology I. [3 cr; SP; A-F only) Application of research and theory in psychological measurement and individual differences to problems in job analysis, personnel selection and classification, and individual training.

Psyc 8702. Seminar in Industrial and Organizational Psychology II. [3 cr; SP; A-F only) Addresses determinants of individual behavior, performance, and job satisfaction that can be influenced after an individual enters an organization. Application of research and theory in motivation, social psychology, and human factors to enhancement of job performance and satisfaction.

Psyc 8703. Seminar in Industrial and Organizational Psychology III. [3 cr; SP; A-F only) Developing issues and trends in current research, research methodological advances, and implementation practices. Recent important and controversial developments.

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

Psyc 8881. Seminar: Psychometric Methods. [1 cr; SP; #) Reviews and individual research on current topics in psychological measurement and statistics.

Psyc 8884. Methods for Multivariate Data Analysis. [3 cr; SP; #) Methods for repeated measures and longitudinal data. Linear mixed-effects model. Treatment of missing data and unbalanced designs. Extensions to conditionally linear and nonlinear models. Exercises with software such as HLM and SAS PROC MIXED.

Psyc 8888. Thesis Credits: Doctoral. [1-18 cr; SP; Max 18 cr per semester or summer; 24 cr required]

Psyc 8935. Readings in Behavioral Genetics and Individual Differences Psychology. [1 cr; SP; Max 18 cr] Each week participants read and discuss one or two primary research articles.

Psyc 8937. Seminar in Human Behavioral Genetics. [2 cr; SP; Max 18 cr; #; A-F only) Advanced topics vary. Sample topics: gene identification in complex human traits, behavioral genetics of alcoholism, and twin-family methodology.

Psyc 8990. Research Problems. [1-6 cr]

Psyc 8993. Directed Studies: Special Areas of Psychology and Related Sciences. [1-4 cr; SP; Max 18 cr per semester or summer; 12 cr required]

Psyc 8995. Research Problems. [1-4 cr]
Public Affairs (PA)
Hubeit 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 hth or #; A-F only)
Evolution of intellectual 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 structure/ 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 hth 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 resolution.

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 hth or #; A-F only)
Basic financing concepts and tools used in public and nonprofit organizations. Fund accounting, balance sheet and income statement analysis, cash flow analysis, and public sector 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. (1.5 cr; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hth or #; A-F only)
History and institutional development of urban planning as a profession. Roles of urban planners in United States and international settings. Scope, legitimacy, and limitations of planning and planning process. Issues in planning ethics and in planning in settings of diverse populations and 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 hth or #; A-F only)
Survey course examines challenges facing higher-level managers in public and nonprofit organizations in a mixed economy and democratic republic. Uses lectures and case study to explore distinctive features of public and nonprofit management, skills necessary for effective management, and manager’s role as a creator of public value.

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 hth 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. Concepts of political philosophy. Theories of the state. Team taught interdisciplinary course with small discussion 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 hth or #; A-F only)
Role of law in regulating and shaping urban development, land use, environmental quality, and local and regional governance services. Interface between public and private sector.

PA 5021. Economics for Policy Analysis and Planning. (1.5 cr; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hth or #; A-F only)
Introduction to a selection of 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. (5 cr; OP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hth or #; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hth or #; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hth or #; A-F only)
Application of economic reasoning to a variety of public policy issues that may vary by section. Includes cost-benefit analysis, nonmarket 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 hth or #; A-F only)
Basic statistical tools for empirical analysis of public policy alternatives. Frequency distributions, descriptive statistics, elementary probability and probability distributions, statistical inference, estimation and hypothesis testing, cross-tabulation and chi-square distribution, analysis of variance, correlation, simple and multiple regression analysis.

PA 5032. Intermediate Regression Analysis. (1.5 cr; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hth or #; A-F only)
Bivariate and multivariate models of regression analysis and assumptions behind them. Problems using these models when such assumptions are not met.

PA 5033. Multivariate Techniques. (1.5 cr; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hth or #; A-F only)
Introduction to applied multivariate techniques (e.g., descriptive, experimental, case study, structural equation, and econometric) with emphasis on the design, conduct, and analysis of research.

PA 5034. Community Analysis and Planning Techniques. (1.5 cr; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hth or #; A-F only)
Survey research methods emphasizing applications to public and applied research. Research design choices (e.g., descriptive, experimental, case studies), sampling, variable specification and measurement, conducting interviews, mailed questionnaires, qualitative techniques.

PA 5035. Survey Research and Data Collection. (1.5 cr; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hth or #; A-F only)
Introduction to survey 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 5101. Management and Governance of Nonprofit Organizations. (1.5 cr; SP–Grad or publ hth or adult special student or #)
Draws on theories, concepts, and real world examples to explore critical managerial challenges. Governance systems, strategic management practices, impact of different funding environments, management of multiple constituencies. Examines different types of nonprofits using economic and behavioral approaches.

PA 5102. Organization Design and Change. (1.5 cr; SP–Grad or publ hth or adult special student or #)
Introduction to basic concepts related to organizational design and managerial challenges associated with organizational change in the context of public sector agencies and nonprofit organizations. Major forces for change, different kinds of change, and management of change. Uses case-based analysis and discussion.

PA 5111. Financial Management in Public and Nonprofit Organizations. (3 cr; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hth or #; A-F only)
Design, installation, and use of accounting and control systems in public and nonprofit organizations. Public accounting standards and practices, financial administration and financial reporting, debt management, budgeting, and contract and procurement management systems. Lecture and discussion with case analysis.

PA 5112. Public Budgeting. (4 cr; SP–Grad or publ hth or adult special student or #)
Budget processes in legislative and executive branches of federal, state, and local government; program planning evaluation and administration; techniques of budget and program analysis; use of budget as policy and management tool; analysis of fund flows within and among governments.

PA 5113. State and Local Public Finance. (3 cr; SP–Grad or publ hth or adult special student or #)
Examines theory and practice of financing and providing public services at the state and local levels of government. Emphasis on integrating theory and practice, applying the materials to specific policy areas, and documenting the wide range of institutional arrangements across and within the fifty states.

PA 5115. State and Local Public Services and Finance. (3 cr; SP–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hth or #; A-F only)
Organizations, delivery, economic analysis, and finance of state and local public services and functions.

PA 5121. Intergovernmental Relations. (3 cr; SP–Grad or publ hth or adult special student or #)
Theory and practice of intergovernmental relations in the United States. Historical, political, and economic roots of contemporary institutions. Intergovernmental dimensions of specific policy areas. Policy areas include education, economic development, metropolitan affairs, social welfare, and other areas of state interest.

PA 512. Law and Public Affairs. (3 cr; SP–Grad or publ hth or adult special student or #)
Public policy making is shaped and constrained by the national, state, and local legal framework in which it occurs. Broad overview of the evolution of the American legal system. Role of courts, legislatures, and political actors in changing law. How law is used to change public policy.

PA 5123. Financial and Development Strategies for Nonprofit and Public Organizations. (1.5 cr; SP–Grad or publ hth or adult special student or #)
Nonprofit agencies are becoming the service delivery arm of the government. This course examines nonprofit and public sector financial and development strategies, the political strategies they use to obtain funding, and philanthropy’s historical role in public affairs. Includes guest speakers.

PA 5131. Conflict Management: Readings in Theory and Practice. (3 cr; SP–Grad or publ hth or adult special student or #)
Current theory; review of conflict resolution strategies. Various aspects of interpersonal, group, organizational, and systemic conflict.

PA 5190. Topics in Public and Nonprofit Leadership and Management. (3 cr; SP–Grad or publ hth or adult special student or #)
Analysis of selected topics.
PA 5202. American Cities II: Economy, Land Use, and Transportation. (3 cr; SP–Grad or publ hllth or adult special student or #) Urban economy and its locational requirements; central place theory; transportation and urban land use, partnerships; industrial and commercial land blight; real estate redevelopment; historic preservation; emphasis on links between land use, transportation policy, economic development, and local fiscal issues. U.S. and Canadian contexts.

PA 5203. Geographical Perspectives on Planning. (4 cr; SP–Grad or publ hllth or adult special student or #) Open to undergraduate and graduate students wishing honors credits. Includes one additional weekly seminar-study meeting and a bibilography project on a topic selected in consultation with the instructor.

PA 5211. Introduction to Land Use Planning. (3 cr; SP–Grad or publ hllth or adult special students or #) Topics in spatial analysis or work experience demonstrating knowledge of field; # for undergrad sr and adult special in UC

PA 5212. Managing Urban Growth and Change. (3 cr; SP–Grad or publ hllth or adult special student or #) Theory and practice of planning, promoting, and controlling growth and change in urban areas. Economic development tools available to state and local policymakers; historic context of their use in the United States; legal, social, and economic implementation constraints; interactions among economic, social, and demographic trends.

PA 5221. Private Sector Development. (3 cr; SP–Grad or publ hllth or adult special student or #) Roles of various participants in the land development process; land speculation, migration, and regulation of industry. Overview of the development process from both public and private perspective.

PA 5231. Transportation Policy and Planning. (3 cr; SP–Grad or publ hllth or adult special student or #) Urban transportation planning and policy-making process, including relationship of transportation to demographics, economic development, land use, and the environment. Transportation system management, demand management, public mass transit systems. Includes field projects in transportation planning.

PA 5241. Environmental Planning. (3 cr; SP–Grad or publ hllth or adult special student or #) Provides basic knowledge and skills for environmental planning practice. Relationship between natural resources, ecology, and urban development, and the planning design principles in balancing these; legal and regulatory context of environmental planning; and methods of environmental impact analysis.

PA 5251. Strategic Planning and Management. (1.5 cr; SP–Grad or publ hllth or adult special student or #) Theory and practice of strategic planning and management for governments, public agencies, and nonprofit organizations. How to promote strategic thinking and acting by policy-making bodies and management teams in order to determine what an organization should do, how it should do it, and why. Lectures and case discussions.

PA 5252. Strategy and Tactics in Project Planning and Management. (1.5 cr; SP–Grad or publ hllth or adult special student or #) Planning, analysis, evaluation, and implementation of short-term plans and projects. Technical analyses and interactional elements of completing projects within budget and time constraints. Appropriate strategic and tactical choices involved in the planning process.

PA 5253. Participatory Management and Public Involvement through Planning. (3 cr; SP–Grad or publ hllth or adult special student or #) Survey of strategies, techniques, and tools for involving members of groups, teams, organizations; and various media to influence public at large in problem definition, policy or plan formulation, decision making, and implementation. Emphasis on public and nonprofit organizations and citizen involvement.

PA 5261. Housing Policy. (3 cr; SP–Grad or publ hllth or adult special student or #) Explores institutional and environmental setting for the making of housing policy in the United States. Competing ideas about solving the nation’s housing problems through public intervention in the market. Federal and local public sector responses to housing problems.

PA 5290. Topics in Planning. (3 cr; SP–Grad or publ hllth or adult special student, #) Analysis of selected topics.

PA 5301. Population Methods and Issues for the United States and the World. (3 cr; SP–Grad or publ hllth or adult special student or #) Basic demographic measures and methodology. Discussion of readings on population growth and environment; development and implementation of fertility; diversity perspectives on nonmarital fertility, marriage, divorce, and cohabitation; cultural differences in family structure; aging; migration; refugee movements; population policies.

PA 5311. Program Evaluation. (3 cr; SP–Grad or publ hllth or adult special student or #) Principal methods and primary applications of evaluation research as applied to policies and programs in health and human services, education, or the environment. Enables students to conduct evaluations and to be more critical consumers of studies done by others.

PA 5390. Topics in Advanced Policy Analysis Methods. (3 cr; SP–Grad or publ hllth or adult special student, #) Analysis of selected topics.

PA 5401. Poverty, Inequality, and Public Policy. (3 cr; SP–Grad or publ hllth or adult special student or #) The nature and extent of poverty and inequality in the United States, its causes and consequences, and the impact of government programs and policies. Extent and causes of poverty and inequality in other developed and developing countries.

PA 5411. Child Development and Social Policy. (3 cr; SP–Grad or publ hllth or adult special student or #) Intersection of conceptual orientations of developmental psychology with policies that affect children and families. Demographic, historical, and social trends that underlie assumptions driving policies directed at women and children; projections of future policies.

PA 5412. Aging and Disability Policy. (3 cr; SP–Grad or publ hllth or adult special student or #) Policy debates concerning populations that are aging or disabled. Students learn and practice analyses in context of important health, social, and economic policy debates. Readings on current theory and evidence.

PA 5421. Racial Inequality and Public Policy. (3 cr; SP–Grad or publ hllth or adult special student or #) Seminar explores historical roots of racial inequality in American society; contemporary economic consequences. Provokes open debate and discourse on public policy responses to racial inequality. Emphasis on stimulating participants to think about and analyze critically the range of strategies offered for reducing racism and racial economic inequality.

PA 5431. Labor Policy. (3 cr; SP–5031 or equiv, graduate or publ hllth or adult special student or #) Public policies regarding employment, unions, and other institutions in the labor markets. Public programs affecting employment, training, mobility, security, and quality of work life. Policy implications of changing nature of work.

PA 5441. Education Policy and the State Legislatures. (3 cr; SP–Grad or publ hllth or adult special student or #) How the Minnesota legislature makes decisions about education issues. (Discussions focus on K-12 issues, but there are many implications for higher education.) Discussions with people influencing statewide educational policy, presentations, and a field trip to the state legislature.

PA 5442. Policy Design for Education and Human Development. (3 cr; SP–Grad or publ hllth or adult special student or #) Develops skills useful in designing effective educational policies. Practice using interdisciplinary approaches to identify and understand core variables (economic, psychological, etc.) that make the difference between policy success or failure. Opportunity to work on policy design tasks using multiple perspectives.

PA 5490. Topics in Social Policy. (3 cr; SP–Grad or publ hllth or adult special student, #) Analysis of selected topics.

PA 5501. Economic Development I. (1.2 cr; SP–Grad or publ hllth or adult special student or #) Economic development theories and strategies at national and regional levels in developing countries and the United States. Redistributions and basic needs strategies, institutional approaches, dependency and Neo-Marxist approaches, gender and development, sustainable development, effects of globalization on world cities, and communities, public policy responses.

PA 5502. Economic Development II. (2 cr; SP–5502 or equiv, graduate or publ hllth or adult special student or #; SP–5501 or equiv, graduate or publ hllth or adult special student or #) Economic development from a macroeconomic and open-economy perspective. Sources of economic growth; agricultural development; import-substitution industrialization; endogenous growth models; distribution, migration, and human development; policy reform and adjustment.

PA 5511. Community Economic Development. (3 cr; SP–Grad or publ hllth or adult special student or #) Contexts and motivations behind community economic development activities; alternative strategies available to communities for organizing and initiating economic development projects; tools and techniques for conducting economic development analysis and planning—market analysis, feasibility studies, development plans, implementation; public policy at the local level.

PA 5521. Development Planning and Policy Analysis. (3 cr; SP–5031 or equiv, 5502 or equiv, graduate or publ hllth or adult special student or #; SP–5501 or equiv, graduate or publ hllth or adult special student or #) Developing skills useful in designing effective educational policies. Practice using interdisciplinary approaches to identify and understand core variables (economic, psychological, etc.) that make the difference between policy success or failure. Opportunity to work on policy design tasks using multiple perspectives.
Courses

PA 5590. Topics in Economic and Community Development. (3 cr; SP–Grad or publ hlt or adult special student or #) Analysis of selected topics.

PA 5601. Survey of Women, Law, and Public Policy in the United States. (3 cr; SP–Grad or publ hlt or adult special student or #) Gendered nature of public policy through historical analysis of welfare, single motherhood, and protective legislation. How laws structure public policy and how courts are arenas for policy making. Emphasis on employment discrimination and reproductive rights. Differences among women. Intersections of oppression based on class/race/sexual orientation.

PA 5611. Feminist Economics. (3 cr; QP–5010, grad or publ hlt or adult special student or #) Feminist philosophy, methodology, and economic practice; feminist perspectives on development and the global economy; feminist perspectives on work and family; heterodox traditions in economics.

PA 5690. Topics in Women and Public Policy. (2–3 cr; SP–Grad or publ hlt or adult special student or #) Analysis of selected topics.

PA 5701. Science and State. (3 cr; SP–Grad or publ hlt or adult special student or #) Relationship between science and contemporary society—its ways of knowing, its values, its processes; how science has influenced U.S. political institutions and political and judicial processes; issues in current debate over U.S. science policy.

PA 5711. Science and Technology Policy. (3 cr; SP–Grad or publ hlt or adult special student or #) Effect of science and technology on global economy, politics, environment, security. Role of national science and technology policies in development, diffusion, and adoption of technologies nationally and internationally. Other issues related to technology, technology policy, technological development, impact of technology, international cooperation.

PA 5721. Energy and Environmental Policy. (3 cr; Grad or publ hlt or adult special student or #) Impact of energy production and consumption choices on environmental quality, sustainable development, and other economic and social goals. Emphasis on public policy choices for both energy and the environment and the links between them.

PA 5722. Environmental and Resource Economics Policy. (3 cr; SP–Grad or publ hlt or adult special student or #) Knowledge of intermediate microeconomics and policy analysis. Public decision making with natural resource use and environmental protection. Develops/applies economic concepts/methodologies/policy mechanisms. Principles of environmental and resource economics; issues related to renewable/nonrenewable resources and environmental pollution. Focus on scientific and political aspects of policy.

PA 5790. Topics in Science, Technology, and Environmental Policy. (3 cr; SP–Grad or publ hlt or adult special student or #) Analysis of selected topics.

PA 5801. U.S. Foreign Policy: Process and Analysis. (3 cr; SP–Grad or publ hlt or adult special student or #) Examines both U.S. general diplomacy and foreign economic policy with an emphasis on analysis. Broad security strategy; policy towards specific, geographic regions; trade, investment, and monetary policy; immigration policy; and environmental cooperation.

PA 5811. Public Policy Problems of Globalization. (3 cr; SP–Grad or publ hlt or adult special student or #) Policy problems facing national and subnational decision makers and some increasing international mobility of goods, services, capital, persons, and ideas.

PA 5812. Open Economy Models: An Assessment. (3 cr; SP–Grad or publ hlt or adult special student or #) Intermediate macroeconomics and trade theory) Understanding open economies and implications for where policy making and implementation take place. Issues at the international level and from the level of domestic economies.

PA 5890. Topics in Foreign Policy and International Affairs. (3 cr; SP–Grad or publ hlt or adult special student, #) Analysis of selected topics.

PA 5901. Computer Applications in Public Affairs. (0.5–3 cr [max 6 cr] SP–Grad or publ hlt or adult special student or #; S–5 N only) Introduction to computer systems and applications as used in public affairs practice.

PA 5921. Application of Mediation Methods. (3 cr; SP–Grad or publ hlt or adult special student or #) Current topics in conflict management research and practice. Theoretical implications and practical applications of conflict management from the perspectives of each participant. National and international issues.

PA 5923. Conflict Management Proseminar. (1 cr; SP–Grad or publ hlt or adult special student or #) Current topics in conflict management. Theoretical implications and practical applications of conflict management from the perspectives of each participant. National and international issues.

PA 5931. The Role of the Media in Public Affairs. (3 cr; SP–Grad or publ hlt or adult special student or #) Historical and contemporary role of news media in defining and shaping public opinion and public policy, primarily in the United States. Emphasis on critical research and professional skills in three forms of journalism: hard news coverage, investigative reporting, and documentaries. Field experience and practice in governmental public relations.

PA 5941. Leadership for the Common Good. (4 cr; SP–Complete enrollment request form, which is approved by instructors) Advances participants’ understanding of practice of leadership in pursuit of the common good. Attention given to many aspects of leadership: personal, team, organizational, visionary, political, and ethical. Emphasis on building and experiencing a learning community.

PA 5951. Global Commons Seminar. (3 cr [max 6 cr]; QP–International Hubert H. Humphrey Fellows; SP–International Hubert H. Humphrey Fellows; S–5 N only) Meets specific needs of International Humphrey Fellows. Topics vary depending on the interests and needs of the fellows.

PA 5961. Seminar: Leadership, You, and the World. (4 cr; SP–Grad or #; A–F only) Leadership theory, community building and social change, and systems thinking. Students conduct/present research on leadership models through literature review, internships, and study groups. Study groups produce major paper describing research project. Participants assemble portfolio demonstrating their leadership learning at University student.

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 explorations 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–Grad PA major or #; A–F only) Development of public policy to advance public interest and common good. Recommendations flow from interdisciplinary understanding of problem, stakeholder analyses, and policy development, and address political feasibility, marketing, entrepreneurship, and advocacy questions.

PA 8105. Human Resources and Organizational Performance. (2 cr; QP–5022, 5012 or equiv; SP–5023, 5022 or equiv) Analysis of selected topics. Knowledge of human resource policies and practices on organizational productivity and effectiveness. Role of government, unions, and private sector institutions on organizational effectiveness.

PA 8181. Capstone Workshop in Public and Nonprofit Leadership and Management. (3 cr; SP–Grad major in PA or planning or sci, tech, and environ policy who has completed core courses or #; A–F only) Project is completed for external client on issue agreed upon by student, client, and instructor. 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.

PA 8182. Capstone Seminar in Public and Nonprofit Leadership and Management. (3 cr; SP–Grad major in PA or planning or sci, tech, and environ policy who has completed core courses or #; A–F only) Facilitates completion of research paper on current issue in public affairs. 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.

PA 8183. Managing Collaborations. (3 cr; A–F only) Management challenges of operating within multiparty (combination of nonprofit, for-profit, and public enterprises) collaborations formed to deal with social problem. Combination of conceptual materials with application in community. Student teams work half for a semester with local collaborations on management problems.

PA 8186. Public Services Redesign. (3 cr; A–F only) Theory, strategy, politics, and some practical mechanisms required to adapt public service system given constraints on resources and continuing pressure for effectiveness and equity. In-class and out-of-class interviews 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. (3 cr; SP–#) Analysis of selected topics.
PA 8203. Housing, Community Development, and Social Policy. (3 cr; SP: Grad PA major or A-F only) 
Policymaking and politics of planning in housing, community development, and social policy. Interconnectedness of these policy arenas with reference to legislative, political, and legal processes. Role of institutional decision-making structures on policy outcomes; importance of citizens, social movements, and interest groups in policymaking process.

PA 8281. Case Study in Planning. (3 cr; SP: Grad major in PA or planning or sci, tech, and environ policy who has completed core courses or A-F only) 
Project is completed for client on issue agreed upon by student, client, and instructor. 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.

PA 8682. Capstone Seminar in Women and Environmental Policy. (3 cr; SP: A-F only) 
Uses social movement literature and histories of U.S. second-wave feminism to study feminist organizations. Recurring 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 8991. Independent Study. (1-3 cr; SP: A-F only) 
Analysis of selected topics.

PA 8977. Thesis Credits: Master’s. (1-18 cr; SP: Max 18 cr per semester or summer; 10 cr total required [Plan A only])

PA 8781. Capstone Workshop in Science, Technology, and Environmental Policy. (3 cr; SP: Grad major in PA or planning or sci, tech, and environ policy who has completed core courses or A-F only) 
Project is completed for external client on issue agreed upon by student, client, and instructor. 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.
Public Health (PubH)

**School of Public Health**

**PubH 5003. Fundamentals of Alcohol and Drug Abuse.** (1.5 cr; QP–5003; ed student or #; SP–5003; 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–#; SP–#)
Generalized, function- or discipline-oriented community experience under academic and professional supervision. Emphasis on applying acquired knowledge and skills to relevant health issues and problems.

**PubH 5005. Topics in Public Health.** (1-10 cr; max 20 cr)
Advanced proposal, #; SP–Advanced proposal, #
Directed instruction, including discussion on selected readings.

**PubH 5010. Public Health Interventions to AIDS.** (3 cr; QP–Upper div or grad or professional school student or #; SP–Upper div or grad or professional school student or #)
Survey of HIV infection from a public health perspective emphasizing intervention.

**PubH 5017. Culture and Health Behavior.** (2 cr; QP–Grad or professional school student or #; SP–Grad or professional school student or #)
Heightens cultural sensitivity regarding public health practice and individual health behaviors. Cultural diversity and its impact on health behaviors; etc (universal) and emic (culture-specific) approaches.

**PubH 5030. Prevention of High-Risk Behavior Among Adolescents.** (2 cr; QP–Grad-level behavioral sci course. [5050 preferred], che or pub hlt nutr or epi MPH or epi grad major or #; SP–Grad-level behavioral sci course [5050 preferred], che or pub hlt nutr or epi MPH or epi grad major or #; second-yr master’s student recommended; SP–Grad-level behavioral sci course [5050 preferred], che or pub hlt nutr or epi MPH or epi grad major or #; second-yr master’s student recommended; A-F only)
Definitions and etiology of high-risk behaviors among adolescents; intervention programs. Review of current literature. Students design prevention program overview based on theory and etiological data using health education/behavior change methods.

**PubH 5035. Applied Research Methods.** (3 cr; QP–5414 or 5450 or equiv, 5806 or 5852 or equiv, che or pub hlt nutr major or #; SP–5414 or 5450 or equiv, 5036 or 5801 or equiv, che or pub hlt nutr major or #; 5420 recommended)
Complements master’s project work using forms, questionnaires, interviews. Literature searching, questionnaire development, scale construction, item analysis, data coding, entry and analysis, and report writing. Students use computer software package to develop questionnaire and conduct data analysis.

**PubH 5036. Program Evaluation for Community Health Education.** (3 cr; QP–Che major or #; SP–Che major or #)
Developing useful program evaluations; emphasis on skills for program administrators, planners. Needs assessments, evaluations, program efficacy, implementation studies, and outcome evaluations; quantitative and qualitative data collection methods; ethical considerations.

**PubH 5040. Dying and Death in Contemporary Society: Implications for Intervention.** (2 cr; QP–Pub hlt hth or ed or hlt sci major or mort sci or #; SP–Pub hlt hth or ed or hlt sci major or mort sci or #)
Concepts, attitudes, ethics, and lifestyle management related to dying, death, grief, and bereavement. Emphasis on preparing community health and helping professionals and educators for educational activities in this area.

**PubH 5049. Legislative Advocacy Skills for Public Health.** (3 cr; QP–5390 or 5398, #; SP–5390 or 5398, #; A-F only)
State legislature as arena for public health practice; develops skills necessary to operate in that arena. Analyzes emergence, development, and resolution of legislative issues in public health importance.

**PubH 5050. Community Health Theses 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; QP–Hhlth sci professional school student or hlt sci or social 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 5084. Internship in Health Education Practice I.** (1-10 cr; QP–Che major or #; SP–Che major or #)
Supervised health education internship in a health or public health setting under academic and professional supervision. Applying community health education knowledge and skills to relevant health issues and problems.

**PubH 5085. Internship in Health Education Practice II.** (1-10 cr; QP–Che major or #; SP–Che major or #)
Supervised health education internship in a health or public health setting under academic and professional supervision. Applying community health education knowledge and skills to relevant health issues and problems.

**PubH 5090. Research Topics in Health Education.** (2-8 cr; QP–Che major or #; SP–Che major or #)
Review of health education research and experience in a selected area.

**PubH 5096. Community Health Education Master’s Research Project.** (1-10 cr; QP–Che major or #; SP–Che major or #)
Original research in, or secondary analysis of, data sets related to health education.

**PubH 5100. Topics in Environmental and Occupational Health.** (1-4 cr; max 20 cr; QP–Eh major or #; SP–Eh major or #; S-N only)
Directed readings and discussion of problems.

**PubH 5101. Environmental and Occupational Health Master’s Project.** (1-3 cr; QP–Eh major or #; SP–Eh major or #; 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.** (2 cr; QP–Eh major or #; SP–Eh major or #; A-F only)
Nature, effects, and regulation of exposure to biological, physical, and chemical hazards in the environment, placing them in context of inter- and multidisciplinary scientific field of environmental health as an essential component of wider field of public health.

**PubH 5104. Toxicology and Epidemiological Methods for Evaluating Environmental Health Effects.** (2 cr; QP–Eh major or #; SP–Eh major or #; A-F only)
Identification of mechanisms and effects on human health of environmental agents, including chemical, biological, and physical 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, proposals and approaches for regulatory reform, approaches to policy analysis, and overall phases and issues in the policy-making process.

**PubH 5110. Environmental and Worker Protection Law.** (4 cr)
Law protecting public health and conserving the environment: 1) common law that evolved as courts settled private disputes; 2) 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 hlt hth or grad or honors undergrad student or #; SP–Pub hlt hth or grad or honors undergrad student or #; Interdisciplinary approach to pollution problems, including sustainability, pollution prevention, risk assessment, regulatory reform, and strategic environmental management.

**PubH 5112. Risk Analysis: Application to Risk-Based Decision Making.** (3 cr; QP–Pub hlt hth or grad student or #; SP–Pub hlt hth 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 hlt hth or grad student or #; SP–Pub hlt hth or grad student or #)
Introduction to and overview of policy making in public health and the environment characterized by substantial risk and uncertainty. Basic mathematics of decision making under risk and uncertainty, the cognitive psychology of how people react to risk, and methods of risk communication.

**PubH 5120. Injury Prevention in the Workplace, Community, and Home.** (2 cr)
Injury epidemiology: analyses of major injury problems affecting the public in the workplace, community, and home using epidemiologic model and conceptual framework: student sets related to health education.

**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 work-related illnesses; overall regulatory framework governing occupational health and safety.

**PubH 5140. Occupational Epidemiology.** (2 cr; QP–Basic course in epi and biostats; SP–Basic course in epi and biostats)
Principles and concepts in identifying health effects in the workplace; strategies for identifying excess risk, evaluating strengths and weaknesses of research techniques, assessing bias and 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. Physical Disposition of Xenobiotics. (2 cr; QP–Environ in biochem, mol biol, org chem or #; SP–1 course each in biochem, mol biol, org chem or #) Pharmacokinetics/toxicokinetics and xenobiotic metabolism. Mechanisms by which phase I and phase II enzymes affect xenobiotics and unify 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 laws (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. Theory and Practice of Occupational Health and Safety. (3 cr; QP–Eh major or #; SP–Eh major or #) Introduction to major concepts and issues in occupational health and safety. Application of public health principles and decision-making process in relation to prevention of injury and disease, health promotion of workers, and protection of worker populations from environmental hazards. Observational visit to manufacturing facility.

PubH 5171. Properties, Behavior, and Measurement of Environmental Airborne Contaminants. (4 cr; QP–Eh major, industrial hygiene specialty or equiv or #; SP–Eh major, industrial hygiene specialty or equiv or #; A-F only) Nature of airborne contaminants in outdoor and indoor environments, emphasizing workplace environments. General physical properties of matter in gaseous and aerosolized forms. Measurement and characterization of airborne concentrations of pollutants and human exposures to them. Setting of health-related environmental standards.

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. Practice 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. (4 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 and living environments, ionizing/non-ionizing radiations (including lasers and ultraviolet, visible and infrared light), noise and vibration, and heat and cold stress; dose, response, and engineering interventions.

PubH 5174. Control of Exposure to Environmental Airborne Contaminants. (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 exposures to airborne contaminants, both gaseous and aerosol; science and practice of process control and exhaust ventilation in workplaces and other indoor air spaces, and air cleaning; control of emissions to the ambient environment.

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 risk assessment, 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 #) Overview air, water, and soil chemistry; pertinent environmental problems; human and ecological multimedia exposures to chemicals in the environment.

PubH 5200. Environmental Health. (2 cr) Principles of environmental health relating to macro- and micro-environments and to products consumed or used by people.

PubH 5201. Issues in Environmental and Occupational Health. (2 cr; QP–Pub hith student or #; SP–Pub hifth 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 and 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 evaluation 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 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 exhaust systems.

PubH 5320. Fundamentals of Epidemiology. (3 cr; QP–Pub hith or grad student or #; SP–Pub hith or grad student or #) Basic concepts and knowledge of epidemiology, a 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 factors; underlying spread of infectious disease; laboratory applications of statistical and epidemiologic methods.

PubH 5333. Principles of Human Behavior. (1 cr; QP–Che or epi major or #; SP–Che or epi major or #; A-F only) Theoretical perspectives on etiology and modification of health behavior in individuals and communities.

PubH 5335. Epidemiology and Control of Infectious Diseases. (2 cr; QP–Epi major or #; SP–Epi major or #) Principles and methods. Strategies for disease control and prevention, including immunization. Relevance of modes of transmission of specific agents for disease spread and prevention. Public health consequences of infectious diseases at local, national, and international levels.

PubH 5336. Advanced Seminar in Infectious Disease Epidemiology. (1 cr [max 2 cr] QP–SP–5330, 5335, #; SP–5330, 5335, #; S-N only) How infectious disease epidemiologic principles are applied in the “real world” to contemporary or controversial issues, including development of prevention and control strategies.

PubH 5340. Epidemiology II. (1 cr; QP–SP–5330, 1 biostats course or SP–SP–5330, 1 biostats course or #) Principles of disease occurrence; strategies and design principles for etiologic and evaluative studies. Measurement of problems, interactions, sensitivity and precision, validity, and need for data specification and control of variables.

PubH 5345. Epidemiologic Methods: Data Collection. (QP–5240, 5330, 5335, #; SP–5240, 5330, 5450, epi MPH major or #; SP–SP–5240, 5330, 5450, epi MPH major or #) Methods and techniques for collecting and managing epidemiologic research data, including practical aspects of sampling, responses and bias, forms design, selection and training of interviewers, and data preparation, entry, cleaning, and management. Ethical issues in research.

PubH 5348. Writing Research Grants. (1 cr; QP–Epi grad major or prestats student or #; SP–Epi grad major or prestats student or #; S-N only) Focuses on NIH-type grants. Mechanics of grant development and writing, principles of informed consent, budget development, grant-review process, identifying funding sources.

PubH 5356. 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 especially important. Scope of epidemiologic studies of older populations; most prevalent health conditions.

PubH 5370. Alcohol and Other Drugs: Epidemiology, Prevention, and Control. (3 cr; QP–Eh or epi grad major or #; SP–Eh or epi grad major or #) Students present their MPH major’s projects and give an effective feedback. Projects should be either underway or near completion.

PubH 5381. Genetic Epidemiology. (3 cr; QP–SP–5330, 5450 or equiv, college coursework in genetics, hth sci grad or professional school student or #; SP–SP–5330, 5450 or equiv, college coursework in genetics, hth sci grad or professional school student or #) Etiology, distribution, and control of diseases in groups of relatives; inherited causes of disease in populations. Associations (case-control family studies), concordance (twin studies), disease transmission (segregation analysis), gene localization (gene mapping), and applications in studies of disease etiology.

PubH 5383. Pathobiology of Human Diseases. (3 cr; QP–SP–hith or biol or dent or epi or nurs or pharm or med school or grad student or #; SP–SP–Eh or SP–Eh or biol or dent or epi or nurs or pharm or med school or grad student or #) Basic cell biology and pathology of human diseases, including cardiovascular, cancer neurendogenerative, 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 #; SP–Epi major or #) Basic human physiologic, chemical, and biologic principles, emphasizing homeostasis as a unifying concept. Cellular, organ, and organ systems function. Health applications and “clinical” problem solving. Course guided by principle that this physiologic information should form background knowledge to critically judge merits of biologic research.

PubH 5386. Public Health Aspects of Cardiovascular Disease. (2 cr; QP–SP–5330, 5450 or equiv; SP–SP–5330, 5450 or equiv) Detailed perspective on well-established risk factors for CVD, prevention of CVD, and national recommendations for treatment and prevention. Introduces emerging risk factors and current controversies in CVD.
PubH 5387. Cancer Epidemiology. (2 cr; QP–5330, 5340, hlhs sci grad student or #) Epidemiologic aspects of cancer, including theories of carcinogenesis, site-specific risk factors, and issues of cancer control and prevention.

PubH 5389. Nutritional Epidemiology. (2 cr; QP–5330 or #) Study of disease/disease relationships through application of epidemiologic methods.

PubH 5390. Smoking Intervention. (2 cr; QP–Che or epi MPH or epi grad major or #) Impact of smoking on U.S. public health; review of research on onset and prevention, factors maintaining dependence, cessation and intervention strategies, public health campaigns, public policies and second-hand smoking controversies, and international issues.

PubH 5393. Design and Analysis of Group-Randomized Trials in Epidemiology. (3 cr; QP, 5340, 5452, epi or epi grad major, SP–5340, 5452, epi MPH or epi grad major, #) Community, school-based, and work site trials and trials involving randomization of other identifiable groups or study conditions. Experimental and quasi-experimental designs and threats to their validity.

PubH 5394. Mass Communication and Public Health. (2 cr; QP–Social or behavioral sci credits, pub hlhs or mass comm grad student or #; SP–Social or behavioral sci credits, pub hlhs or mass comm grad student or #) Role, functions, and effects of mass media on public health; planned and unplanned effects; review of literature to understand how theories, models, and assumptions of mass communication research relate to 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 hlhs nutr MPH or epi grad major or #; Epi or che or pub hlhs nutr MPH or epi grad major or #) Philosophical, ethical, economic, political, and efficacy rationale for a policy approach to prevention; historical and current application of prevention policy to public health problems.

PubH 5399. Seminar: Topics in Epidemiology. (1-4 cr; SP–Epi MPH or epi grad major or #) One or more topics of current interest.

PubH 5414. Biostatistical Methods I. (2 cr; QP–5450; pub hlhs or epi sci grad student or #; SP–5450; pub hlhs or epi sci grad student or #) Basic quantitative methods; descriptive statistics, concepts of probability, random sampling and sampling distribution, fundamental inferential procedures (confidence estimation, t-tests and chi-square tests, simple linear regression). Applications to public health studies: design, analysis, and interpretation of results.

PubH 5415. Biostatistical Methods II. (2 cr; QP–5420, 5450; pub hlhs or epi sci grad student or #; SP–5420, 5450; pub hlhs or epi sci grad student or #) Continuation of 5414; basic statistical methods, including correlation, regression, analysis of variance and nonparametric tests. Introduction to use of computer packages for data analysis, including SAS.

PubH 5420. Statistical Computing I: Using Statistical Packages. (1 cr; QP–5410 or 5440, hlhs sci grad student or #; SP–5410 or 5440, hlhs sci grad student or #) Use of the statistical computer package SAS for analysis of biomedical data. Data manipulation, description, and 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 #) 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. (3 cr; QP–M ath 1111 or 1201, hlhs sci grad student or #; SP–M ath 1111 or Math 1201, hlhs sci grad student or #) Descriptive statistics; Gaussian probability models, point and interval estimation for means and proportions; hypothesis testing, including t, chi-square, and non-parametric tests; regression and correlation techniques. One-way analysis of variance; health science applications using output from statistical packages.

PubH 5452. Biostatistics II. (4 cr; QP–5400, competence in SAS through 5420 or equiv or grade of B or better in 5414-5415; SP–5400, competence in SAS through 5420 or equiv or grade of B or better in 5414-5415) Analysis of counted data, including contingency table analysis and logistic regression; survival analysis, including Cox proportional hazards regression model.

PubH 5456. Proseminar for the Biostatistician. (2 cr; QP–5410, biostats major or #) Professional roles and responsibilities of the practicing biostatistician as consultant and collaborator in health sciences research.

PubH 5462. Clinical Trials: Design, Implementation, and Analysis. (3 cr; QP–5420 or 5462 or #) Introduction to and methodology of randomized clinical trials: design issues, sample size, operational details, interim monitoring, data analysis issues, and overviews.

PubH 5465. Biostatistical Inference I. (4 cr; QP–5450-5452; Stat 5101 or #; Stat 5101, biostats major or #; SP–5450-5452; Stat 5101 or #; Stat 5101, biostats major or #) Exploratory data analysis using SAS and S+, ANOVA, classical non-parametric methods, power analysis, sample size determinations, and ANCOVA. Simple linear regression, ANOVA as regression, robust regression.

PubH 5466. Biostatistical Inference II. (4 cr; QP–5450-5452; Stat 5102 or #; Stat 5102, biostats major or #; SP–5450-5452; Stat 5102 or #; Stat 5102, biostats major or #) Regression analysis based on least squares and maximum likelihood, implemented in SAS and S+. Basics of linear algebra and matrix notation. Estimation interactions, regression diagnostics. Contingency tables; logistic regression; analysis of matched and unmatched case-control and cohort studies.

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) Directed study toward completion of a master’s or Plan B project in biostatistics.

PubH 5500. Topics in Maternal and Child Health. (1-4 cr; QP–#; SP–#) New eds offerings.

PubH 5601. Principles of Maternal and Child Health. (2 cr; QP–Pub hlhs or grad student or #; SP–Pub hlhs or grad student or #) For MCH students and others interested in learning about the needs of children and families. Examines MCH activities in the context of "Healthy People 2000," including the history and organization of programs, policies, and advocacy activities.

PubH 5603. Reproductive and Perinatal Health. (2 cr; QP–Pub hlhs or grad student or #; SP–Pub hlhs or grad student or #) Major public health issues of adolescents in the United States. Emphasis on prevention and health promotion strategies and on effectiveness of programs and policies.


PubH 5611. Families and Health: An Ecosystems Approach. (2 cr; QP–Pub hlhs or grad student or #; SP–Pub hlhs 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 5613. Chronic Illness and Disability in Childhood: Principles, Programs, and Policies. (2 cr; QP–Pub hlhs or grad student or #; SP–Pub hlhs or 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/coordinated service delivery, advocacy.

PubH 5621. Women’s Health: Issues and Controversies. (3 cr; QP–Sr or grad or professional school student preferred; SP–Sr or grad or professional school student preferred) Women’s health concerns, health status, and health care today. Historical, socioeconomic, and gender perspectives; public health policies; access parameters; and multidisciplinary aspects. Roles of women as consumers and providers.

PubH 5623. Adolescent Sexual Identity: Teen Risk and Professional Responsibility. (1 cr; QP–Professional in pub hlhs or medicine or ed or social work or counseling or youth service; SP–Professional in pub hlhs or medicine or ed or social work or counseling or youth service) Issues that gay, lesbian, and bisexual adolescents and their families face in coming to terms with sexual orientation. Helpful ways to work with this hidden population and their families. One-day workshop.
PubH 5625. Sexual Orientation Issues for Adolescents. (3 cr; QP–Pub hth or grad student; SP–Bacalaurate degree or employment in ed or hth or social service field; SP–Bacalaurate degree or employment in ed or hth or social service field; Adole Fel and social orientation from perspective of individual identity; impact of the community and response of the community to gay, lesbian, bisexual, and transgender youth; and interventions/roles of professionals in the school and community.

PubH 5621. Research Methods in the Health Assessment of Women and Children. (2 cr; QP–Pub hth or grad student, 5330 or 5330 or #–SP–Pub hth or grad student, 5330 or #–SP 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 operationalization and measurement, selection of analytic models, and dissemination of results.

PubH 5633. Qualitative Research Methods. (2 cr; QP–Pub hth or grad student, 5806 or 5631 or #–SP–Pub hth 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 application of qualitative methods and developing data analysis skills.

PubH 5635. Critical Reading of Scientific Literature in Adolescent Health. (1 cr; QP–Pub hth or grad student, 5414 or 5450 or equiv or #–SP–Pub hth or grad student, 5414 or 5450 or equiv or #) Critical examination of empirical research in adolescent health across disciplines. Enhance skills in understanding theoretical methods, measurement, sampling design, statistical analysis, structure of research articles, peer review process, and ethical responsibilities of researchers in reporting research findings.

PubH 5637. Program Evaluation in Maternal and Child Health. (2 cr; QP–$582.5621 or 5806 or #–SP–mch or pha major or #–Research course, mch 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 forces that shape evaluation design, implementation.

PubH 5639. Grant Writing for Public Health. (1 cr; QP–Mch or pha major or #–SP–Mch or pha major or #) Hands-on workshop for those with all levels of grant-writing experience; focuses on children, youth, and families. Identifying successful elements of a grant application; understanding the grant review process; critiquing a grant; and writing a grant application.

PubH 5640. Public Health and Medical Care Organization. (2 cr; QP–Pub hth or grad student or #–SP–pub hth 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 5651. Advocating for Change for Children. (2 cr; QP–Pub hth or grad student or professional in pub hth or ed; SP–Pub hth or grad student or professional in pub hth or ed) Strategies for changing systems and building skills in public policy research, information and perception management, coalition building, personal persuasion, and advocacy.

PubH 5653. Community Organizing for Health. (2 cr; QP–Pub hth or grad student or #–SP–Pub hth 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 5661. Prevention: Theory, Practice, and Application. Public Health Services. (3 cr; Grad or professional school student or professional in hth-related discipline preferred; SP–Grad or professional school student or professional in hth-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, roles and implications for societal action.

PubH 5663. Cross-Cultural Health Issues. (2 cr; QP–Pub hth or grad student or #–SP–Pub hth or grad student or #) Health issues and “culture” of ethnic communities in Minnesota, including Hmong, Hispanic, African-American, and Native American. Cultural factors that influence health and health services.

PubH 5677. Maternal and Child Health Master’s Project. (2–3 cr; QP–Mch major, #–SP–Mch major, #–S-N only) Students work with their advisor to complete one of three types of master’s projects: research, critical literature review, technical report.

PubH 5691. Independent Study in Maternal and Child Health. (1–5 cr; QP–Pub hth or grad student, #–SP–Pub hth or grad student or #) Independent study with direction from a maternal and child health faculty member.

PubH 5696. Field Experience in Maternal and Child Health. (2–4 cr; QP–Mch major, #–SP–Mch major, #–S-N only) Planning, organization, and administration of public health agencies at the state level, how these agencies function in relation to educational, local, federal, and nonprofit public health agencies.

PubH 5700. Foundations of Public Health Administration Practice. (2 cr; QP–Pha major or #–SP–Pha major or #) Issues, administrative problems, activities, structure, organization, supervision, and direction of state, local, federal, and nonprofit public health agencies.

PubH 5702. Policy Issues in Public Health Administration. (2 cr; QP–Pha major or #–SP–Pha major or #) Policy development and implementation in public health-related agencies and organizations.

PubH 5705. Community Health Assessment. (2 cr; QP–Grad epi course, pha or mch major or #–SP–Grad epi course, pha or mch major or #) Synthesis of life cycle developmental approach and community health perspective with introduction to health behavior change conceptual models to develop intervention models that are effective in addressing primary public health problems across the life span.

PubH 5753. Public Health Ethics/Politics and Public Health. (2 cr; QP–Pub hth or grad student or #–SP–Pub hth or grad student or #) Systematic examination of ethical/ value aspects related to decision making in public health interventions. Responsibilities of the state in relation to health, politics as public ethics, and distributive justice in a pluralistic society.

PubH 5773. Topics: Multidisciplinary Perspectives on Aging. (3 cr; QP–Ad Ed 5440, §§Phy 5305, §§Gero 5105, §§HSU 5009, §§Nurs 5708, §§Pha 5009, §§Soc 5860, §§SW 5024, §§upper div or grad or extension student §–SP–Ad Ed 5440, §§Phy 5305, §§Gero 5105, §§HSU 5009, §§Nurs 5708, §§Pha 5009, §§Soc 5860, §§SW 5024; upper or grad extension student §) Sociological, biological, and psychological aspects of aging; theories of aging; death and bereavement; issues and problems of older adults in America; human services and their delivery systems (health, nutrition, long-term care, education); public policy and legislation; environment and housing; retirement.

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 5743. Ethics in Health-Care Organizations. (2 cr; QP–Pha major or MHA student or #–SP–Pha major or MHA student or #) Ethical perspectives in management of health-care organizations, components of a decision-making framework, application of framework to selected ethical issues, and institutional mechanisms for dealing with ethical problems.

PubH 5751. Principles of Management in Health-Services Organizations. (3 cr; QP–Grad or professional school student; SP–Grad or professional school student) Lectures, case studies on the role of health-care services administrators, principles of management and the administrative process.

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 PPS and RBRVS; risk-adjusted capitaiton; health care reform.

PubH 5771. Health-Care Financial Management (Public Sector Emphasis). (3 cr; QP–3–cr college-level accounting course or # knowledge of computerized spreadsheets recommended §–SP–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 PPS and RBRVS; risk-adjusted capitaiton; health care reform.
PubH 5777. Master's Project: Public Health Administration. (3 cr; QP–Pha major, #; SP–Pha major, #; S-N only) Major research paper to fulfill 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, #; S-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, #; 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. (A 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 question, methodological design, sampling designs, 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 question, research design, sampling techniques, use of research concepts, and data analysis. Data collection techniques, including questionnaires, interviews, and data analysis.

PubH 5812. Managed Care. (3 cr; QP–Pha major or MHA student or #; SP–Pha major or MHA student or #; A-F only) Development and operation 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, #; SP–Pha major, #) Overview of evaluation, models of evaluation, objectives of an evaluative study, sampling of subjects, methods of data collection, methodological designs, interpretation of data, preparation 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, health insurance markets, cost sharing, HMOs, PPOs, public and catastrophic health insurance, and the uninsured. Emphasis on public policy.

PubH 5862. Cost-Benefit, Cost-Effectiveness, and Decision Analysis in Health Care. (2 cr; QP–Intermediate econ course; SP–Intermediate econ course; A-F only) Application of cost-benefit, cost effectiveness, and decision-analytic techniques in evaluating health care programs; government regulations; new technologies; diagnosis and treatment protocols. Strengths, limitations, and appropriateness of different approaches.

PubH 5863. Understanding Health-Care Quality. (2 cr) Introduction to assessment topics of measuring quality of care. Emphasizes both process and outcomes approaches, parallelism interest in the appropriateness and effectiveness of care. Issues around creating needed behavior change in health-care professionals.

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 5881. Topics in Health-Services Research and Policy. (1-4 cr; QP–Pha major, #) 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 U.S. health-care sector, emphasizing problems of pricing, production, and distribution. Health-care services as one factor contributing to nation's health.

PubH 5894. Health Services Policy. (3 cr; QP–Pha or MHA student or #; SP–Pha or MHA student or #) Social, political, and economic context within which U.S. health-care system developed; influence of these contextual elements on public policies guiding and regulating organization and delivery of health services.

PubH 5900. Public Health Nutrition: Principles and Programs. (2 cr; QP–Pub hth nutr major or #; SP–Pub hth major 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; QP–3xxx nutr course or equiv or #; SP–3xxx nutr course or equiv or #) Nutritional needs of childbearing women and infants and how to meet these through programs and services.

PubH 5905. Human Nutrition and Health. (2 cr; QP–Pha major or #; SP–Pha major or #; A-F only) Introduction to human nutrition and health with emphasis on concepts relating to the design of nutrition education programs; implications for specific target audiences, and evaluating the impact of these programs in relation to nutrition education and research.

PubH 5906. Field Experience: Public Health Nutrition. (1-8 cr; max 10 cr) QP–Pub hth nutr major; SP–Pub hth major; S-N only) Placement in an approved agency with opportunity for experience in nutrition-related activities of public health programs.

PubH 5907. Assessment of Dietary Intake. (1 cr; QP–Pub hth nutr major or #; SP–Pub hth 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 used to assess 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 hth nutr major or #; SP–Pub hth nutr major or #) Independent study with faculty guidance in research topic.

PubH 5910. Critical Review of Research in Public Health Nutrition. (2 cr; QP–Pub hth nutr or mch major, grad-level course each in research, biostats, epi or #; SP–Pub hth nutr or mch major, grad-level course each in research, biostats, epi or #) Applying principles of nutrition, epidemiology, and biostatistics to evaluate scientific research on topics of significance in public health nutrition. Interactive seminar format with lecture, discussion, and student presentations.

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 application 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 hth nutr major or #; SP–Pub hth major or #) For public health nutrition M.P.H. students involved in original independent research.

PubH 5920. Public Health Aspects of Nutrition Policy. (2 cr; QP–Pub hth nutr or che or epi MPH or epi MPH or epi nutr grad major or #; SP–Pub hth nutr or che or epi MPH or epi nutr grad major or #; A-F only) Nutrition policy formulation and effects on public health. Role of policy approaches in context of nutrition; how these approaches differ from other prevention strategies.

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. Relation 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-social factors influencing food behaviors; and strategies for improving nutritional health.

PubH 8100. Topics in Environmental and Occupational Health Research. (1-6 cr; max 20 cr; QP–Pha major, #; SP–Pha major, #; S-N only) Selected readings and discussion of research topics.

PubH 8101. Research: Environmental and Occupational Health. (1-6 cr; max 6 cr) QP–Eh grad or MPH major) Opportunities to pursue research in environmental and occupational stresses on human 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, OIECP specialty or equiv, 5120, 5320, 5450 or 3450 or #) Facilitates student research efforts in 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)
Courses

In-depth examination of conceptual basis for validity in observational epidemiologic research. Recognizing, evaluating, preventing, and correcting for confounding specification error, measurement-error bias, and selection/option bias.

PubH 8160. Advanced Toxicology. (2 cr [max 12 cr]; QP—One course each in biochem and molecular biology, 5160; SP—One course each in biochem and molecular biology, 5160 or #) Cellular and molecular mechanisms by which xenobiotics cause toxicity; investigative approaches to current research problems in toxicology and carcinogenesis. Apoptosis, cell cycle regulation, genetic toxicity, molecular mechanisms of chemical carcinogenesis, and genetic basis for susceptibility to environmental toxins.

PubH 8170. Advanced Industrial Hygiene Applications. (2 cr—QP: 5170; SP: 5170; eh grad major; A-F only) Recognition, evaluation, and control of occupational health and safety hazards; application of concepts to specific industrial hygiene problems related to gases/vapors, aerosols, physical agents.

PubH 8330. Research in Epidemiology. (1-8 cr [max 12 cr]; SP—Epi grad or MPH major or #) Opportunities for pursuing research through the School of Public Health and cooperating organizations.

PubH 8331. Field Practice in Epidemiologic Investigations. (1-8 cr [max 10 cr]; SP—Epi grad or MPH major or #) Supervised participation in epidemiologic investigations under the auspices of health agencies or faculty of the School of Public Health.

PubH 8332. Readings in Epidemiology. (1-4 cr [max 1 cr]; SP—Epi grad or MPH major or #) Readings in current research articles.

PubH 8333. FTE: Masters'. (1 cr; SP—M aster’s student, adviser and ODS consent)

PubH 8350. Advanced Epidemiologic Theory. (2 cr; SP—Epi PhD 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, classroom discussions, and exercises provide experience in epidemiologic research methods in chronic diseases and 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. (1-3 cr—SP—Epi grad major or #; S-N only) Discussion of selected current problems.

PubH 8386. Special Topics and Issues in Epidemiology. (1-8 cr [max 3 cr]; SP—Epi grad major or #; A-F only) Intensive three-week immersion exercise 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 sp or the MPH major or #) Current theoretical measurement and research issues. Topics drawn from infectious and chronic disease epidemiology, epidemiologic methodology, and biostatistical applications.

Introduces 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; SP—Doctoral student, adviser and DGS consent)

PubH 8470. Topics in Biostatistics. (1-4 cr; QP—#; SP—#)

PubH 8494. Research in Biostatistics. (1-4 cr; SP—#) Directed research.

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

PubH 8777. Thesis Credits: Masters'. (1-18 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—Hspra grad major or #; A-F only) Integrated overview of U.S. health-services policy; theoretical and empirical literature related to this 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—Hspra 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; QP—Grad-level course in hth-care policy; SP—Grad-level course in hth-care policy or #) Long-term care policy for functionally impaired persons, particularly the elderly. Team taught from health-care and social services perspective; grounded in research literature on evidence of program effects. Innovative programs addressing current fragmentation of services.

PubH 8805. Applications of Sociological Theory to Health. (3 cr; SP—Hspra grad major or #; A-F only) Impact of social and organizational structures on access, delivery, and outcomes of care.

PubH 8806. Applications of Social Psychological Theories to Health. (3 cr; SP—Hspra grad major or #; A-F only) Social psychological theory explains the nature and causes of human social behavior: how people’s thoughts, identities, and actions are affected by social processes and structures. Social psychological factors that influence health behaviors, and relationships between actors in the health-care system.

PubH 8810. Seminar: Research Studies in Healthcare. (4 cr; QP: Stat 5121, Stat 5122, Stat 3302; SP—Hspra grad major or Stat 4101, Stat 4102; Stat 3302 or #; A-F only) Review and appraisal of design, measurement, analysis, and findings of contemporary studies.

PubH 8811. Research Studies in Healthcare. (3 cr; QP: 8810; SP—8810 or #; A-F only) Research methods commonly used in analysis of health services research and health policy problems.

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 innovativeness, 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 or linear algebra; SP—One course each in intermediate microeconomics, calculus, intro to linear algebra; A-F only) Application of microeconomic theory to health-care 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) Examines application of microeconomic theory to health services research through selected reading from published and unpublished health economics literature.
### 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; QR-M or grad student or #; SP-M or grad student or #; A-F only) Investigation of the rational, sociological, psychological, and philosophical foundations of the recreational use of leisure in contemporary society. Involves a survey of leisure services.

- **Rec 5111. Sports Facilities.** (3 cr; QR-6 or grad student or #; SP or grad student or #; A-F only) Systematic planning and management of facilities for athletics, physical education, and sport for college, professional, and public use.

- **Rec 5161. Recreation Land Policy.** (3 cr; QR-5 or grad student or #; SP-6 or grad student or #; A-F only) Historical development of recreational land policy in the United States and related contemporary issues in policy, management, interpretation, and research.

- **Rec 5191. Commercial Recreation and Tourism.** (3 cr; QR-5 or grad student or #; SP-5 or grad student 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; QR-5 or grad student or #; SP-5 or grad student or #; A-F only) Purpose: introduction to therapeutic recreation. Content: an overview of the therapeutic recreation profession, its role in community recreation agencies, and an introduction to therapeutic recreation methods and techniques. Components: lecture, discussion, and laboratory activities.

- **Rec 5221. Comprehensive Therapeutic Recreation Services Development and Management.** (4 cr; QR-6 or grad student or #; SP-6 or grad student or #; A-F only) Comprehensive development of written plans including development of protocols and critical pathways, intervention programs/activities, individual treatment plans and standards for appropriate placement of individuals in group intervention, and management of patient/client service delivery, record keeping, and administrative responsibilities.

**Courses**

### Recreation, Park, and Leisure Studies (Rec)

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**School of Health, Exercise, and Recreation Sciences (Hsrp&a)**

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<td>PubH 8861</td>
<td>Topics in Theory and Principles of Health Services Research, Policy, and Administration</td>
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<td>PubH 8880</td>
<td>Directed Research</td>
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<td>PubH 8888</td>
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<td>Rec 5100</td>
<td>Introduction to Therapeutic Recreation</td>
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**Department of Physical Medicine and Rehabilitation**

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For definitions of course numbers and symbols, see inside back cover.
Religions in Antiquity (RelA)

Department of Classical and Near Eastern Studies
College of Liberal Arts

RelA 5070. Topics in Ancient Religion. (3 cr; SP—RelA 3071 or 3072 or 3073 or 5071 or 5073 or any RelA course or #)
Study of a specific aspect of religion in Classical and Near Eastern antiquity such as healing cults, magic and divination, Gnosticism, or prophecy and authority. Topics specified in Class Schedule.

RelA 5071. Greek and Hellenistic Religions. (3 cr; SP—5371, §3171)
Greek religion from the Bronze Age to Hellenistic times. Sources include literature, art, and archaeology. Homer and the Olympian deities; ritual performance; prayer and sacrifice; temple architecture; oracles; death and the afterlife; mystery cults; philosophical religion; Near Eastern salvation religions. Meets with 3071.

RelA 5072. The New Testament. (3 cr; SP—§3072, §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 5089. Archaeology in Biblical lands II: New Testament Period. (3 cr; SP—53089)

RelA 5050. History and Development of Israelite Religion I. (3 cr; SP—SPRelA 3505)
Survey of the evolution of Israelite religion. Cultic practices, law and religion, prophecy, religion and historiography. Relationship to surrounding religious systems.

RelA 5504. Development of Israelite Religion II. (3 cr)
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.

Rhetoric (Rhet)

Department of Rhetoric
College of Agricultural, Food, and Environmental Sciences

Rhet 5108. Gender in Rhetoric of Science and Technology. (3 cr)
How cultural gender roles are affected by science and technology and the influence of scientific and technological thinking, particularly through communication strategies, language, and image. Values and goals of past and present scientific and technological communities.

Rhet 5111. Message Design: Theory and Practice I. (3 cr; A-F only)
Audience analysis, media selection, and message design through a variety of theoretical perspectives including cognitive and schema, social construction, feminist, and intercultural theories. Usability testing and contextual inquiry as means to study the effectiveness of messages.

Rhet 5112. Message Design: Theory and Practice II. (3 cr; OP—5111 or OP—5111; A-F only)
Political, economic, social, and technical dimensions of media selection and message design. Apply theories of message design and media selection to an on-line design project. Media analyses, scripts, budgets, treatments, project design plans, and various interactive scenarios.

Rhet 5196. Internship in Scientific and Technical Communication. (3 cr or max 6 cr; OP—STC grad student or #; STC grad student or #; STC grad student or #)
Internship sites may include the University, industry, or government agencies. An internship proposal, progress report, internship journal (optional), and final report with a letter from the internship supervisor are required.

Rhet 5258. Information-Gathering Techniques in Scientific and Technical Communication. (3 cr; A-F only)
Questionnaire development, informational interviewing, and focus group interviewing. Emphasis on guides, schedules, questioning techniques, and communication theories. Descriptive statistics used to analyze data for various projects.

Rhet 5270. Special Topics. (1-3 cr or max 3 cr; OP—STC or RSTC grad major or #; STC/RSTC grad major or #; STC/RSTC grad major or #; A-F only)
Topics specified in Class Schedule. For more information, consult the department office before registration.

Rhet 5291. Independent Study. (1-3 cr or max 3 cr; OP—#; A-F only)
Supervised reading and research on advanced projects not covered in regularly scheduled offerings.

Rhet 5511. Research in Scientific and Technical Communication. (3 cr; A-F only)
Experimental and survey research techniques for both quantitative and qualitative methodologies in STC. Face-to-face, telephone, and focus group interviewing; questionnaire development; contextual inquiry; using rating, ranking, and sort methods. Ethics, experimental bias, and inferential statistical analysis.

Rhet 5531. Scientific and Technical Communication Course Development and Pedagogy I. (3 cr; OP—Grad student or #; OP—Grad student or #; A-F only)
Focus on pedagogical philosophy and methodology in the beginning writing, speaking, and technical communication class. Introduction to theories underlying teaching with technology.

Rhet 5532. Scientific and Technical Communication Course Development and Pedagogy II. (3 cr; OP—5531 or OP—5531; A-F only)
Mentor with Rhetoric faculty. Issues facing new teachers and development of a philosophy of teaching. Focus on evaluating work in the classroom and designing classroom research.

Rhet 5534. Designing Technical Training for Intercultural Audiences. (3 cr; A-F only)
Select and research a training topic, write learning objectives and outcomes, set the conditions for learning, complete a comprehensive course outline, and design training modules.

Rhet 5562. Theory and Practice in International Business Communication. (3 cr; OP—3562; OP—3562 or equiv; A-F only)
Theories and practice in international and intercultural scientific, technical, and business communication. Examines cultural differences by studying cultural metaphors and research studies, by interviewing people from other cultures including international business managers, and through case studies.

Rhet 5562. Advanced Technical Communication. (3 cr; OP—3562; OP—3562 or equiv; A-F only)
Focus on creating multimedia, hypertext, on-line help, and Internet documents. Learn linear and nonlinear design; linking; reading and editing on-line. Principles of technical communication taught through projects: scripts, on-line support, and using a mark-up language.

Rhet 5564. Science Writing for Popular Audiences. (3 cr; A-F only)
Criticism and practice to examine how science is “translated” for popular audiences. Use rhetorical theory to critique popularized articles. Develop a heuristic for writing articles and consider controversial issues surrounding the movement from science to science as “popular.”

Rhet 5775. Aristotle’s Rhetoric and Scientific and Technical Communication. (3 cr; A-F only)
A study of Aristotle’s Rhetoric; emphasis on understanding the nature of a theory of rhetoric. Attention to the historical context and contemporary appropriation to explain scientific communication or computer-mediated communication. Reading in contemporary scholarship on the Rhetoric.

Rhet 8011. Research Methods in Rhetoric and Scientific and Technical Communication. (3 cr; SP—Grad RSTC major or #; A-F only)
Quantitative and qualitative research methods used in the field. Theoretical perspectives that demonstrate and test analytical approaches to scientific and technological rhetoric.

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—Grad RSTC major or #; A-F only)
Extended problem-solving situation in business, government, or industry in which student acts as consultant to explore a problem, identify possible solutions, introduce solution, and apply it.

Rhet 8510. Topics in Rhetorical Theory, History, and Criticism. (3 cr; max 12 cr; SP—5775 or equiv; A-F only)
Rhetorical theory in context of a culture influenced by science and technology. Topics specified in Class Schedule.

Rhet 8520. Topics in Science and Rhetoric. (3 cr; max 12 cr; SP—5775 or equiv; A-F only)
Doctoral seminars concerning relationships between rhetoric and science. Topics specified in Class Schedule.

Rhet 8530. Topics in Feminist Theory in Science, Technology, and Communication. (3 cr; max 12 cr; A-F only)
Doctoral seminars on interaction of gender with science and technology. Sample topics: social construction of gender in contemporary scientific and technological cultures. Topics specified in Class Schedule.
Courses

Russian (Russ)

Institute of Linguistics and Asian and Slavic Languages and Literatures

College of Liberal Arts

Rus 5104. Introduction to Literary Analysis. (3 cr; SP–3002 or equiv) 
Reading and analysis of poetry and prose selections to understand rudiments of studying Russian literature. Readings are in Russian.

Rus 5105. Russian Poetry and Prose. (3 cr; SP–3002 or equiv) 
Appreciation of literary values through stylistic analysis and literary interpretation; analysis of humanistic elements. Readings in Russian.

Rus 5211. Modern Russian Literature in Translation. (3 cr) 
Literary, cultural, and political significance of modern Russian literary works.

Rus 5404. Tolstoy in Translation. (3 cr; SP–3040) 
Novels, stories, and philosophical writings of Leo Tolstoy.

Rus 5407. Stories and Plays of Anton Chekhov in Translation. (3 cr; SP–3407) 
Study of literary devices and themes in selected stories and major plays using the intrinsically approach.

Rus 5409. 19th-Century Russian Novel. (3 cr; SP–3409) 
The Russian realistic novel from origin to decline; social, political, and intellectual circumstances that led to its emergence as the dominant genre of the “age of realism” in Russia.

Rus 5411. Dostoevsky in Translation. (3 cr; SP–3411) 
Novels, stories, and other writings of Fyodor Dostoevsky.

Rus 5421. Literature: Middle Ages to Dostoevsky in Translation. (3 cr; SP–3421) 
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–3422) 
Survey of Russian literature from mid-19th century to the present: realism, modernism, feminism and other trends.

Russ 5601. Methods of Translating Fiction From Russian to English. (3 cr; SP–3501, 3502 or equiv) 
Learning to appreciate a variety of literary styles through the experience of translation.

Russ 5900. Topics in Russian Language, Literature, and Culture. (3 cr; SP–1102 for language topics) 
Variable topics in Russian language, literature, and culture.

Russ 5993. Directed Studies. (1-4 cr; SP–#) 
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 per semester or summer; 10 cr total required [Plan A only])

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–5001 or equiv) 
Introduction to the classical language of ancient India.

Skt 5201. Intermediate Sanskrit. (3 cr; SP–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–5202 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 13th-century Iceland. Discussion includes cultural and historical information about medieval Iceland and analysis of a selection of saga texts using contemporary critical approaches. All readings in translation.

Scan 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 5702. Old Norse Saga Reading and Analysis. (3 cr; SP–5701 or equiv reading knowledge of Old Norse) 
Reading and analysis of Old Norse prose narratives, including close reading and discussion of the critical literature about the prose narratives and medieval Icelandic culture. All primary texts read in Old Norse.

Scan 5703. Old Norse Poetry. (3 cr; SP–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–Intro 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 to study of Scandinavian languages, literatures, and cultures. Integrated sections on Scandinavian bibliography.

Scan 8333. FTE: Master's. (1 cr; SP–Master’s student, adviser and DGS consent) 
Scan 8444. FTE: Doctoral. (1 cr; SP–Doctoral student, adviser and DGS consent)

Scan 8500. Seminar in Medieval Scandinavian Languages and Literature. (3 cr [max 9 cr]) 
Sample topics: Voluspæ, Seer's studies in Snorri Sturluson's Edda, dialogue analysis in the Icelandic saga.

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).
Courses

Scan 8610. Seminar in Scandinavian Drama. [3 cr] (max 9 cr)
Sample topics: dilemma of representation in modern drama, epic theater.

Scan 8630. Seminar in Scandinavian Criticism. [3 cr]
Sample topics: feminist theory in Scandinavia, writing literary history in Scandinavia.

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

Scan 8702. Philological 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 8888. Thesis Credits: Doctoral. (1-18 cr; SP-Max 18 cr per semester or summer; 24 cr required)

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 data structures.

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 statistics 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; 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; SP-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

SciC 8888. Thesis Credits: Doctoral. (1-18 cr; SP-Max 18 cr per semester or summer; 24 cr required)

Slavic (Slav)

Institute of Linguistics and Asian and Slavic Languages and Literatures

College of Liberal Arts

Slav 5900. Topics in Slavic Languages and Literatures. (3 cr)
Topics specified in Class Schedule.

Social and Administrative Pharmacy (SAPh)

Department of Pharmacy Practice

College of Pharmacy

SAPh 8100. Seminar. (1 cr [max 8 cr]; SP–Grad SAPh major or #)
Contemporary issues and research problems in sociobehavioral pharmacy, pharmacoconomics and policy, and clinical research.

SAPh 8173. Principles and Methods of Implementing Research. (3 cr; OP–Two grad stat courses; SP–Two grad stat courses)
Integrates scientific, statistical, and practical aspects of research. Interrelationships among design, sample selections, subject access, human subjects requirements, instrument selection and evaluation, data management, analyses plans, grant writing, and research career issues. Field experiences.

SAPh 8200. Research Problems. (1-8 cr [max 16 cr]; SP–Grad SAPh major or #)
Individually designed research experience directed at contemporary problems related to drug use process.

SAPh 8255. Pharmaceutical Economics and Policy. (3 cr; SP–Grad SAPh major or #; A-F only)
Economic analysis of pharmaceutical sector of healthcare systems. Problems of pricing production and distribution of pharmaceuticals. Domestic or international policy issues relevant to price and access of pharmaceuticals.

SAPh 8255. Pharmaceutical Marketing. (3 cr; SP–Grad SAPh major or #; S-N only)
Contemporary issues and theory related to pharmaceutical marketing. Pharmaceutical proportion, especially directed to consumer advertising.

SAPh 8270. Clinical Conferences. (2 cr; SP–Grad SAPh major or #)

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

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

SAPh 8500. Pharmacy and Its Environment. (4 cr; SP–Grad SAPh major or #)
Cultural foundations of pharmacy. Development of present state of pharmacy practice. Role of pharmacist as health practitioner in relation to other health practitioners. Identification of factors (health policy, regulation, economics, research and development, promotion) that affect individual responses to drug therapy.

SAPh 8501. Pharmacy and Its Environment. (3 cr)
Cultural foundations of pharmacy. Development of present state of pharmacy practice. Role of pharmacist as health practitioner in relation to other health practitioners. Identification of factors (health policy, regulation, economics, research and development, promotion) that affect individual responses to drug therapy.

SAPh 8610. Pharmacoepidemiology. (3 cr; SP–Grad SAPh major or #)

SAPh 8666. Doctoral Pre-Thesis Credits. (1-18 cr; SP-Max 18 cr per semester or summer; doctoral student who has not passed prelim oral; S-N only)

SAPh 8702. Hospital Pharmacy Survey. (1 cr [max 3 cr]; SP–Grad SAPh major or #)
Readings for directed students to explore contemporary issues in hospital pharmacy practices.

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

SAPh 8810. Social Psychology of Health Care. (2 cr; SP–Grad SAPh major or #)
Behavioral and social aspects of recovery responses to drugs and other therapies, patients’ compliance with prescribed therapies, relationships between health-care professional and patient.

SAPh 8840. Social Measurement. (3 cr; OP–Intro stat course, understanding of simple correlations; SP–Intro stat course, understanding of simple correlations or #; A-F only)
How social factors such as innovativeness, compliance, religiosity, and stress are measured and tested for reliability and validity. Relationships between theory, concepts, variables, data.

SAPh 8888. Thesis Credits: Doctoral. (1-18 cr; SP-Max 18 cr per semester or summer; 24 cr required)

Social Work (SW)

School of Social Work

College of Human Ecology

SW 5051. Human Behavior and the Social Environment. (2-3 cr; QP–Grad student or #; 12 cr social sciences or #; SP–Grad student or #; 8 cr social sciences or #)
Social, psychological, biological, and cultural factors of individual and group development as applied to social work practice. Behavior and life-cycle development focusing on diversity and each stage of life. Discuss development in terms of the individual, and in terms of overlapping social systems such as the multi-generational family, culture, community, and society.
SW 5052. Ecologies of Child Development Within Communities and Groups. (3 cr; QP-Grad student or #; SP-Grad student or #)
Examine social, affective, and cognitive development of children of color via a life course, ecological systems framework, school, peers, and community are studied as ecological contexts which influence developmental trajectories for these children and youth. Attention is given to poverty, racism, and oppression.

SW 5101. Historical Origins and Contemporary Policies and Programs in Social Welfare. (3-4 cr; QP-Grad student or 12 cr social sciences; SP-Grad student or 8 semester cr social sciences)
Contemporary policies and programs in social welfare are examined in light of their historical origins and evolution. A framework is then developed for analysis of concepts and principles in contemporary social policy for social welfare programs and services. The emergence of the profession of social work also examined.

SW 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; QP-Grad student or adult special or #; SP-Grad student or adult special or #)
Examine 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; QP-Grad student or adult special or #; SP-Grad student or adult special or #)
Examine concepts and principles of case management practice with special populations such as older adults, persons with developmental disabilities, and persons with substance or 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; QP-Grad student or adult special or #; SP-Grad student or adult special or #)
The practice components of social work with older adults including assessment, intervention, and case management. Taught from the perspective of biopsychosocial strengths and challenges and within the context of current social policy and delivery systems.

SW 5314. Social Work in the Schools. (2 cr; QP-Grad student or adult special or #; SP-Grad student 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; QP-Grad student or adult special or #; SP-Grad student or adult special or #)
Prepares students for social work practice in a hospital or health care setting. Focus on integration of conceptual and practice subject matter that covers differential assessment, clinical intervention models, impact of acute and chronic illness, special populations, managed care, legal and ethical issues, interdisciplinary team work, and transition planning in health care.

SW 5316. Brief Treatment and the Task-Centered Approach. (2 cr; QP-Grad student or adult special or #; SP-§5803; grad student or adult special or #)
The advent and current prominence of brief treatment models in work with individuals, families, and groups including their theoretical and empirical bases. Practice with diverse populations in a 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; QP-Grad student or adult special or #; SP-Grad student or adult special or #)
Includes theory, ethics, effectiveness, and intervention methods for work with client systems that experience involuntary contact with a social worker. Interventions at micro, mezzo, and macro levels are included. Practice in varied settings such as child welfare, mental health, corrections, and public schools as well as practice related to organizational responses to change.

SW 5318. Family Centered Home Based Services. (2 cr; QP-Grad student or adult special or #; SP-$5814; grad student or adult special or #)
Ecological, multisystems approach focusing on the family system. Theoretical, meta-neutrality, strengths-focus, case management and team treatment. Family-based services evaluated for high-risk, multi-problem families and as an 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-Admission to child abuse prevention specialization)
Foundation of research and theory for the 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-§5482)
Understanding risk factors, protective factors, and resilience in cultural settings; identifying and designing inventive 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; QP-Admission to child abuse prevention specialization or #; SP-§5483)
Designing instruments for child abuse risk assessment based upon research. Culturally and ethically competent interviewing skills; ethnographic interviewing, strengths-based systemic assessment. Strategies for evaluation of interventions. This is the second course for Level II Child Abuse Prevention certification.

SW 5519. Mediation and Conflict Resolution. (3 cr; SP-§8619)
Develop mediator skills for making informed decisions regarding the appropriateness of mediation for conflicts that frequently confront social worker practitioners such as divorce, neighborhood disputes, conflicts between tenants/landlords, conflicts between spouses, and conflicts between crime 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 social policies in different economic and political systems with emphasis on Third World nations.

SW 5705. Violence in Families. (3 cr; SP-$5706, §5707; grad student or adult special or #)
Prevention and interventions with perpetrators, survivors and social institutions, and for research on perpetration, effects on victims, and social responses to family violence. Focus on child abuse and neglect, and abuse of women and vulnerable adults. Roles of gender, race, culture, age, physical ability, and sexual orientation.

SW 5706. Issues and Interventions in Child Sexual Abuse. (2 cr; QP-Grad student or adult special or #; SP-§5705; grad student or adult special or #)
Major issues 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 student or adult special or #; SP-§5705; grad student 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 assailants and their families.

SW 5708. Substance Abuse and Social Work. (3 cr; QP-Grad student or adult special or #; SP-§8801; grad student or adult special or #)
Acquire knowledge base and develop skills required to identify ethical issues, resolve ethical dilemmas, and make ethical decisions within the context of the professional practice of social work. Values 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 student or adult special or #; SP-§5813; §8801; grad student or adult special or #)
A legal regulation of social work; licensing standards; professional liability; ethical issues and sanctions. Social worker involvement in legal process 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 613. Child Welfare and the Law. (2 cr; QP-Grad student or adult special or #; SP-§5812; §8801; 2nd-yr MSW or advanced standing or #)
Social work practice in juvenile court; child abuse and neglect reporting laws, risk assessment, reasonable efforts, case plan, 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 6 cr])
Independent study in areas of special interest to students and faculty.

SW 8010. Field Practicum I. (4 cr [max 8 cr]; QP-§8400; SP-§2001; S-N only)
Field practice and social work process under direct supervision. Professional tasks in various types 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. (3 cr [max 6 cr]; QP-§8100; SP-§2010; 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.
Courses

SW 8030. Advanced Standing Social Work Practicum. (4 cr; max 12 cr; advanced standing; SW only) Field practice under direct supervision. Advanced social work practice related to student’s concentration, and policy formulation integrated into coherent professional perspective as integral to the profession. Field practice seminar completed concurrently with placement.

SW 8051. Psychopathology and Social Work Practice. (3 cr; QP–8401; SP–8203 or advanced standing or #) Psychopathology from ecological perspective. Biopsychosocial influences on incidence, 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 to families. Current debates about policies, financing, and structure and organization of service delivery; process of influencing policy change by community-level advocacy.

SW 8103. Health and Mental Health Policy. (3 cr; QP–5111; SP–5101 or advanced standing or #) Factors affecting health and mental health status of variety of populations. Policies on organizational, local, state, and federal 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 8303. Advanced Mental Health Practice with Adults. (3 cr; QP–8400; SP–Advanced standing or 8202 or #) Theory and practice of cognitive, cognitive-behavioral, and psychodynamic social work treatment in community and clinical settings. Criteria for differential applications, including brief treatment and crisis-oriented approaches. Cultural and social aspects of mental health and issues important to populations at risk.

SW 8304. Advanced Practice With Children and Adolescents. (3 cr; QP–8401; SP–Advanced standing or 8202 or #) Practice with children, adolescents, and their families; ecosystemic model undergirds assessment and intervention. Mastery of developmental tasks and enhanced social functioning as protective mechanisms. Biopsychosocial focus; integrates familial and community contributions, especially in face of loss or disruption.

SW 8312. Social Work Practice in Interdisciplinary Teams. (3 cr; QP–Foundations courses; SP–Advanced standing or foundation courses) Interdisciplinary and interorganizational collaboration primarily in health care and school settings. Socialization processes and status differences. Role expectations, ambiguity, strain. Value disparities and other barriers to collegiality. Collaborative practice: relational communication, advocacy, consultation, mediation, conflict resolution skills.

SW 8314. Social Work Interventions With Families. (3 cr; QP–8402; SP–8121 or SP–8122 or SP–5538; SP–advanced standing or 8203 or #) Interventions based on systems perspective of family as center of focus and in environmental context. Policy and practice principles of working with families in their home and community environment.

SW 8333. FTE: Master’s. (1 cr; QP–Master’s student, adviser and DGS consent) SW 8441. Life-Cycle Therapy. (2 cr; QP–8401; SP–Advanced standing or 8202 or #) Strength-based approach to client treatment grounded in Erik H. Erikson’s theory of the life cycle. Model explicitly considers differences in environmental supports and in “healthy” outcomes, based on culture, race, gender, sexual orientation, spiritual belief, age. Focus on maximizing health and remediating disorders.

SW 8444. FTE:Doctoral. (1 cr; QP–Doctoral student, adviser and DGS consent) SW 8460. Special Topics: Practice With Individuals, Families, and Groups. (1-3 cr [max 9 cr]; QP–8400; SP–8201 or #) Advanced practice courses.

SW 8501. Planning, Marketing, and Program Development. (3 cr; QP–5111, 8402; SP–5101, 8203 or advanced standing or #) Principles and applied practice of management concepts in human service settings. Management theories, organizational planning, program development, marketing and communications. Management practice that is client and community-focused and results-oriented, and seeks to achieve positive social change.

SW 8502. Resource Development and Management. (3 cr; QP–8301; SP–8501 or #) Procuring and managing financial resources in social work settings. Principles of philanthropy, fund raising, grant writing, preparing and monitoring budgets, interpreting basic financial reports, management information systems, and accountability requirements.

SW 8503. Personnel Leadership and Management. (3 cr; QP–8501 or SP–8501 or #) Skills and principles in effective leadership. Legal and strategic considerations in personnel management, including workplace diversity, selection, hiring and development of paid/unpaid staff, evaluation, compensation and benefits, promotions and staff termination, management of work groups and collaboratives.

SW 8505. Advanced Community Organization and Advocacy. (3 cr; QP–8301; SP–8501 or #) Methods for stimulating and supporting joint action for constructive community needs. Principles of working with local organizations and social action to accomplish specific changes.

SW 8515. Conflict Resolution for Social Workers. (3 cr; QP–5101, MSW student or grad conflict mgmt minor or #) Advanced mediator skills for social workers; appropriateness of mediation for conflicts that frequently confront social work practitioners, such as divorces, neighborhood disputes, and conflicts between parents and adolescents, between spouses, and between crime victims and offenders.

SW 8525. Global Perspectives on Social Welfare, Peace, and Justice. (3 cr; QP–5111 or SP–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; QP–MSW 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 at case, program, policy levels. Social research design development of research questions, sampling, measurement, research design, data collection and analysis.

SW 8602. Direct Practice Evaluation. (2 cr; QP–8901 or equiv; SP–8801 or equiv or #) Introduction to evaluation that incorporates current evaluation methods and principles derived from research, theory, practice wisdom, their own experience. Evaluation methods include single-system designs, client- focused evaluations, practitioner-focused evaluations, and use of event analyses, standardized instruments, self-constructed instruments.

SW 8603. Program Evaluation. (2 cr; QP–8901 or equiv; SP–8801 or equiv or #) Conceptual, methodological, political, psychological, and administrative factors related to conduct and consequences of 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. (1-18 cr; QP–Max 18 cr per semester or summer, doctoral student who has not passed prelim oral) Independent study under tutorial guidance.

SW 8694. Directed Research. (1-6 cr [max 6 cr]; SP–#) Independent small group research inquiry translates introductory course content into research design and study. 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 applied in human service management or direct practice settings. Critical examination of human needs and organizational responses to racially and culturally competent practice with populations at risk.

SW 8801. Social Work Ethics and Legal Issues. (3 cr; QP–Foundation courses; SP–5811, 5812, 5813; foundation courses or advanced standing or #) Models and case studies: ethical issues in social work practice in various human service systems: administrative, educational,
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)
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, xenophobia 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 8 cr sociology or anth)
Theories of the structure of and behavior in corporations and bureaucracies. Corporate structure from standpoint of role expectations, transaction costs, and structural responses to organizational failures. Power, conflict, and bargaining in organizational decision making. Course content varies.
Soc 8421. Work and Occupations. (3 cr; QP–3201 or 3405 or 5201 or 5405 or 5480 or equiv)
Sociological analysis of work, occupations, and labor markets, including contemporary theory and research. Course emphasis varies with instructor.
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 relations, comparative study of organizations, 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/contemporary research on the family. Topics specified in Class Schedule.
Soc 8551. Social Structure and the Life Course. (3 cr)
Central concepts and premises of life course analysis as applied to intersocietal (comparative), intrasocietal (socioeconomic status, race, and gender), and historical variability; institutional patterning of life course (family, education, work, the polity); deviance and criminal careers; changes in the self; and methodological strategies.
Soc 8590. Topics in Life Course Sociology. (2 cr)
Theory of aging, sociology of youth, and mental health and adjustment in early life course. Topics specified in Class Schedule.
Soc 8666. Doctoral Pre-Thesis Credits. (1-18 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 sociology major or #4-F only)
Traditions of social theory basic to sociological knowledge, their reflection and expansion in contemporary theory, their applications in selected areas of empirical research. Sample topics: social inequality, social organization and politics, family organization and social reproduction, social order and change, sociology of knowledge and religion.
Courses

Soc 8711. Theories of Social Organization. (3 cr)
Key frameworks and theories, structure and process, micro and macro levels of analysis. Empirical literature on major substantive issues related to work, gender, and race; politics and social movements; and post-structuralization and technological change. World systems theory.

Soc 8721. Theories of Social Psychology. (3 cr)
Prominent contemporary theories of sociological social psychology, including structural (social structure and personality) perspectives, social relations, and small group processes (exchange, equity, expectation states theories), and symbolic interactionism. Classical writings, theoretical statements, and empirical studies.

Soc 8777. Thesis Credits: Master's. (1-18 cr; SP; Max 18 cr per semester or summer; 15 cr total required [Plan A only])

Soc 8790. Advanced Topics in Sociological Theory. (3 cr)
Sample topics: theories of conflict, theories of purposive action, Marxist theory, and structure-agency debate.

Soc 8801. Sociological Research Methods. (4 cr; SP; Grad sociology major or #A-F only)
Multiple objectives of social research and how they inform research design. Conceptualization and measurement of complex concepts. Broad issues in research design and quantitative and qualitative approaches to data collection and management.

Soc 8811. Advanced Social Statistics. (4 cr; SP; Soc 5811 or equiv; grad sociology 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 event history analysis. Applications to datasets using computers.

Soc 8888. Thesis Credits: Doctoral. (1-18 cr; SP; Max 18 cr per semester or summer; 24 cr required)

Soc 8890. Advanced Topics in Research Methods. (3-4 cr; SP; Grad sociology major; 8801, 8811 or #A-F only)
Advanced quantitative methods (e.g., multilevel models) and historical/comparative, field, and survey research. Topics specified in Class Schedule.

Software Engineering (SEng)

Computer Science Institute of Technology

SEng 5115. Graphical User Interface Design, Evaluation, and Implementation. (3 cr; SP; Grad 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. (3 cr; SP; Grad SEng major; SP; Grad 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. (3 cr; SP; Grad SEng major; SP; Grad SEng major; A-F only)
Java programming, concurrent programming, workflow, distributed database, security, collaborative computing, object-oriented architecture and design, network publishing, messaging architecture, distributed computing, and intranet.

SEng 5511. Artificial Intelligence. (3 cr; CP; Grad SEng major; SP; Grad SEng major; A-F only)

SEng 5551. Introduction to Intelligent Robotic Systems. (3 cr; CP; 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-robotics.

SEng 5707. The Principles of Database Systems. (3 cr; CP; Grad SEng major; SP; Grad SEng major; A-F only)
Fundamental concepts; conceptual data organization; data models; data manipulation languages; database design; security and integrity; performance evaluation; query optimization; distributed database systems.

SEng 5708. Object-Oriented Databases. (3 cr; CP; Grad SEng major; SP; Grad SEng major; A-F only)
Applications and motivation; extended relational, object-relational, and object-oriented data models; object identifier, constructors; versions; 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; CP; Grad SEng major; SP; Grad SEng major; A-F only)
Overview of software development processes and process description techniques. Personal software process. In-depth study of methods, tools, notations, and validation techniques for software requirements. Concepts and methods for design of large-scale software systems. Architectural design concepts and design notation. Group projects and case studies.

SEng 5802. Software Engineering II: Software Implementation, Verification, and Maintenance. (3 cr; CP; Grad SEng major; SP; Grad SEng major; A-F only)
Introduction to software testing, maturity models, reliability models, and complexity, and cost specification models, bug estimation, quality control, experience report. Student groups specify design, implement, test partial software systems. Emphasizes application of general software development methodologies, principles from S801, rather than specific systems.

SEng 5811. Object-Oriented Techniques, Analysis, Design, Implementation, and Testing. (2 cr; CP; Grad SEng major; SP; Grad SEng major; A-F only)
Principles of object-oriented design, development, and programming. Classes, components, inheritance, scenarios, design architecture, design patterns, and frameworks. Group projects and case studies.

SEng 5831. Software Development for Real-Time Systems. (3 cr; CP; Grad SEng major; SP; Grad SEng major; A-F only)
Analysis, design, verification, and validation of real-time systems. Periodic, aperiodic, and sporadic processes, scheduling theory. Pragmatic issues.

SEng 5841. Formal Modeling and Analysis in Software Engineering. (2 cr; CP; Grad SEng major; SP; Grad SEng major; A-F only)
Formal specification of software artifacts; applicability of formal specifications; introduction to methods such as Z, SCR, and Satecharts. Formal analysis techniques; basis theorem proving, reachability analysis techniques; model checking; introduction to tools such as PVS, Statemate, SPIN, and SMV.

SEng 5851. Software Project Management. (3 cr; SP; Grad SEng major; A-F only)
Concepts used to manage software projects. Project management cycle: initiation, planning/control, status reporting, review, post-project analysis. Leadership and motivation strategies. Lecture, discussion, individual/team presentations/projects.

SEng 5852. Quality Assurance and Process Improvement. (3 cr; CP; Grad SEng major; SP; Grad SEng major; A-F only)
Theory and application of capability maturity model: process assessment, modeling, and improvement techniques. Life cycle issues related to development and maintenance; quality, safety, and security assurance; project management; and automated support environments. Group projects and case studies.

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

SEng 8494. Capstone Project (Plan B Project). (3 cr; SP; Grad SEng major; A-F only)
Students work in teams on software project using tools, techniques, and skills acquired during previous coursework. Each team works with a client to establish requirements, agree upon design, and achieve a successful acceptance test of resulting software system.

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; SP; #SP- Maj #F only)
Practical experience in precision agriculture in agri-industry/business. Content and extent of work at the internship site is jointly decided by the instructor, host business representative, and student's principal 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. Biometeorology. (3 cr; QP-Biol 1009 or equiv, Math 1251, Phys 1041 or #SP-Biol 1009 or equiv, Math 1271, Phys 1041 or #)
Microclimates, and energy and mass transfer between organisms and their environment. Consider the basic environmental variables of temperature, humidity, wind, and radiation and apply these concepts to plants, animals, and soil-atmosphere exchange processes.

Soil 5232. Soil Physics: Transport Properties and Processes. (3 cr; QP-Math 1251 or equiv, Phys 1041 or #SP-Math 1271 or equiv, Phys 1042 or equiv)
Basic soil physical properties and processes governing the transport of mass and energy in soils. Principles of water and solute transport in unsaturated soils, and their role in subsurface hydrology and water quality.

Soil 5311. Soil Chemistry and Mineralogy. (3 cr; QP-Chem 1002 or equiv, Phys 1041, grad student or #SP-Chem 1022 or equiv, Phys 1042, grad student or #)

Soil 5312. Soil Chemistry and Mineralogy Laboratory. (2 cr; QP-Soil 5311 recommended)
Soil 5401. Introduction to Atmospheric Science. (3 cr [max 2 crs]; QP–Math 1121, Math 1211, Stat 2211, Stat 2212, Math 2211, Phys 1211, Stat 2211, Math 1211, Phys 1211, Stat 2211) Calculus-based, introductory description of the atmosphere including atmospheric dynamics, radiation, thermodynamics, chemical composition, and cloud processes. Discuss applications to climate, meteorology, the hydrologic cycle, air quality, and biogeochemical cycles.

Soil 3402. The Atmospheric Boundary Layer. (3 cr; QP–Math 1211, Phys 1211, Stat 2211, Stat 2212, Math 2211, Phys 1211, Stat 2211) 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 clouds, air quality, microclimate, and observational and modeling methods.

Soil 5515. Soil Genesis and Landscape Relations. (3 cr; QP–3125 or #; SP–2125 or #) Basic soil morphology and soil profile descriptions; pedogenic processes and models of soil development; soil geomorphology, hydrology, and hillslope processes; digital spatial analysis; soil classification; soil surveys and land use, soil geography.

Soil 5555. Wetland Soils. (2 cr; QP–1020 or 3125 or equiv or #; SP–1125 or 2125 or equiv or #; SP–5115 recommended; A-F only) Morphology, chemistry, hydrology, and formation of mineral and organic soils in wet environments. Soil morphological indicators of wet conditions, field techniques of identifying hydric soils for wetland delineations. Peatlands; wetland benefits, preservation, regulation, and mitigation. Field trips, lab, and field training in hydric soil delineation projects.


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.

Soil 8005. Supervised Classroom or Extension Teaching Experience. (2 cr) Teaching experience in one of five departments: Biosystems and Agricultural Engineering; Agronomy and Plant Genetics; Horticultural Science; Soil, Water, and Climate; or Plant Pathology. Participation in discussions about effective teaching to strengthen skills and develop a personal teaching philosophy.

Soil 8110. Colloquium in Soil Science. (1-3 cr [max 6 cr]) Research or intellectual areas in soil science or climatology not covered in regular courses. Topics vary; contact department for current offerings.

Soil 8128. Seminar in Soils. (1 cr [max 2 cr]; S-N only) Students present an open seminar on an advanced topic and attend seminars presented by other graduate students.

Soil 8195. Research Problems in Soils. (1-5 cr [max 10 cr]; SP–Grad major in soil sci or related field) Directed research on special topics of interest in soil science or climatology supervised by individuals or small groups of faculty.

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

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

Soil 8510. Advanced Topics in Pedology. (2-4 cr [max 12 cr]; SP–3133) Sample topics: soil-landscape relations, soil genesis, landscape evolution, land use and management, precision agriculture, digital terrain modeling, forest soils.

Soil 8550. Teaching Experience. (1 cr [max 6 cr]; SP–Grad major in soil sci or related field, #; S-N only) Provides students with practical experiences in instructional techniques in a university setting.

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

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

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

South Asian Languages and Cultures (SALC)

Institute of Linguistics and Asian and Slavic Languages and Literatures

College of Liberal Arts


SALC 5090. Instruction in South Asian Languages. (3-5 cr) Individualized instruction 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 epics, folk dramas, proverbs, and riddles—they’re relationship to Indian society and inter-relationships with literary 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. Hinduism. (3 cr) Development of Hinduism focusing on sectarian trends, modern religious practices, myths and rituals, pilgrimage patterns and religious festivals, and the interrelationship between Indian social structure and Hinduism.

SALC 5413. Buddhism. (3 cr) Historical account of Buddhist religion in terms of its rise, development, various schools, and common philosophical concept. Indian Buddhism compared with Hinduism; Buddhism’s demise and revival on the Indian subcontinent.

SALC 5414. Comparative Religions of South Asia. (3 cr) Compares and contrasts basic philosophical concepts, literatures, ideologies, and ritualistic practices of Hinduism, Buddhism, 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; SP–3411 or 3412 or 3413 or 5411 or 5412 or 5413) An introduction to Indian philosophy emphasizing analyses of mind and knowledge.

SALC 5521. Gandhi and Non-Violent Revolution. (3 cr) Character of Gandhi; his influence over contemporaries, and his hold on the world 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.

SALC 5730. Seminar in South Asian Culture. (4-5 cr) Selected topics on South Asian cultures.

SALC 5833. India's Gods and Goddesses. (3 cr) Indian history examined by following development of the deities Krishna, Shiva, and Kali.

SALC 5993. Directed Studies. (1-5 cr; SP–#, ∆, Q) Guided individual reading and study of topics not covered in regular courses. Open to qualified students for one or more semesters.

SALC 5994. Directed Research. (1-5 cr; SP–#, ∆, Q) Directed research on topics of language, literature, or civilization selected by qualified students with consent of instructor and studied on tutorial basis.

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

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

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

SALC 8730. Teaching South Asian Languages, Literatures, and Cultures. (1-5 cr; SP–#) Topic specified in Class Schedule.

SALC 8720. Seminar: Interdisciplinary Study of South Asian Topics. (1-5 cr; SP–#) Selected Indian topics: language problems, social structure, and cultural change, law, and religion, as seen from a variety of social science and humanities disciplinary perspectives.

SALC 8730. Teaching South Asian Languages, Literatures, and Cultures. (1-5 cr; SP–#) Fundamentals of language instruction as applied to South Asian languages and literatures. Materials preparation and teaching of specific languages to a controlled group.

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

SALC 8790. Research. (1-5 cr; SP–#)

SALC 8888. Thesis Credits: Doctoral. (1-18 cr; SP–Max 18 cr per semester or summer; 24 cr required)
Courses

Spanish (Span)

Department of Spanish and Portuguese

College of Liberal Arts

Span 5106. The Literature of the Reconquest and Feudal Spain. (3 cr; SP–Three 3xxx or 5xxx lit courses in Spanish) The major literary genres developed in Spain from the Reconquest to 1502, with reference to the crucial transformations of the Middle Ages, including primitive lyric, epic, clerical narrative, story-telling, debates, collections, chronicles, “exempla,” and the Celestina (1499–1502).

Span 5107. The Literature of the Spanish Empire and Its Decline. (3 cr; SP–Three 3xxx or 5xxx lit courses in Spanish or Portuguese) Major Renaissance and Baroque works of the Spanish Golden Age (16th– and 17th-century poetry, nonfiction prose, novel, drama) examined against the historical background of internal economic decline, national crisis, and ideological apparatus developed by the modern state.

Span 5108. Don Quixote. (3 cr; SP–Three 3xxx or 5xxx lit courses in Spanish or Portuguese) Analysis of Cervantes’ Don Quixote in its sociohistorical context; focus on the novel’s reception 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 lit 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 rise of bourgeois liberalism.

Span 5110. Discursive Forms at the Threshold of 20th-Century Spain. (3 cr; SP–Three 3xxx or 5xxx lit courses in Spanish or Portuguese) Theory and representative examples of the realist/naturalist novel (Galáps, Pardo Bazán) in the context of its antecedents (‘costumbrismo’), opposites (the idealist/sentimental novel), and turn-of-the-century innovations of modernism and the “generation of 1898.”

Span 5111. Contemporary Spanish Literature Since 1915. (3 cr; SP–Three 3xxx or 5xxx lit 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/TV; problems of literary history.

Span 5221. Spanish Drama in Performance: 17th-Century Comedia. (3 cr; SP–Three 3xxx or 5xxx lit courses in Spanish or Portuguese) Major dramatists of the Spanish comedia (e.g., Cervantes, Lope, Tirso, Calderón). Traditional genres such as tragedy, farce, interludes or auto sacramentales and problems of honor, blood purity, free will, city vs. country, and poetic justice examined against the background of cultural and social history.

Span 5224. Feminism and Literature in Spain. (3 cr; SP–Three 3xxx or 5xxx lit courses in Spanish or Portuguese) Spanish feminist thought and practice; literature, cultural discourse, literary and critical theory.

Span 5227. Hispanic Modernism. (3 cr; SP–Three 3xxx or 5xxx lit 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 5316. Spanish Picareseque Narratives. (3 cr; SP–Three 3xxx or 5xxx lit courses in Spanish or Portuguese) Major picareseque narratives—Lazarillo, Gomán, Buscón, Cervantes’ Picaros, Estebanillo González—in relation to Spanish Renaissance, Western tradition, European novel, realism. Literary autobiography, episodic structure, themes of rogery, delinquency, sin, marginality, social criticism, moral proclamations. Comparison to European counterparts.

Span 5525. Caribbean Literature: An Integral Approach. (3 cr; SP–Three 3xxx or 5xxx lit courses in Spanish) Literature of the Spanish-speaking Caribbean with emphasis on the historical legacy of slavery, African culture, and independence struggles.

Span 5526. Creole Consciousness and Mercantilist Culture. (3 cr; SP–Three 3xxx or 5xxx lit courses in Spanish) Discourse production in Spanish America between 1492 and 1700. Conquest and colonial writing and counterwriting; historical origin and evolution and the impact of cultural, political, and socioeconomic factors.

Span 5527. National Literary Consciousness and Free Trade. (3 cr; SP–Three 3xxx or 5xxx lit courses in Spanish) Literary movements as part of the process of forming nation-states in Spanish America.

Span 5528. Popular Literary Consciousness: 1900–1950. (3 cr; SP–Three 3xxx or 5xxx lit courses in Spanish or Portuguese) 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 lit courses in Spanish or Portuguese) Literary trends of the contemporary period (1950 to present) as a reaction to internal social demands for development of independent national cultures and in response to international cultural pressures.

Span 5531. Hispanic Literature of the United States. (3 cr; SP–Three 3xxx or 5xxx Spanish or Portuguese lit courses or #) Interdisciplinary approach providing a framework for deconstructing issues of national identity, marginalization, and gender. U.S. Hispanic theatre/literature and its ethnic diversity, regional variations, cultural links, and scope of its genres.


Span 5536. Feminism and Literature in Latin America. (3 cr; SP–Three 3xxx or 5xxx lit courses in Spanish or Portuguese or #) Latin American feminism in thought and practice; literature, cultural discourse, literary theory.

Span 5701. History of Ibero-Romance. (3 cr; SP–3702, two 3xxx or 5xxx Spanish linguistics courses or #) Origins and developments of Ibero-Romance languages; evolution of Spanish, Portuguese, and Catalan.

Span 5711. The Structure of Modern Spanish: Phonology. (3 cr; SP–3701, two 3xxx or 5xxx linguistics courses in Spanish or Portuguese) Formulating and evaluating a phonological description of Spanish. Approaches to problems in Spanish phonology within metrical, autosegmental, and lexical phonological theories.

Span 5712. The Structure of Modern Spanish: Morphology. (3 cr; SP–3701) 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 linguistics 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–3703) Linguistic types and processes that appear across languages, such as grammatical relations, word order, transitivity, subordination, information structure, grammaticalization, and how these are present in the syntax of Spanish.

Span 5715. The Structure of Modern Spanish: Semantics. (3 cr; SP–3702) Applying semantic theory to Spanish: conceptual organization and the structuring of experience; meaning and cultural values; semantic fields; categorization and prototypes; cognitive model theory; metaphor, metonymy, and mental imagery as source and change of meaning.

Span 5716. The Structure of Modern Spanish: Pragmatics. (3 cr; SP–3702) Concepts used in current literature in Spanish pragmatics, such as deixis, presupposition, conversational implicature, speech act theory, and conversational structure.

Span 5731. Spanish Dialectology: Regional and Social Dialects of Modern Spanish. (3 cr; SP–Three 3xxx or 5xxx linguistics courses in Spanish or Portuguese) Major dialect areas of Spanish, with distinguishing phonological, morphological, lexical, and syntactic variations of each. Impact of recent cultural, political, 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 Portuguese) 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 5910. Topics in Spanish Peninsular Literature. (3 cr; SP–9 cr) Three 3xxx or 5xxx lit courses in Spanish or Portuguese) 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; SP–5 cr) Three 3xxx or 5xxx lit courses in Spanish or Portuguese) Spanish-American literature analyzed according to important groups, movements, trends, methods, and genres. Specific approaches depend on topic instructor. Topics specified in Class Schedule.

Span 5930. Topics in Ibero-Romance Linguistics. (3 cr; SP–5 cr) Three 3xxx or 5xxx lit courses in Spanish or Portuguese) Problems in Hispanic linguistics; a variety of approaches and methods.

Span 5970. Directed Readings. (1–4 cr; max 9 cr) Students must submit reading 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–3xxx or 5xxx linguistics courses in Spanish or Portuguese) 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) Students must submit research plans for particular topics, figures, periods, or issues. Readings in Spanish and/or Spanish-American subjects.

Span 5991. The Acquisition of Spanish as a First and Second Language. (3 cr; SP–Three 3xxx or 5xxx linguistics courses in Spanish or Portuguese) Analysis of issues such as the acquisition of Spanish and English by bilingual children; Spanish in
immersion settings; developmental sequences in Spanish; classroom language learners’ attitudes, beliefs, and motivation; development of pragmatic competence.

Span 8100. Research in Sociohistorical Approaches to Spanish Literature. (3 cr; [max 9 cr]; SP-5xxx courses in Span lit and culture)
Sociohistorical functions of Spanish literary works and major theories concerning literary production of texts. Testing modern theories in terms of representative fictional discourses from specific historical periods.

Span 8200. Spanish Literary Texts: Theories of Formal Structures. (3 cr; [max 9 cr]; SP-5xxx courses in Span lit 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-5xxx courses in Span lit and culture)
Medieval origins of drama to La Celestina (1499-1502), pastoral dialogues, crossover plays of Spanish and Portuguese dramatists, popular theater up to emerging public and private theaters under Italian influence. Rojas, Encina, Vicente, Naharro, Cervantes, emerging public and private theaters under Italian influence. Rojas, Encina, Vicente, Naharro, Cervantes, amongst others.

Span 8223. The Poetry of the Spanish Golden Age. (3 cr; SP-5xxx courses in Span lit and culture)
New Spanish poetic forms, from Garcilaso de León, mystics, and San Juan to Baroque trends by Góngora, Lope, and Quevedo. Classic traditions and modern adaptations. Ideological foundations of lyric genres—eclogue, lira, mystics, satire, conceptismo/ culturalism; and sonnet.

Span 8252. Spanish Literature: 19th Century. (3 cr)
Critical examination of readings and research on Spanish literature. Taught in Spanish and/or Portuguese; A-F only.

Span 8271. Spanish Theater: 20th Century. (3 cr)
Development and evolution of dramatic genres (experimental, absurd, or vanguard) from 1898 crisis to World War II and Franco era to the present: Gallodís, Valle-Inclán, Unamuno, Grau, Lorca, Vallejo, Arrabal, and “Subterráneans.” Emphasizes “drama in performance” and diverging ideologizes.

Span 8300. The Construction of Spanish Literary History. (3 cr; [max 9 cr]; SP-Two 5xxx courses in Span lit and culture)
Origins and development of Hispanic literary canon: sociocultural theories of Spanish literary histories as academic and historiographic disciplines. Critiques of modern literary theories through analysis of literary works by major writers.

Span 8312. Two Spanish Masterpieces: Libro de Buen Amor and La Celestina. (3 cr; SP-5106, 5109, 5111 or 5xxx course in Portuguese)
Cultural reappraisal of the late Middle Ages by reference to two Spanish masterpieces: the Archpriest’s Book of True Love and Rojas’ La Celestina (1499-1502). Emphasizes historical function of varied genres, motifs, and sources adapted by the authors.

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 8866. Doctoral Pre-Thesis Credits. (1-18 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 in specific topic.

Span 8777. Thesis Credits: Master’s. (1-18 cr; SP-Max 18 cr per semester or summer; 10 cr total required (Plan A only))
Span 8780. Seminar in Hispanic Sociolinguistics. (3 cr; [max 9 cr]; SP-5721 or 5752 or 5985 or #)
Current issues.

Span 8888. Thesis Credits: Doctoral. (1-18 cr; SP-Max 18 cr per semester or summer; 24 cr required)

Span 8900. Spanish Seminar. (3 cr; [max 9 cr]; SP-Span 5xxx series required for MA or cr)
Projects relying heavily on advanced research in Spanish problems. Investigation of assigned fields, analysis of problems, appraisal of principles. Limited to small group of students. For list of sample seminars, consult department and director of graduate studies.

Span 8940. Advanced Research in Spanish-American Literary Historiography. (3 cr; [max 9 cr])
Sources and procedures that have given rise to institutionalizations of Spanish-American literary history. Evaluation and review of epistemological principles and assumptions in theory of literary criticism and histories of literature.

Span 8960. Workshop: Research in Hispanic Cultural Issues. (3 cr; [max 9 cr]; SP-Reading knowledge of Spanish and Portuguese; A-F only)
Individualized support and advice in framing, theorizing, problematizing, and interpreting areas of cultural research. Taught in Spanish, Portuguese, and English.

Span 8990. Advanced Comparative Research of Caribbean Genres. (3 cr; [max 9 cr]; SP-5525 or #)
Major literary works and genres of Caribbean literature studied against the background of sociohistorical vicissitudes of the process leading to the formation and consolidation of the national states.

Span 8999. Advanced Comparative Research of Caribbean Genres. (3 cr; [max 9 cr]; SP-5525 or #)
Major literary works and genres of Caribbean literature studied against the background of sociohistorical vicissitudes of the process leading to the formation and consolidation of the national states.

Spanish-Portuguese (SpPt)

Department of Spanish and Portuguese
College of Liberal Arts

SpPt 5930. Selected Topics in Hispanic Cultural Discourse. (4 cr; SP-Reading knowledge of Spanish and Port; A-F only)
Cultural discourses in Spanish- and Portuguese-speaking areas. Historical intersections and divergences. Taught in Spanish and/or Portuguese; English when cross-listed. Topics specified in the Class Schedule.

SpPt 5999. The Teaching of College-Level Spanish: Theory and Practice. (3 cr; SP-Grad student or #)
Theoretical grounding in the general principles of second language acquisition and guidance with their practical applications to the teaching of first- and second-year Spanish at the college-level.

SpPt 8400. Topics in Modern Hispanic and Lusophone Culture. (3 cr; [max 9 cr]; SP-Three 5xxx Span or Port courses)
Advanced research in methods of analysis of culture. Emphasizes theoretical and practical frameworks within which representative cultural products and events are analyzed and interpreted from differing perspectives.

SpPt 8920. Cross-Cultural Issues in Hispanic and Luso-Brazilian Cultural Discourse. (3 cr; [max 9 cr])
Comparative study of literary and cultural production in historical periods when economic, social, political, and ideological bonds among Hispanic and Lusophone countries were intensified. Topics specified in Class Schedule.

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 current offering.

Spch 5210. Contemporary Problems in U.S. Electronic Media. (3 cr; [max 3 cr]; SP-3211 or #)
Problems affecting U.S. commercial and educational electronic media. Audiences; race/ethnicity issues; regulation.

Spch 5220. Television Genres. (3 cr; [max 3 cr])
Natural, historical development, and influence on society of specific genres of television programming: drama, situation comedy, mystery, soap opera. Program genre change over time and how society, government regulation, and economics of production influence that historical process.

Spch 5233. 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, hygienic standards, literacy, and awareness of civic responsibility.

Spch 5261. Communicative Processes in Electronic Media. (3 cr; SP-3211 or #)
Organizational practices of media communicators; media content as a link between communicators and audiences; how viewers use and process media content.

Spch 5401. Advanced Theories of Communication. (3 cr; SP-3401 or grad student)
Survey of major theoretical approaches to communication including, positivism, constructivism, and systems.

Spch 5402. Advanced Interpersonal Communication. (3 cr; SP-3102, 3402 or 3411 or 3431 or 3441 or 3451)
Social scientific approaches to interpersonal communication; theory and research findings.

Spch 5404. Language and Culture. (3 cr; SP-3401 or #)
How language and communication transmit cultural knowledge, attitudes, and beliefs. Connections among language, thought, and culture. Social and ethnic perspectives on the study of language and communication.

Spch 5406. Communication and Gender. (3 cr; SP-One women’s studies course or #)
How gender affects verbal communication. Development of analytical skills through readings, exercises, research that raise awareness of the power of language and the influence of gender prescriptions. Comparisons across languages where possible.

Spch 5408. Social Cognition. (3 cr)
Role of cognitive processing in communication studies. Models include perception, attention, memory and their use in communication. Evaluation of social cognition theory and research.

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.
Courses

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) illustrating persuasive processes and theories. Research paper required.

Spch 5441. Communication in Human Organizations. (3 cr; SP–9 cr social science, 3441 or #)
Communication in organizational settings. Organizational structure and dynamics and their effect upon the communication process. Individual projects.

Spch 5451. 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 Ling 5001)
Discourse processes in dyadic and multiparty conversations. Application of concepts through analysis of conversations.

Spch 5462. Field Research in Spoken Language. (3 cr; SP–5461, Ling 3001 or Ling 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 5615. Introduction to Rhetorical Criticism. (3 cr; SP–1101, 3601 recommended)
Analysis of public discourse using various theoretical perspectives.

Spch 5617. History and Criticism of U.S. Public Discourse: 1630-1865. (3 cr; SP–Jr)
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, L, S-N only)
Guided individual reading or study.

Spch 8110. Seminar: Advanced Speech Problems. (3 cr; SP–undergrad degree in spch-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 on topics; conducting independent research project on a particular topic.

Qualitative research methods for studying media institutions, texts, audiences, and contexts.

Spch 8221. 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. (5 cr; SP–5402 or #)
Evaluate and develop new perspectives for analyzing, diagnosing, and managing interpersonal communication problems.

Spch 8403. Seminar: Emotion and Communication. (5 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 to 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; SP–#)

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.

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)
Elements involved 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 literary studies and the growth of hermeneutics as a basis for reassessing rhetorical methods.

Spch 8606. Seminar: Rhetorical Analysis of Campaigns and Movements. (3 cr; SP–5431, 5617 or 5618, 10 cr social 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, intercultural, and media settings. Theories of ethics and methods of analysis.

Spch 8666. Doctoral Pre-Thesis Credits. (1-18 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; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

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

Statistics (Stat)

School of Statistics
College of Liberal Arts

Stat 5021. Statistical Analysis. (4 cr; SP–College algebra or # SP–3011; College algebra or # Stat course recommended)
Intensive introduction to statistical methods for graduate students needing statistics as a research technique.

Stat 5031. Statistical Methods for Quality Improvement. (4 cr; SP–5302 or 5091 or 5201 or 5122 or 5152 or 5172; Math 1252; SP–5021 or 4102 or 5021 or 5120 or 8102; Math 1272)
Applications of statistical concepts of random variability and sampling, statistical process control, Shewhart and accumulative charting, analysis of plant data, applications of trend surface analysis, analysis of variance and design of experiments, quality improvement by reduction of random variability.

Stat 5041. Bayesian Decision Making. (3 cr; SP–5122 or 5152 or SP–5021 or 5101 or #)

Stat 5101. Theory of Statistics I. (4 cr; SP–5121, 5122; Math 3252; SP–Math 2263)
Probability; Bayes’ theorem; discrete and continuous univariate and multivariate distributions; independence; generating functions; limit theorems; various parametric families; sampling distributions; order statistics; likelihood, sufficiency, and information.

Stat 5102. Theory of Statistics II. (4 cr; SP–5101 or Math 5651)
Estimation, test of hypotheses, size, and power; categorical data; contingency tables; multivariate normal distribution; linear models; decision theory.

Stat 5201. Sampling Methodology in Finite Populations. (3 cr; SP–3091 or 5021 or 5121 or #; SP–5021 or 5021 or #)
Simple random, systematic, stratified, and unequal probability sampling ratio and model based estimation; single stage, multistage, and adaptive cluster sampling; spatial sampling.

Stat 5302. Applied Regression Analysis. (4 cr; SP–5516, 5021 or 5133 or 5153; SP–3021 or 5021 or 4102 or 5021 or #)
Simple, multiple, and polynomial regression. Estimation, testing, and prediction. Use of graphics in regression. Stepwise and other numerical methods; weighted least squares; nonlinear models; response surfaces. Experimental research and applications.

Stat 5303. Designing Experiments. (4 cr; SP–55163; 3021 or 5021 or 5133 or 5153 or SP–3022 or 4102 or 5102 or #)
Analysis of variance, multiple comparisons, variance-stabilizing transformations, contrasts, construction and analysis of complete and incomplete block designs, fractional factorial designs, confounding split plots, and response surface design.

Stat 5401. Applied Multivariate Methods. (3 cr; SP–5302 or 5133 or 5153; SP–5302 or 5012 or #)

Stat 5421. Analysis of Categorical Data. (3 cr; SP–5516; 3021 or 5021 or 5133 or 5153 or SP–5302 or 8101 or #)
and goodness of fit. Logistic regression,
genetic analysis, linear models, and nonparametric response models.

Stat 5601. Nonparametric Methods. (3 cr; QP-5101 or 5122 or 5132 or 5152 or SP-8101 or 3021 or 4012 or 5021 or 5102 or #)
Order statistics, classical random-based procedures (e.g.,
Wilcoxon, Kruskal-Wallis), goodness of fit. Topics
may include smoothing, bootstrap, generalized linear models.

Stat 5931. Topics in Statistics. (3 cr; SP-8061, 4102 or 5102 or #)
Topics vary according to student needs and available
staff.

Stat 5932. Topics in Statistics. (3 cr; SP-8061, 4102 or 5102 or #)
Topics vary according to student needs and available
staff.

Stat 5993. Tutorial Course. (1-3 cr; max 12 cr)
Directed study in areas not covered by regular
offerings.

Stat 8061. Applied Statistical Methods I. (4 cr; QP–5120, 5130, 5302, 5421; 5131 or 5151; SP–
Grad stat major or A-F only)
The regression problem; linear regression with one or
more predictors; using graphics in regression; model
building; model assessment and diagnostics; outliers;
generalized linear models; logistic, Poisson, and
nonlinear regression.

Stat 8062. Applied Statistical Methods II. (4 cr; QP–5162; SP-8061, grad stat major or A-F only)
Categorical data analysis: logistic linear models, logit
models, nonparametric response models, exact and
asymptotic inference, conditional independence;
models of association. Experimental design:
randomization, ANOVA; contrasts and multiple
testing, factorials, blocking, covariates, split plots,
random effects, fractional factorials, 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; QP–5152; SP–
8101, 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; QP–5133 or 5153; real analysis, matrix algebra; SP–5102 or 8102 or #)
real analysis, matrix algebra
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; QP–8112; SP–
8111)
Statistical inference, estimation, and hypothesis
testing. Convergence and relationship between
convergence modes. Asymptotics of maximum
likelihood estimators, distribution functions, quantiles.
Delta method.

Stat 8121. Theory of Inference. (3 cr; QP–8153, Math
8656; SP–8112, Math 8657 or #)
Topics 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; QP–8152 or
equiv; SP–8112 or equiv)
Traditional frequentist and nontraditional 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, perturbation analysis and control.

Stat 8141. Probability Assessment. (3 cr; QP–5133 or
equiv; SP–5102)
Probability as a language of uncertainty for
quantifying and communicating expert opinion and for
use as Bayesian priors. Methods for
elicitation and construction of subjective probabilities.
De Finetti coherence, predictive elicitation, fitting
subjective-probability models, computer-aided
elicitation, and use of experts.

Stat 8151. Statistical Decision Theory. (3 cr; QP–8153,
Math 8658; SP–8112, Math 8656)
Comparison of inferential methods in statistics
(including risk comparison, minimaxity, and
admissibility) using Wald's formulation of decision.
Formal and proper Bayes rules compared with
frequentist inferences. Topics vary depending on
instructor.

Stat 8171. Sequential Analysis. (3 cr; QP–8153; 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; QP–5153; SP–8102 or #)
Sampling theory; stratified sampling, ratio estimators,
cluster sampling, double sampling, superpopulation
theory, Bayesian methods, multiple imputation,
nonresponse.

Stat 8311. Linear Models. (3 cr; QP–Linear algebra 5122 or
5133 or 5153; SP–Linear algebra, 5102 or 8102 or #)
General linear model theory from a coordinate-free
geometric approach. Distribution theory, ANOVA,
tables, testing, confidence statements, mixed models,
covariance structures, variance components
estimation.

Stat 8312. Linear and Nonlinear Regression. (3 cr; QP–
8312–SP–8311)
Nonlinear regression: asymptotic theory, Bates-Watts
curvature, super leverage, parameter plots, projected
residuals, transform-both-sides methodology, Wald
versus likelihood inference. Topics in linear and
generalized linear models as they relate to nonlinearity
issues, including diagnostics, semiparametric models,
and model assessment.

Stat 8313. Topics in Experimental Design. (3 cr; QP–
8312–SP–8311)
Optimal, Bayesian, and nonlinear designs; algorithms
for computing designs; sample size; recent developments.

Stat 8321. Regression Graphics. (3 cr; QP–8312; SP–
8311)
Objectives: dimension-reduction subspaces, Li−Duan
Lemma, structural dimension. Inferring about central
dimension-reduction subspaces by using 3D plots,
graphical regression, inverse regression graphics, net-
effect plots, principal Hessian directions, sliced
inverse regression and predictor transformations.
Graphics for model assessment.

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

Stat 8401. Topics in Multivariate Methods. (3 cr; QP–
8312–SP–8311)
Bivariate and multivariate distributions. Multivariate
normal distributions, Hotelling’s T-squared,
MANOVA, MANCOVA, and regression with
multivariate dependent variable. Repeated measures,
growth curve, and profile analysis. Canonical
correlation analysis. Principle components and factor
analysis. Discrimination, classification, clustering.

Stat 8411. Multivariate Analysis. (3 cr; QP–8153; 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; QP–
5152–SP–8062 or #)
categorical data, multidimensional cross-classified
arrays, mixed categorical and continuous data.
Loglinear, logit, and multinomial response models.
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; QP–5131 or 5151; SP–5101 or 8101)
Markov chains in discrete and continuous time,
renewal processes, Poisson process, Brownian motion,
and other stochastic models encountered in
applications.

Stat 8511. Time Series Analysis. (3 cr; QP–5133 or 5153; SP–
8102 or 8111 or #)
Discrete and continuous parameter time series.
Stationarity. Second-order descriptions of times series.
Frequency domain representation and univariate
and multivariate time series analysis. Smoothed modified
periodograms, multi-taper estimation. Time−domain
representation and time series analysis, ARIMA
models, structural models.

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

Stat 8701. Computational Statistical Methods. (3 cr; QP–
8212, programming exper; SP–8211, programming
exper)
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; QP–8162; SP–
8701 or #)
Basic numerical analysis for statisticians. Numerical
methods for linear algebra, eigeen-analysis, integration,
and optimization and their statistical applications.

Stat 8721. Programming Paradigms and Dynamic Graphics In Statistics. (3 cr; QP–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 graphs and representation and use of functional data,
such as mean function in nonlinear regression log
likelihoods and prior densities in Bayesian
analysis.

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

Stat 8801. Statistical Consulting. (1 cr; SP–Grad stat
major or #)
Almost all statistics graduates will provide some level
of consulting to statistics users in other subject areas.
Principes of effective consulting and problem-
solving, meeting skills, and reporting. Aspects of
professional practice and behavior, ethics, and
continuing education.

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

Stat 8931. Advanced Topics In Statistics. (3 cr; SP–)
Topics vary according to student needs and available
staff.

Stat 8932. Advanced Topics In Statistics. (3 cr; SP–)
Topics vary according to student needs and available
staff.

Stat 8992. Directed Readings and Research. (1-3 cr; SP–
#)
Directed study in areas not covered by regular
offerings.
**Courses**

**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) Series of weekly lectures by nationally and internationally known scholars with diverse disciplinary 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 Phil 8602 or Phil 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 Phil 8602 or Phil 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 Phil 8602 or Phil 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 Phil 8602 or Phil 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 - #) 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-Advanced undergrads with 2 yrs of another foreign lang, grad) Sumerian writing and grammar. Readings from classical Sumerian literary and historical texts.

Sum 5012. Elementary Sumerian II. (3 cr; SP-HSci 8111 or [Phil 8601 or Phil 8602 or Phil 8605]) or #) Provides intro to ag practices or issues; SP–Grad surg major; A-F only.

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) Evaluation 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, adviser and DGS consent) Students gather data and write reports.

Surg 8444. FTE: Doctoral. (1 cr; SP-Doctoral student, adviser and DGS consent) Students participate in ongoing research on the role of models and theories in science, and prepare and present research papers.

**Sustainable Agriculture 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 intro to ag practices or issues; SP-Coursework in biological or social sciences that provides intro to ag practices or issues; A-F only) Forum for University faculty and students, and representatives of the farming community, including farmers, grassroots organizations, agricultural businesses, and representatives of state agencies, to engage in discussions on topics related to sustainability of food production.

SAgr 8020. Field Experience in Sustainable Agriculture. (1-3 cr; QP–Coursework in biological or social sciences that provides intro to ag practices or issues; SP-Coursework in biological or social sciences that provides intro to ag practices or issues; A-F only) Eight- to ten-week internship with growers or organizations working with sustainable agriculture issues. Students analyze these issues in a term paper and seminar.

Teaching English as a Second Language (TESL)

**Institute of Linguistics and Asian 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 from the point of view of second-language speakers as well as native speakers. Phonetics, phonology, morphology, and some aspects of the syntax of the English language. Part of a two-course sequence.

TESL 5402. Language Analysis for Teachers of English as a Second Language. (4 cr; SP-5401, 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 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. (3 cr; SP-ESL major or minor; 5721 or #) Observation of, and practice in, teaching English as a second language to adults at the college or 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 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-#, Q) Directed study for teaching English as a second language.

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

TESL 8751. English for Specific Purposes. (3 cr; SP-5721, 5401, 5402 or #) Critical review of literature: registers 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; SP-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**Theatre Arts**

**Department of Theatre Arts and Dance**

College of Liberal Arts

Th 5100. Theatre Practicum. (1-4 cr; QP–#A; SP–#A, #) Individual creative projects in production of approved plays as an actor, director, dramaturg, or playwright. (See 5500 for design practicums.)


Th 5172. History of the Theatre II. (3 cr) Theatre as a mirror of society. Aesthetics, philosophy, and practices of theatre arts. Mid-18th century to the present.

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

Th 5182. Contemporary Black Theatre: 1960-Present. (3 cr) Essays, plays, playwrights, and theatres that have contributed to contemporary Black theatre. From the beginning of the Black Arts Movement to the present.
Th 5310. MFA Actors Studio. (1 cr; max 3 cr; QP-MFA actor or # by audition; SP-MFA actor or # by audition; S-N only) Apply elements of performance, including research techniques, creative thinking, and rehearsal techniques.

Th 5321. Career Preparation for the Actor. (3 cr; SP-3323 or MFA actor or # SP-3322 or MFA actor) Information and techniques necessary for the professional acting career.

Th 5322. Acting for the Camera. (3 cr; SP-3322 or MFA actor or # SP-3322 or MFA actor) Differences between stage acting and acting for the camera. Learn film technique with hands-on experience of using equipment. Scenes and monologues rehearsed and performed for the camera with playback on videotape for class critique.

Th 5331. Physical Approaches to Acting: Use of Self. (2 cr; QP-3323, # by audition or MFA actor; SP-MFA or # by audition) Movement for advanced actors: awareness, flexibility, observation, release, improvisation in both verbal and nonverbal physical modes.

Th 5332. Physical Approaches to Acting: Stage Combat. (2 cr; QP-3323, # by audition or MFA actor; SP-MFA or # by audition) Movement for advanced actors: awareness, flexibility, observation, release, improvisation in both verbal and nonverbal physical modes; focus on stage combat.

Th 5333. Physical Approaches to Acting: Period Styles. (2 cr; QP-3323, # by audition or MFA actor; SP-MFA or # by audition) Movement for advanced actors: awareness, flexibility, observation, release, improvisation in both verbal and nonverbal physical modes; focus on period styles of movement.

Th 5334. Physical Approaches to Acting: Mask. (2 cr; QP-3323, # by audition or MFA actor; SP-MFA or # by audition) Movement for advanced actors: awareness, flexibility, observation, release, improvisation in both verbal and nonverbal physical modes; focus on mask work.

Th 5341. Speech for Actors. (2 cr; QP-MFA or # SP-MFA or # A-F only) Theories of professional voice production, anatomy and physiology of the vocal mechanism and respiratory system, phonetics, tonal placement, vowel standardization, and articulation are applied to dramatic texts.

Th 5342. Classical Text for Actors. (3 cr; QP-MFA or # SP-MFA or # A-F only) Metrical and rhetorical techniques used in the dramatic texts of Shakespeare and Shaw, as well as textual performance styles from Elizabethan to contemporary. Discussion, presentation, oral reports, and performances.

Th 5351. Musical Theatre. (3 cr; A-F only) History of American musical theatre featuring videos/discussions, basic music theory, voice, dance, acting, and audition techniques. Solo and ensemble presentations for a public class performance.

Th 5500. Theatre Design Practicum. (1-3 cr; QP-MFA money or SP-3515, A, #) Individual projects in production of approved plays as a designer of scenery/properties, costumes, lighting, or sound. (3 credits for other creative practicums.)

Th 5510. Drawing, Rendering, and Painting for the Theatre Designer I. (3 cr; QP-3513 or SP-3515 or grad student; SP-3515 or grad student or #) Development of skills necessary for the presentation of theatre scene and costumes designs. Practical study of materials, layout, and techniques used in scene painting. Focus on basic drawing/graphic skills.

Th 5515. Design Composition and Collaboration. (3 cr; QP-Grad student or 3513, 3711, SP-Grad student or 3515, 3711; #) Classical composition of art and its application to stage design and directing through the collaborative process.

Th 5520. Scene Design. (3 cr; max 9 cr) QP-3513 or grad student or SP-3515 or grad student or #) Conceiving and communicating design ideas in both two-dimensional sketches and three-dimensional models for the theatre and allied venues.

Th 5530. Costume Design. (3 cr; max 9 cr) QP-3513 or grad student or SP-3515 or grad student or #) Theory and process of costume design for theatrical productions (e.g., dance, opera, film) through hypothetical productions.

Th 5540. Lighting Design for the Theatre. (3 cr; max 9 cr) QP-3513 or grad student or SP-3515 or grad student or #) Design aesthetics and exploration of design for various stage forms and venues. Development of the lighting plot and paperwork; use of the computer in lighting design.

Th 5545. Stage Lighting Technology. (3 cr; SP-3515 or grad student or SP-3513 or grad student or #) The lighting technician's skills and crafts: equipment, techniques, control operation, wiring, and maintenance.

Th 5550. Sound Design for Performance. (3 cr; max 9 cr) QP-5564 or SP-5555 or #) Audio technology and psychology and their impact on an audience in a performance situation. Communication, design process, psychoacoustics, and script analysis.

Th 5555. Audio Technology. (3 cr; QP-5564 or SP-5-Th major or #) Sound as a science and the technology used to create and manipulate sound, including, effects processing, signal processing and recording, microphone, and mixing techniques.

Th 5557. Digital Audio and MIDI for Performance. (3 cr) Computer and CPU-generated audio technology and the use of MIDI language protocol for performance in all aspects of the arts.

Th 5560. Drawing, Rendering, and Painting for the Theatre Designer II. (3 cr; QP-5510, SP-5510) Development of skills necessary for the presentation of theatre scene and costumes designs. Practical study of materials, layout, and techniques used in scene painting. Focus on rendering and scene painting skills.

Th 5570. Properties/Scenery Technology. (1-3 cr; max 15 cr) QP-3513 or grad student or SP-3515 or grad student or #) Management, structures, upholstery, mask-making, furniture construction, stage mechanics, soft properties, faux finishes. Topics specified in Class Schedule.

Th 5580. Costume Technology. (1-3 cr; max 15 cr) QP-3515 or grad student or SP-3515 or grad student or #) Fabric enhancement techniques, masks, wig-making, millinery, makeup prosthetics, pattern drafting, and draping. Topics specified in Class Schedule.

Th 5590. Theatre Technology Practicum. (1-3 cr; max 15 cr) QP-MFA money; QP-MFA money; # or max for undergrads) Individual creative projects in technology or craft areas of theatre that develop practical skills in costume, lighting, makeup, props, scenery, sound, or theatre management.

Th 5711. Advanced Stage Direction. (3 cr; QP-3711 or grad student or SP-3513 or grad student or #) Realistic and nonrealistic dramatic forms, theory and technique of rehearsal, solving production problems, and directing three one-act plays.

Th 5715. Actor-Director Collaboration. (3 cr; QP-3323, 3711 SP-Grad student or 3322, 3711) Applying advanced acting and directing technique to an artistic, collaborative process that promotes flexibility and creativity. Actors and directors are exposed to a challenging range of roles, styles, and scenes.
Courses

Th 8321. MFA Acting I. (3 cr; SP–MFA actor or # by audition)
Advanced acting technique and theory. Eclectic approach emphasizing Stanislavski-based vocabulary. Improvisation and prepared exercises as preparation for text-based work.

Th 8322. MFA Acting II. (3 cr; SP–MFA actor or # by audition)
Continuation of 8321. Advanced acting technique and theory. Eclectic approach emphasizing Stanislavski-based vocabulary. Prepared exercises and scenes from plays.

Th 8323. MFA Acting III. (3 cr; SP–MFA actor or # by audition)
Advanced techniques for performing classical texts with increasingly extended vocal and physical demands using Shakespearean scenes and monologues.

Th 8324. MFA Acting IV. (3 cr; SP–MFA actor or # by audition)
Advanced techniques for performing contemporary texts with increasingly extended vocal and physical demands using modern and postmodern scenes and monologues.

Th 8325. MFA Showcase Preparation. (3 cr; SP–Third-yr MFA actor; A-F only)
Research, preparation, and rehearsal for the MFA actor's final creative project.

Th 8326. MFA Showcase. (3 cr; SP–Third-yr MFA actor; A-F only)
Research, rehearsal, production, and performance of the MFA actor’s final creative project.

Th 8330. Alexander Technique for the MFA Actor. (0.5 cr [max 2 cr]; SP–MFA actor; A-F only)
Principles for improving performance; developing body/mind awareness, ease of movement, and range of physical/emotional expression. Group and individual work.

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

Th 8341. MFA Vocal Production I. (2 cr; SP–MFA actor or # by audition)
Using voice for the stage; fundamentals of body awareness, breath and support, resonance.

Th 8342. MFA Dialects I. (2 cr; SP–MFA actor or # by audition)
Skills and resources for learning stage dialects.

Th 8343. MFA Vocal Production II. (2 cr; SP–MFA actor or # by audition)
Using voice for the stage; pitch, rate, volume; application to poetic texts.

Th 8344. MFA Dialects II. (2 cr; SP–MFA actor or # by audition; A-F only)
Skills and resources for learning stage dialects.

Th 8345. MFA Vocal Production III. (1 cr; SP–MFA actor or # by audition; A-F only)
For the third-year MFA actor.

Th 8346. MFA Vocal Production IV. (1 cr; SP–MFA actor or # by audition; A-F only)
For the third-year MFA actor.

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–#)
Individual creative projects in production of approved plays as a designer for scenery/properties, costumes, lighting, or sound (see 8100 for other creative practicums).

Th 8590. Theatre Technology Practicum. (1-3 cr [max 20 cr]; SP–#)
Individual creative projects in the technology or craft of costume, lighting, makeup, props, scenery, sound, or theatre management.

Th 8666. Doctoral Pre-Thesis Credits. (1-18 cr; SP–Max 10 cr per semester or summer; doctoral student who has not passed prelim oral)

Th 8711. Theory and Practice of the Modern Stage Director. (3 cr)
Survey of principal stage directors (e.g., Saxe-Meiningen, Meyerhold, Brecht, Strehler, Mouchkine, 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)
Rehearsed and performed production of published or original one-act (2 cr) or full-length play (3 cr) with budgeted design and technical support.

Th 8777. Thesis Credits: Masters. (1-18 cr; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

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

Th 8980. Internship. (1.5 cr [max 10 cr]; SP–#; A-F only)

Th 8990. MFA Creative Thesis. (3-4 cr; SP–#; A-F only)

Th 8994. Directed Research. (1-5 cr; SP–#; A-F only)

Toxicology (Txcl)

Graduate School

Txcl 5011. Principles of Toxicology. (2 cr; SP–Grad student tcl major or # A-F only)
Introduction to fundamentals of poisoning in individuals and the environment, assessment of potential health hazards, and application of toxicology in various professional careers.

Txcl 8012. Advanced Toxicology I. (3 cr; QP–5214 or PubH 5261; SP–5011 or BioC 4331, PubH 5104 or #; A-F only)
Absorption, distribution, metabolism, and excretion of xenobiotics; toxicokinetics; mechanisms of toxicity or specific classes of chemical agents.

Txcl 8013. Advanced Toxicology II. (3 cr; QP–5214 or PubH 5261; SP–8012, BioC 4332, Phph 5002 or Phph 6101 or #; A-F only)
Kinetic and dynamic determinants of target organ toxicity; pathological alterations in structure/function relationships for major target organ systems; mechanisms of mutagenesis, carcinogenesis, and teratogenesis.

Txcl 8100. Investigative Toxicology. (1 cr [max 2 cr]; QP–5214; SP–8103 or # A-F only)
Evaluating toxicology research issues and literature.

Txcl 8333. FTE: Master's. (1 cr; SP–MFA actor or # by audition; A-F only)

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

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

Th 8777. Thesis Credits: Masters. (1-18 cr; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

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

Urban Studies (UrbS)

Department of Geography
College of Liberal Arts

UrbS 5101. The City and the Metropolis: An Exploration. (3-4 cr; SP–Grad student 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 5073. Problems in Disease Control and Eradication. (2 cr; SP–# A-F only)
Past and present disease control and eradication programs; factors influencing success and failure. Development of models for programs in the United States or a foreign country for group evaluation and analysis.

Vmed 5080. Problems in Veterinary Epidemiology and Public Health. (1-3 cr; SP–# A-F only)
Individual study on problem of interest to epidemiology or public health student.

Vmed 5165. Monitoring and Surveillance of Disease and Production. (2 cr; SP–# A-F only)
Seminars and discussion on techniques used to monitor animal disease and production.

Vmed 5571. Biohazard in Veterinary Medicine. (1 cr)
For veterinary medicine graduate students who expect to assume supervisory responsibility for design and safe operation of laboratories in veterinary research, teaching, regulatory, or commercial institutions.

Vmed 5596. Swine Diseases and Diagnostics. (2 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–Epidemic 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 on-farm HACCP principles and prudent use of antibiotics.

Vmed 8201. Advanced Small Animal Veterinary Medicine. (1-3 cr; A-F only)
Discussions 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 disease in patients admitted to Veterinary Teaching Hospital.

Vmed 8210. Seminar: Veterinary Medicine. (1 cr)
Participation and presentations of regularly scheduled seminars about internal medicine.
VMed 8220. Advanced Nephrology/Urology Clinics. (1-3 cr; SP–DVM, grad vet med major, #; A-F only)
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)
Discussions 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 medicine 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 anatomist, 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 internal medicine or to 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)

VMed 8492. Seminar: Infectious Diseases and Swine Medicine. (1-2 cr)
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 discussion of journal articles.

VMed 8593. Advanced Veterinary Virology and Serology. (1-3 cr)
Discussion and laboratory practice.

VMed 8666. Doctoral Pre-Thesis Credits. (1-18 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)
Discussions 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 [max 6 cr]; SP–DVM or equiv degree; #; A-F only)
Surgery of various systems in large animals, with preoperative 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)
Discussions on pathophysiology of surgical diseases in dogs and cats.

VMed 8685. Neurosurgery. (2-3 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)
Discussions 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 surgery 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 [max 6 cr]; SP–DVM or equiv degree, #; A-F only)
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. Controlled 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; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

VMed 8780. Advanced Avian Critical Care: Principles and Procedures. (2 cr; SP–Course each in vet pathology, physiology, pharmacology, anatomy, small animal anesthesiology and critical care; A-F only)
Procedures and protocols for managing avian medical emergencies such as starvation, toxicities, respiratory failure, and massive trauma.

VMed 8781. Advanced Veterinary Anesthesiology. (1-3 cr; SP–CVM 5231, CVM 6322, A-F only)
Discussions, presentations, and readings; for veterinary anesthesiology and surgery residents and graduate students.

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; SP–5330, 8780, 8796, DVM; A-F only)
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–7871 or equiv; SACS 5380 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 radiation therapy, or specific applications.

VMed 8793. Seminar: Veterinary Anesthesiology. (1-2 cr; SP–CVM 5231, CVM 6322 or equiv; DVM degree; A-F only)
Discussion and presentations; for veterinary anesthesiology and surgery residents and graduate students.

VMed 8794. Research in Veterinary Radiology. (1-3 cr)
Research into an application, development of an application, or prospective/referpective study of any aspect of veterinary imaging or veterinary radiotherapy.

VMed 8795. Problems: Veterinary Radiology. (1-3 cr [max 6 cr])
Discussion of problems associated with veterinary imaging or radiation therapy.

VMed 8796. Avian Anesthesia and Orthopedic Surgery. (1-3 cr; SP–Courses in vet anesthesia, vet small animal orthopedics; A-F only)
Current methods for anesthetizing raptors, psittacine birds, and waterfowl. Lecture and lab on current methods for avian fracture bone fixation.

VMed 8882. Theriogenology. Journals: Critical Evaluation. (1 cr [max 1 cr])
Reading and presentation of selected current research journal articles; critical evaluation of experimental design, methods, and results.

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

VMed 8891. Seminar: Theriogenology. (1 cr)

VMed 8893. Advanced Diagnostic Methods in Theriogenology. (1-3 cr; SP–CAPS 5570)
Directed research in methods for studying fertility factors affecting female and male animal reproduction.

VMed 8894. Special Problems in Theriogenology. (1-3 cr; SP–CAPS 5570; #)
Specialized and directed scientific readings and discussion; allows for individualizing students’ graduate programs.
Courses

Veterinary Pathobiology (VPB)

Department of Veterinary Pathobiology

College of Veterinary Medicine

VPB 5601. Veterinary Parasitology. (4 cr)

VPB 8501. Advanced Veterinary Basic Pathology. (2-3 cr; SP; #)

Basic mechanisms and concepts relating to reaction of tissue to injury. Gross and microscopic interpretation of retrogressive cellular changes, cellular infiltrations, inflammation, and neoplasia. Students complete a special project selected in conjunction with instructor.

VPB 8502. Advanced Systemic Pathology. (3-4 cr; OP-Q 5501 or VDM 5501, #; SP-Q 5501 or VDM 5501, #)

Reaction of specific systems to injury emphasizing basic response capabilities of tissue or organ, with materials illustrating gross and microscopic changes. Students complete a special project selected in conjunction with instructor.

VPB 8504. Advanced Veterinary Histopathology. (1 cr; OP-Q 5502, 5503, #; SP-Q 5502, 5503, #)

Discussion and study of selected case materials from veterinary anatomic, diagnostic, and surgical pathology programs.

VPB 8531. Hospital Pathology. (1-2 cr; OP-Q 5501, 5502, 5503, #; SP-Q 5501, 5502, 5503, #)

Necropsy and surgical pathology techniques, examination of tissue for diagnosis, and preparation of reports and records.

VPB 8540. Problems: Veterinary Pathology. (2-6 cr [max 12 cr]; SP; #)

Independent study.

VPB 8550. Problems: Veterinary Clinical Pathology. (2-6 cr [max 12 cr]; SP; #)

Independent study.

VPB 8640. Problems: Parasitology. (2-6 cr [max 12 cr]; SP; -)

Independent research.

VPB 8700. Seminar: Veterinary Pathobiology. (1 cr; [max 3 cr]; SP; -)

VPB 8724. Advanced Veterinary Diagnostic Microbiology. (3 cr; SP; -)

Lectures and laboratory in techniques of diagnostic mycology, bacteriology, virology, and serology.

VPB 8740. Problems: Veterinary Microbiology. (2-6 cr [max 12 cr]; SP; -)

Independent study.

Water Resources Science (WRS)

Graduate School

WRS 5001. Introduction to Field Research in Water Resources. (2 cr; SP; Grad WRS major or #)

Introduction to field research techniques and opportunities during two-week summer excursion to regional sites. Data acquisition in large/small lakes, streams, and wetlands for biota and chemical/physical water quality, surface and groundwater hydrologic measurements and sampling.

WRS 5101. Water Resources: Individuals and Institutions. (3 cr; SP; Grad student or #)

Control of water resources by natural system functions, user actions, and influence of social and political institutions. How these controls vary in space and time; complexities of each control and feedbacks among them.

WRS 8050. Special Topics in Water Resources Science. (1-3 cr; [max 17 cr]; SP; – F only)

WRS 8060. Directed Studies in Water Resources Science. (1-3 cr; [max 6 cr]; SP; – F only)

WRS 8095. Plan B Project. (3 cr; SP; – S-N only)

Satisfies Plan B project requirement. May appear on master’s program, but does not count toward credit minimum in major. Project topic arranged between student and adviser. Written report required.

WRS 8100. Interdisciplinary Seminar in Water Resources. (1-3 cr [max 3 cr])

WRS 8233. FTE: Masters’. (1 cr; SP; Masters student’s adviser, and DGS consent)

WRS 8444. FTE: Doctoral. (1 cr; SP; Doctoral student’s adviser, and DGS consent)

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

WRS 8777. Thesis Credits: Masters’. (1-18 cr; SP-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

WRS 8888. Thesis Credits: Doctoral. (1-18 cr; SP-Max 18 cr per semester or summer; 24 cr required)

Women’s Studies (WoSt)

Department of Women’s Studies

College of Liberal Arts

WoSt 5101. Feminist Approaches to Ethnography. (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 cross-cultural issues pertaining to fieldwork.

WoSt 5102. Feminist Approaches to History. (3 cr; SP-8 cr WoSt or grad student or #)

Analysis and practice of feminist history. Theories, methods, and sources that address the interrelationship of gender, race, class, and sexuality.

WoSt 5103. Feminist Pedagogies. (3 cr; SP; grad student 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 5104. International Feminist Theory. (3 cr; SP-3102, 8 cr WoSt or grad student or #)

Western and non-western feminist theories in conversation. Attention to historical, cultural, and political context, the relation of theory to activism.

WoSt 5105. Gendered Rhetoric of Science and Technology. (3 cr; SP-8 cr WoSt or grad student 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 student or 12 cr WoSt 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 5300. Topics: Methods of Inquiry. (3 cr)

Topics specified in Class Schedule.

WoSt 5301. Global Politics and Processes of Sexuality. (3 cr; SP-12 cr WoSt or feminist studies grad student or #)

Comparative examination of the social construction of sexuality, including formal and informal norms and regulations, categories of deviance, representation of sex in the media and arts, and the role of sexuality in relation to agency and subjectivity.

WoSt 5302. 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, race and class in therapy, and related topics.

WoSt 5303. Women and Madness in History and Literature. (3 cr; SP-3206; 4 cr WoSt or #)

The representation of madness and how it intersects with gender as well as class, race, sexual orientation, and nationality.

WoSt 5390. Topics: Biology, Psychology, and Social Perspectives. (3 cr)

Topics specified in Class Schedule.

WoSt 5399. Topics: Literature, Film, and Other Arts. (3 cr)

Topics specified in Class Schedule.

WoSt 5401. Lesbian Cultural Production. (3 cr; SP-3001)

Lesbianism and lesbian identities as a product of cultural practices, relations, and meanings that are historically specific and historically changing.

WoSt 5402. History of Western Feminism. (4 cr; SP-3402; 9 cr WoSt or grad student or #)

Survey of the main currents in the history of Western feminist thought, politics, and social movements from the 1770s to the present.

WoSt 5403. Chicana/Latina Feminisms. (3 cr; SP-8 cr WoSt and/or Chic or grad student or #)

The historical and social development of Chicana and Latina feminisms in general and their various specific types.

WoSt 5404. Working Class Women’s Cultures. (3 cr; SP-12 cr WoSt or #)

Myths and realities surrounding working class women and their cultures. Use sociological and literary material in an effort to learn about working class women and to hear their own voices.

WoSt 5405. Chicanas: Women and Work. (3 cr)

Chicanas and their various relationships to family and community, local, national, and global work forces. Exploration of larger questions and issues related to the growing integration of the world’s systems of production.

WoSt 5490. Topics: Comparative and Global Studies. (3 cr [max 12 cr])

Topics specified in Class Schedule.

WoSt 5501. Women and the Law. (3 cr; SP-8 cr WoSt or feminist studies grad student or #)

The legal system as it relates to women: an historical legal approach to issues related to the constitutional rights of women.

WoSt 5502. Women and Public Policy. (3 cr; SP-12 cr WoSt or grad student or #)

Uses social movement literature and histories of second-wave feminism in the United States to study feminist organizations. Recurring issues and conflicts within organizations and movements examined through some comparative studies of feminism in Latin America, Eastern Europe, Britain, and Italy. Teaches methods and sources for studying feminism. Students write a case study of a feminist organization.

WoSt 5504. Honors: Legislative Internship. (3 cr; SP-4504 or equiv or grad student, #)

Discussion group and learning community for students working as interns for a Minnesota legislator during the year’s legislative session.
WoSt 5505. Women and Indigenous Land Struggles. (3 cr; SP–Fall) Focus and/or Chic and/or Amin or # Representative land struggles by indigenous women from a critical race and gender perspective.

WoSt 5590. Topics: Civic and Community Studies. (3 cr; [max 12 cr])
 Topics specified in Class Schedule.

WoSt 5593. Directed Study. (1-12 cr; [max 12 cr] SP–#)
WoSt 5594. Directed Instruction. (1-12 cr; [max 36 cr] SP–#)
WoSt 5595. Directed Research. (1-8 cr; [max 36 cr] SP–#)

WoSt 8101. Intellectual History of Feminism. (3 cr)
Major trends in feminist intellectual history from 14th century to the present, especially in the United States and Europe.

WoSt 8102. Advanced Studies in Sexuality. (3 cr)
Continual theoretical and scholarly research on selected issues related to sexuality, gender, and the body.

WoSt 8103. Feminist Theories of Knowledge. (3 cr)
Interdisciplinary seminar; feminist approaches to knowledge 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 postmodern and postcolonial theorizing.

WoSt 8108. Feminist Theories and Methods I. (3 cr; SP–Feminist studies PhD or grad minor student)

WoSt 8109. Feminist Theories and Methods II. (3 cr; SP–WoSt PhD or grad minor student)

WoSt 8190. Topics: Feminist Theory. (1-3 cr; [max 12 cr])
WoSt 8201. Feminist Theory and Methods in the Social Sciences. (3 cr)
Seminar on recent theories, including feminist versions of positivist, interpretivist, critical theoretical, and postmodernist models of social science knowledge. Methodologies congenial to feminist practices of inquiry, including use of narrative in theory, feminist ethnography, discourse analysis, and comparative methods in history.

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 array of scholars and scholarship in field of feminist literary theory and criticism, emphasizing broad range of feminist textual analysis taking place in various University departments.

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 space 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; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

WoSt 8888. Thesis Credits: Doctoral. (1-18 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/CAFS Colloquium. (1-8 cr [max 36 cr])
Feminist studies Ph.D. students must register for credit per semester. Credit available also to other graduate students.

Wood and Paper Science (WPS)

Department of Wood and Paper Science

College of Natural Resources

WPS 8300. Research Problems. (1-10 cr [max 10 cr] SP–#)
Independent research under faculty guidance.

WPS 8303. Advanced Topics in Panel Products Technology. (2 cr; #QP–5307; SP–4307)
Partial and fiber processing; additives; the press cycle; design of panels for specific end uses.

WPS 8304. Advanced Topics in Wood Drying. (2 cr; #QP–5304; SP–4304)
Rheological behavior of first-dried solid wood; significance of creep to stress-strain pattern; shrinkage, and degrade development in lumber drying; interpretation and evaluation of schedules, processes, and primary and auxiliary equipment used in commercial drying processes; energy consideration in drying processes.

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 8307. Advances and Methods in Forest Products Pathology and Preservation. (2 cr; SP–5303; SP–4303)
Principles in wood protection and methods of evaluating preservatives, emphasizing international developments.

WPS 8311. Mechanics of Wood and Wood Composites. (2 cr; SP–#)
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 WCFE. (3 cr; A-F only)
Nature of thinking and learning in everyday life contexts of family, work, and community. Theory and practice relevant to stimulating and supporting thinking and learning in and for these contexts.

WCFE 5011. Technology and Public Ethics. (3 cr; A-F only)

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 resources of interest to educators.

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 roles 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. (2 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 5301. Philosophy and Practice of Vocational Education. (2 cr; A-F only)
Purpose, recipients, practices, legislation and funding, socioeconomic contexts of work, community, and family education.
Courses

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 participants; organization of related instruction; training sponsor 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)
    Sociological 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)
    Lived 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)
    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. Nonformal Education in Youth-Serving Organizations. (3 cr; A-F only)
    Examination of the language, historical influences and educational philosophies fundamental to youth development work in organizations serving youth.

WCFE 5414. Issues in Youth Development Leadership. (3 cr; A-F only)
    An examination of issues that drive the professional practice of community-based youth work. Participants engage experts from the family, community, schools, and workplace to develop a deeper understanding of how public issues and policy affect the everyday lives of youth.

WCFE 5451. Seminar in Youth Development Leadership. (1 cr [max 4 cr]; S-N only)
    Applies the principles of healthy youth development, nonformal learning venues, and experiential education to the practice and policies of community-based youth work. Individual and group projects focus on applied research, community-based teaching and learning, and foundations of ethical practice. Four-semester course.

WCFE 5496. Leadership Field Experience: Youth Development. (3 cr; S-N only)
    Field experience to demonstrate leadership in support of healthy youth development. Work in agency dedicated to community-based youth programming, education, public policy, and advocacy for children, youth, and families.

WCFE 5511. Education for Work. (3 cr)
    Examination of the aims and purposes, federal and state policies, educational reform, and issues and concepts related to school-to-work education.

WCFE 5521. School-to-Work Policies. (3 cr)
    Examination of contexts underlying education for work; implications for practice.

WCFE 5522. School-to-Work Practices. (3 cr)
    Examination of learning in context; curricular integration; educational system articulation; educational partnerships; best practices in school-based, work-based, service-based learning, and connecting work, learning, community support; and leadership relating to school-to-work education.

WCFE 5569. Teaching Internship: Extended Practice. (1 cr; SP–Admission to an initiative program; S-N only)
    Extended student teaching experience in a school system that provides programs for grades 5-12.

WCFE 5771. Teaching Entrepreneurship: Small Business Management. (3 cr)
    Methods, organization, curriculum development and modification, and implementation of educational programs for entrepreneurs.

WCFE 5801. Educating Special Populations in Work, Community, and Family Settings. (3 cr)
    Identifying and accommodating educational traits of students with disabilities and disadvantaging conditions in work, community, and family settings.

WCFE 5802. Interagency Collaboration for Special Populations in Work, Community, and Family Settings. (2 cr)
    Interagency planning issues and practices relating to special populations for educational, business, and human service organization personnel, as well as family members and advocates.

    Examination of the nature of diverse populations and their unique learning and training needs, exemplary programs, and collaborative efforts among programs representing work, community, and family settings.

WCFE 5822. Diversity and Organizational Transformation in Work, Community and Family Education. (2 cr)
    Developing models for understanding the impact of diversity on individual, organizational, and community outcomes; discussing organizational change in relation to diversity.

WCFE 5823. Program Planning and Improvement for Special Populations in Work, Community, and Family Education. (2 cr)
    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.

WCFE 5901. Using Research in Work, Community, and Family Education. (3 cr)
    Introduction to the role of work, family, and community education in professional practice, significant problems of practice for research, alternative modes of research, and synthesis and application of the results of research.

WCFE 5990. Special Topics in Work, Community, and Family Education. (1-4 cr [max 4 cr])
    Topics vary.

WCFE 5993. Directed Study in Work, Community, and Family Education. (1-4 cr; SP–Admission to a specialty program; S-N only)
    Self-directed study, with faculty advice, in areas not covered by regular courses.

WCFE 8100. Work, Community, and Family Education Colloquium. (1-3 cr [max 3 cr])
    Selected topics of significance to work, community, and family education professionals. Topics based on interest and demand.

WCFE 8141. History and Philosophy of Work, Community, and Family Education. (3 cr)
    Historical influences and philosophical views regarding ideas, research, practice, and emerging issues in work, community, and family education.

WCFE 8142. Work, Community, and Family Education Comparative Systems. (3 cr; SP–8141)
    Comparison of work, community, and family education systems within the United States and between the United States and other countries.

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

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

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

WCFE 8896. Internship. (1-10 cr [max 10 cr]; SP–A-F only)
    Student applies for position in professional practice; individual arrangements describe specific responsibilities during internship. Ed.D. program requirement.

WCFE 8911. Foundations of Inquiry. (2 cr; A-F only)
    Practice of inquiry in work, community, and family education; historical and philosophical influences; scientific, political, and ethical nature of inquiry; alternative inquiry perspectives and central concepts; characteristics of positivistic, interpretive, and critical science research perspectives.

WCFE 8912. Positivist Research. (3 cr; SP–8911)
    Assumptions and procedures related to planning and conducting positivistic research. Problems of positivism, including limitations of the scientific method in social science research. Identifying problems, validating instruments, writing the positivistic research proposal, analyzing positivistic data.

WCFE 8913. Interpretive Research. (3 cr; SP–8911; A-F only)
    Hermeneutic, ethnomet hodological, and phenomenological research methodologies. Consideration of ethics, evaluation, and usefulness of interpretive research. Practice in conducting interpretive research in work, community, and family education.

WCFE 8914. Critical Science Research. (3 cr; SP–8911; A-F only)
    Origins, influences, characteristics, and central concepts; distinction between critical science and other action research; requisite skills and knowledge for conducting critical science research and using that knowledge in a project.

WCFE 8915. Ethics and Responsible Research. (1 cr; A-F only)
    Introduction to ethical and legal issues involved in practicing responsible educational research. Key issues, formal and informal codes of conduct, and ethical reasoning skills.

WCFE 8990. Research Seminar. (1 cr [max 6 cr]; SP–Max 4 cr per semester or summer; 24 cr required)
    Developing, reporting, and evaluating research. Participants make and react to presentations. (Two credits counted in doctoral program.)
Youth Development and Research (YoSt)

School of Social Work
College of Human Ecology

YoSt 5031. Youth in the World. (3 cr; QP–One upper div adolescent psychology course; SP–One upper div adolescent psychology course)
Encourages critical thinking about how youth as ideal and as lived reality are understood in scholarship, public discourse, and professional practice. Larger framework includes building a basis for understanding youth and working with or on behalf of youth.

YoSt 5032. Child and Adolescent Psychology for Practitioners. (2 cr; QP–Courses in ed psychology or child or adolescent psychology; SP–Courses in ed psychology or child or adolescent psychology)
Application of theory and research about children and adolescents including how findings can be used and how theories facilitate understanding of behavior.

YoSt 5101. Youth Work Practice I: Internship. (3 cr; QP–3100, 5330, #; SP–5101, 5032 or equiv, §§111, #)
First course of a sequential internship that includes 15 hours per week working with youth in a community youth-serving organization. Develop and enhance competence and identity as a youth worker, and reflect on and integrate knowledge about youth with on-going experience in youth work.

YoSt 5102. Youth Work Practice II: Internship. (3 cr; QP–5201, 5330, #; SP–5101, §§112, #)
Second course of a sequential internship that includes 15 hours per week of work with youth in a community youth-serving organization. Develop and enhance competence and identity as a youth worker, and reflect on and integrate knowledge about youth with ongoing experience in youth work.

YoSt 5111. Youth Work Methods I: Seminar. (1 cr; QP–5201, 5202, #; SP–3101, 5032 or equiv, §§101, #)
Weekly discussion seminar taken concurrently with 5101 to integrate theory and praxis with youth work experience. Written and experiential assignments to increase knowledge, competency, and skills related to working with youth.

YoSt 5112. Youth Work Methods II: Seminar. (1 cr; QP–5201, 5202, #; SP–5111, §§102, #)
Weekly discussion seminar taken concurrently with 5102 to integrate theory and praxis with youth work experience. Written and experiential assignments to increase knowledge, competency, and skills related to working with youth.

YoSt 5234. Youth Agencies, Organizations, and Youth Service System. (2 cr; QP–Two sociology/anth courses, work exper in a youth agency or org; SP–Two sociology/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 with youth or #; SP–Two social sci courses, exper 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–#; SP–#)
Independent reading and/or research under faculty supervision.

YoSt 5301. Communicating With Adolescents About Sexuality. (2 cr; QP–Upper div adolescent psychology course, exper working with youth or #; SP–Upper div adolescent psychology 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. (3 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–5330 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 adolescent psychology course, family therapy course or #)
Theories and techniques of working with youth and their families. Emphasis on practical methods of structural change, developing effective communication, decision-making and problem-solving systems, winning the family’s cooperation; the role of the professional to influence healthy family development.

YoSt 5323. Work With Youth—Groups. (2 cr; QP–5320 or 5330 or #; SP–5321 or upper div adolescent psychology 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.

Zoology (Zool)

Graduate School

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

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

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

Zool 8777. Thesis Credits: Masters. (1-18 cr; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only?])

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

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