

Rubrics

The following is a list of rubrics used for graduate courses. Please note that not all course rubrics currently list courses in the catalog.

Accounting (ACTG)
 Administrative Studies in Nursing (NUAS)
 African American Studies (AAST)
 Anatomy and Cell Biology (ANAT)
 Ancient Greek (GKA)
 Anthropology (ANTH)
 Architecture (ARCH)
 Art and Design (AD)
 Art History (AH)
 Asian American Studies (ASAM)
 Asian Studies (ASST)
 Associated Health Sciences (AHS)
 Biochemistry and Molecular Genetics (BCMG)
 Bioengineering (BIOE)
 Biological Sciences (BIOS)
 Biomedical and Health Information Sciences (BHIS)
 Biomedical Visualization (BVIS)
 Biopharmaceutical Sciences (BPS)
 Biostatistics (BSTT)
 Business Administration (BA)
 Campus Courses (CC)
 Chemical Engineering (CHE)
 Chemistry (CHEM)
 Civil and Materials Engineering (CME)
 Classics (CL)
 Committee on Institutional Cooperation (CIC)
 Communication (COMM)
 Community Health Sciences (CHSC)
 Computer Science (CS)
 Criminology, Law, and Justice (CLJ)
 Curriculum and Instruction (CI)
 Disability and Human Development (DHD)
 Earth and Environmental Sciences (EAES)
 Economics (ECON)
 Education (ED)
 Educational Policy Studies (EDPS)
 Educational Psychology (EPSY)
 Electrical and Computer Engineering (ECE)
 Energy Engineering (ENER)
 Engineering (ENGR)

English (ENGL)
 English as a Second Language (ESL)
 Entrepreneurship (ENTR)
 Environmental and Occupational Health Sciences (EOHS)
 Epidemiology (EPID)
 Finance (FIN)
 French (FR)
 Gender and Women's Studies (GWS)
 Geography (GEOG)
 Germanic Studies (GER)
 Graduate College (GC)
 Graduate College—Life Sciences (GCLS)
 Health Information Management (HIM)
 Health Policy and Administration (HPA)
 Histology (HSTL)
 History (HIST)
 Honors College Courses (HON)
 Human Nutrition (HN)
 Industrial Engineering (IE)
 Information and Decision Sciences (IDS)
 Information Technology (IT)
 Interdisciplinary Public Health Sciences (IPHS)
 Interdisciplinary Studies in the Arts (ISA)
 Italian (ITAL)
 Jewish Studies (JST)
 Latin (LAT)
 Latin American and Latino Studies (LALS)
 Learning Sciences (LRSC)
 Liberal Arts and Sciences (LAS)
 Linguistics (LING)
 Lithuanian (LITH)
 Management (MGMT)
 Marketing (MKTG)
 Master of Business Administration (MBA)
 Maternal-Child Nursing (NUMC)
 Mathematical Computer Science (MCS)
 Mathematics (MATH)
 Mathematics Teaching (MTHT)
 Mechanical Engineering (ME)
 Medical Biotechnology (MBT)
 Medical Education (MHPE)
 Medical Humanities (MHUM)
 Medical Laboratory Sciences (MLS)
 Medical-Surgical Nursing (NUMS)
 Medicinal Chemistry (MDCH)
 Medicinal Chemistry and Pharmacognosy (PMMP)

Microbiology and Immunology (MIM)
 Movement Sciences (MVSC)*
 Music (MUS)
 Native American Studies (NAST)
 Natural Sciences (NATS)
 Neuroscience (NEUS)
 Nursing Sciences (NUSC)
 Occupational Therapy (OT)
 Oral and Maxillofacial Surgery (OSUR)
 Oral Medicine and Diagnostic Sciences (OMDS)
 Oral Sciences (OSCI)
 Orthodontics (ORTD)
 Pathology (PATH)
 Pediatric Dentistry (PEDD)
 Pharmacognosy (PMPG)
 Pharmacology (PCOL)
 Pharmacy (PHAR)
 Pharmacy Administration (PMAD)
 Pharmacy Practice (PMPR)
 Philosophy (PHIL)
 Physical Therapy (PT)
 Physics (PHYS)
 Physiology and Biophysics (PHYB)
 Polish (POL)
 Political Science (POLS)
 Prosthodontics (PROS)
 Psychiatric Nursing (NUPS)
 Psychology (PSCH)
 Public Administration (PA)
 Public Health Nursing (NUPH)
 Public Policy Analysis (PPA)
 Religious Studies (RELS)
 Russian (RUSS)
 Slavic and Baltic Languages and Literatures (SLAV)
 Social Work (SOCW)
 Sociology (SOC)
 Spanish (SPAN)
 Special Education (SPED)
 Statistics (STAT)
 Surgery (SURG)
 Theatre (THTR)
 Urban Planning and Policy (UPP)
 Women's Health Nursing (NUWH)

* *Note: Beginning with the Spring 2009 semester, the Movement Sciences (MVSC) rubric will change to Kinesiology (KN).*

Accounting

ACTG 417

Advanced Financial Accounting 3 OR 4 hrs.

Financial accounting theory for business combinations, consolidated financial statements, international transactions and investments, and partnership accounting. 3 undergraduate hours. 4 graduate hours.

Prerequisite(s): ACTG 316.

ACTG 435

Auditing 4 hrs.

Introduction to the audit function; ethical and legal environment; audit standards; objectives and procedures; materiality and audit risk; sampling; auditing in a computer environment; reporting. Extensive computer use required.

Prerequisite(s): ACTG 316.

ACTG 445

Federal Income Tax I 3 OR 4 hrs.

Concepts and provisions of federal income taxation as applicable to individual taxpayers, partnerships, individuals, and trusts. 3 undergraduate hours. 4 graduate hours. Credit is not given for ACTG 445 if the student has credit for ACTG 508. Extensive computer use required.

Prerequisite(s): ACTG 315.

ACTG 446

Federal Income Tax II 3 OR 4 hrs.

Concepts and provisions of federal income taxation on corporations and partnerships; special problems in reorganization, liquidations, and personal holding companies. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** ACTG 445 or the equivalent.

ACTG 456

Business Law II: Business Organizations 3 OR 4 hrs.

Business organizations, including: agency, general partnerships, limited partnerships, corporations, limited liability companies, securities regulations, bankruptcy, suretyship, bailments, real property, wills and trusts, and accounting liability. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ACTG 355 or the equivalent.

ACTG 465

Governmental and Nonprofit Accounting 3 OR 4 hrs.

Financial transaction analysis and recording system; budget preparation and control; concepts and principles underlying the financial reports of governmental and nonprofit organizations. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ACTG 316.

ACTG 474

Accounting Information Systems 3 OR 4 hrs.

Skills and concepts that enable the documentation, design, and use of accounting information systems, understanding transaction cycles, sound internal controls, accounting software, and the electronic business environment. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** Grade of C or better in ACTG 210 and grade of C or better in ACTG 211; and IDS 200.

ACTG 475

Database Accounting Systems 3 OR 4 hrs.

Concepts and principles of designing database systems to perform accounting functions, applications of microcomputer accounting software packages systems design tools, and computerized transaction cycles.

Same as IDS 475. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** ACTG 211 and IDS 200.

ACTG 484

International Accounting 3 OR 4 hrs.

Financial accounting for international operations, multinational managerial accounting and control, comparative international accounting, international reporting issues and international taxation. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ACTG 316.

ACTG 485

Valuation and Analysis 3 OR 4 hrs.

Financial analysis and valuation of firms. Corporate strategies, financial reporting issues, and market perceptions. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** ACTG 315 and FIN 300 for undergraduate students. One accounting and one finance class or consent of the instructor for graduate students.

ACTG 494

Special Topics in Accounting 1 TO 4 hrs.

Topics rotate in various areas of accounting, including but not restricted to financial, managerial, governmental, and nonprofit accounting, law, and business ethics. Explores current issues and proposed alternatives.

Prerequisite(s): Two courses in accounting or finance beyond ACTG 111 and FIN 300 or the equivalent.

ACTG 495

Competitive Strategy 4 hrs.

Multidisciplinary analysis of organization strategy and policy, using case method and/or business simulation. Assignments involve extensive library research and oral and written reports.

Prerequisite(s): Senior standing in the College of Business Administration and completion of all other CBA core courses, or consent of the instructor.

ACTG 500

Introduction to Financial Accounting 4 hrs.

Concepts and principles of financial accounting for preparation and evaluation of external reports and financial statements. Credit is not given for ACTG 500 if the student has credit for MBA 501. Extensive computer use required.

Prerequisite(s): Admission to the MBA or MS in Accounting or Master of Healthcare Administration program.

ACTG 502

Financial Accounting I 4 hrs.

Accounting theory and practice related to asset valuation, revenue recognition, and the determination of short-term liabilities; aspects of financial statement analysis related to these issues. **Prerequisite(s):** ACTG 500.

ACTG 503

Financial Accounting II 4 hrs.

Contemporary financial accounting issues, including liabilities, pensions, tax allocation, leases, price-level reporting, investments, capital transactions, and financial statement analysis. **Prerequisite(s):** ACTG 500 and ACTG 502 or the equivalents.

ACTG 506

Management Accounting 4 hrs.

Design of cost accounting systems; alternate costing methods; costing for decision making; budget planning and performance evaluation. **Prerequisite(s):** ACTG 500.

ACTG 508

Federal Income Tax—Graduate 4 hrs.

Concepts and provisions of federal income taxation generally applicable to individual taxpayers, corporations, and partnerships. Credit is not given for ACTG 508 if the student has credit for ACTG 445. **Prerequisite(s):** ACTG 500.

ACTG 509

Business Law: Commercial Transactions 4 hrs.

Commercial transactions, including: contracts, sales of goods, negotiable instruments, and secured transactions. **Prerequisite(s):** ACTG 500 or the equivalent.

ACTG 515

Accounting Theory and Paradigms 4 hrs.

Theory construction, conceptual framework, and paradigmatic avenues in accounting with relation to applications.

Prerequisite(s): ACTG 502 or the equivalent.

ACTG 516

Financial Statement Analysis 4 hrs.

Use of financial information by decision makers external to the firm; profitability and risk analysis; financial forecasting and equity valuation. Extensive computer use required. **Prerequisite(s):** ACTG 502; or approval of the department.

ACTG 525

Management Control of Strategic Performance 4 hrs.

Contemporary overview of the management control systems measuring technological activities, measuring value added, outsourcing noncore compensation plan and performance measurement. Extensive computer use required. **Prerequisite(s):** ACTG 506; or approval of the department.

ACTG 535

Advanced Auditing 4 hrs.

Review and evaluation of academic research in auditing behavioral and capital market research. Overview of audit research methodology, examination of Sarbanes-Oxley and its effect on internal controls, auditing standards, and the accounting profession. Extensive computer use required. **Prerequisite(s):** ACTG 435.

ACTG 537

Fraud Examination 4 hrs.

Concepts and skills necessary for examining financial fraud. Content will include fraud schemes, prevention and detection of fraud, ethics, forensic software tools, auditing techniques, and the law and regulations governing fraud cases. Extensive computer use required. **Prerequisite(s):** ACTG 474 and ACTG 502 or equivalents.

ACTG 545

Taxes and Business Policy 4 hrs.

The role of taxes in business decisions. Emphasizes integrating taxes with other variables—behavioral, financial, environmental, and other. Also discusses the relationship between taxation and financial and managerial accounting. **Prerequisite(s):** ACTG 345 and ACTG 446.

ACTG 565
Advanced Government and Nonprofit Accounting 4 hrs.
Financial accounting principles applicable to governments and nonprofit organizations. Transactions and events are analyzed, leading to the preparation and analysis of financial statements.
Prerequisite(s): ACTG 503 or equivalent.

ACTG 570
The Legal and Ethical Environment of Business 4 hrs.
An examination of the decision-making process on both the individual and organizational levels. The effect of moral, legal, and economic factors on the decision-making process. Course information: **Prerequisite(s):** ACTG 502; or consent of the instructor.

ACTG 585
Corporate Valuation and Accounting Information 4 hrs.
Valuation using discounted cash flow and multiples. Use of financial disclosures to construct forecasts. How multiples behave. How accounting affects valuation ratios. Credit is not given for ACTG 585 if the student has credit for ACTG 485.
Prerequisite(s): ACTG 502; and FIN 510 or FIN 520; or approval of the department.

ACTG 590
Case-Based Research in Accounting 4 hrs.
Development of skills necessary to research and interpret accounting standards and guidelines to resolve recognition and disclosure issues using real-life and simulated cases.
Prerequisite(s): ACTG 503 or equivalent.

ACTG 593
Accounting Research: Methodology and Communication 4 hrs.
Instruction in research methods, issues, and research appreciation and evaluation together with individual practice in planning, conducting, and reporting professional research projects in accounting and capital markets. Extensive computer use required.
Prerequisite(s): ACTG 502.

ACTG 594
Special Topics in Accounting—Graduate 1 TO 4 hrs.
Topics rotate in the various areas of accounting, including but not restricted to financial, managerial, governmental, and nonprofit accounting explores current issues and proposed alternatives. May be repeated. Students may register in more than one section per term. Extensive computer use required.
Prerequisite(s): Approval of the department.

ACTG 596
Independent Study in Accounting—Master's 1 TO 4 hrs.
Independent study on an accounting topic chosen with faculty approval; requires a study plan and a paper of length and specification required by a faculty member. **Prerequisite(s):** ACTG 515 and ACTG 525.

ACTG 599
PhD Thesis Research 0 TO 16 hrs.
Research on topic of the doctoral dissertation. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term.
Prerequisite(s): Faculty acceptance of thesis proposal.

Administrative Studies in Nursing

NUAS 501
Administrative Nursing Models 2 hrs.
Appraisal and synthesis of theory, research, and practice in the organization and management of the delivery of nursing and healthcare services, including currently used models of nursing care delivery. **Prerequisite(s):** Consent of the instructor.

NUAS 502
Strategic Planning and Outcomes Evaluation for Clinical Programs 3 hrs.
Analysis of trends and issues affecting healthcare systems in the context of planning appropriate strategies for the development and growth of clinical programs and services. **Prerequisite(s):** Consent of the instructor.

NUAS 505
Nursing Systems Operations Management 3 hrs.
Nursing systems operations management of health services. Examines the managerial role at individual, program, work unit, department, and organizational levels. Includes focus on interaction of the organization and environment. **Same as** NUPH 505. **Prerequisite(s):** Consent of the instructor.

NUAS 512
Healthcare Human Resources Management 3 hrs.
Focuses on the development of a strategic human resource plan to support the mission of the healthcare organization. Current human resources management and organizational performance research findings are explored. **Same as** NUPH 512. **Prerequisite(s):** Consent of the instructor.

NUAS 517
Financial Resource Management for Nursing Decision Makers 3 hrs.
Provides the clinical decision maker with state-of-the-art tools to plan, implement, and evaluate the financial viability of healthcare programs and initiatives. **Same as** NUPH 517. **Prerequisite(s):** Consent of the instructor; knowledge of Excel is required.

NUAS 520
Internship in Advanced Nursing 1 TO 3 hrs.
Intensive field study for advanced nursing practice with emphasis on integration of graduate course work. **Same as** NUPH 520. May be repeated. **Prerequisite(s):** Consent of the instructor.

NUAS 560
Leadership Reflections: Building a Personal Map 2 hrs.
Reflective practice experience focuses learners to identify personal leadership styles and develop personal leadership growth plans. **Prerequisite(s):** Admission to the Executive Leadership Concentration of the Doctor of Nursing Practice.

NUAS 561
Collaboration for Strategic Financial Management in Healthcare 3 hrs.
Builds on basic financial management skills to prepare the learner to synthesize financial theories and concepts in order to apply knowledge to strategic decision making. **Prerequisite(s):** NUAS 517 or equivalent course.

NUAS 562
Ethical Leadership in Providing Healthcare 2 hrs.
Provides an opportunity for the student to analyze and critique current ethical issues impacting nurse leaders and formulate a personal ethics code. **Prerequisite(s):** NUSC 528 or the equivalent and credit or concurrent registration in NUSC 509.

NUAS 563
Transforming the Healthcare Organization 3 hrs.
Builds on concepts from strategic management to provide a framework for the learner's synthesis project. Applications include: project management, strategic planning, and change management processes applied in a transdisciplinary manner. **Prerequisite(s):** NUAS 502 or the equivalent and credit or concurrent registration in NUSC 509.

NUAS 564
Systems Approach to Healthcare Quality and Safety 3 hrs.
Focuses on the critical review of current quality and safety guidelines and systems impacting healthcare agencies. **Prerequisite(s):** NUAS 505 or the equivalent and credit or concurrent registration in NUSC 509 and credit or concurrent registration in NUSC 563.

NUAS 565
Seminar in Nursing Executive Leadership 1 TO 3 hrs.
Specific topics as announced each semester. In-depth study of selected current topics in executive leadership for nurse leaders. May be repeated.

African American Studies

AAST 405
Urban Ethnography 3 OR 4 hrs.
The study of processes and meanings in African American communities in urban areas. Includes interviews, participant observation, focus groups. **Same as** SOC 406. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** AAST 100; and junior standing or above.

AAST 406
Politics of Race, Gender, and Class 3 OR 4 hrs.
Formation of social status categories, individual and collective identity construction, the mechanisms of group-based marginalization and stigmatization. Also looks at relationship between social status categories. **Same as** GWS 406. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** AAST 100 or GWS 102 or GWS 101; or graduate or professional standing; or consent of the instructor.

AAST 407
Seminar in Comparative Racialization 3 OR 4 hrs.
Provides an interdisciplinary and comparative approach to the making and remaking of "race" and the resultant racialized experiences of different groups in the U.S. and globally. **Same as** SOC 407. **Prerequisite(s):** AAST 247 or AAST 248 or AAST 340 or SOC 225; and senior standing or above; or consent of the instructor.

AAST 410
Seminar in Black Child Development 3 OR 4 hrs.
Race, class, and cultural theories of black child development. Examination of socialization process and developmental outcomes, with particular attention to social attitudes and behaviors. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** AAST 201 or PSCH 100 or consent of instructor.

AAST 441
Topics in African History 3 OR 4 hrs.
Specific topics are announced each term. **Same as** HIST 441. 3 undergraduate hours. 4 graduate hours. May be repeated.
Prerequisite(s): 3 hours of African history, African American studies, or consent of the instructor.

AAST 445
History of Islam in the African World 3 OR 4 hrs.
A comprehensive study of the history of Islam and its role among the people of African descent in sub-Saharan Africa and the United States. **Same as** HIST 445. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Consent of the instructor.

AAST 481
Topics in African and African American History 3 OR 4 hrs.
African and/or African American history for students with significant background in the field. Topics vary. **Same as** HIST 485. 3 undergraduate hours. 4 graduate hours. May be repeated if topics vary. Students may register in more than one section per term.
Prerequisite(s): AAST 247 or AAST 248 or HIST 104 or HIST 247 or HIST 248 or consent of the instructor.

AAST 490
Topics in African American Literature 3 OR 4 hrs.
African American literature and culture for students with significant background in the field. Topics vary. **Same as** ENGL 473. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** AAST 357 or AAST 360 or ENGL 357; and senior standing or above; or consent of the instructor.

AAST 492
Topics in Social Science Research 3 OR 4 hrs.
Inclusive examination of a selected specialized topic based on instructor's field. Topics are drawn from research in political science, psychology, sociology, and history. 3 undergraduate hours. 4 graduate hours. May be repeated if topics vary. Students may register in more than one section per term.
Prerequisite(s): AAST 100 or consent of the instructor.

AAST 496
Topics in Race, Ethnic, and Minority History 3 OR 4 hrs.
Specific topics are announced each term. **Same as** HIST 496. 3 undergraduate hours. 4 graduate hours. May be repeated.
Prerequisite(s): 3 hours of history or consent of the instructor.

Anatomy and Cell Biology

ANAT 403
Human Neuroanatomy 3 hrs.
Morphological organization of the nervous system. Functional correlations of neural structures. **Same as** NEUS 403. Meets eight weeks of the semester.
Prerequisite(s): Graduate standing and consent of the instructor. Must be in a degree program.

ANAT 414
Neuroanatomy for Allied Health Program 3 hrs.
Basic development and gross features of the central nervous system and systems neuroanatomy; motor, sensory, and integrative functional areas.

ANAT 439
Gross Human Anatomy I 3 hrs.
Gross structure of the adult human thorax, abdomen, pelvis, and perineum, emphasizing spatial relationships and functional/clinical relevance. Includes embryology and radiology topics. Limited to six (6) students.
Prerequisite(s): Graduate standing in a degree-granting program only and consent of the instructor.

ANAT 440
Gross Human Anatomy II 4 hrs.
Gross structure of the adult human head, neck, deep back, and limbs, emphasizing spatial relationships and functional/clinical relevance. Includes embryology and radiology topics. Limited to six (6) students.
Prerequisite(s): Graduate standing in a degree-granting program only and consent of the instructor.

ANAT 441
Gross Human Anatomy 5 hrs.
Functional and structural anatomy of the body. For allied health students. **Prerequisite(s):** Graduate standing and consent of the instructor; or enrollment in the Doctor of Physical Therapy program or MS in Biomedical Visualization program.

ANAT 442
Cell Structure and Human Histology 5 hrs.
Structure and function of cells and fundamental tissues. Function and microscopic anatomy of organs.
Prerequisite(s): Graduate standing and consent of the instructor.

ANAT 520
Concepts of Synaptic Function and Morphology 2 hrs.
Overview of current and classical methods employed in the study of synapses. A review of some of the most interesting aspects of synaptic function, such as sources of synaptic vesicles, synaptic patterns, synaptic plasticity, and synaptic specificity. **Prerequisite(s):** Consent of the instructor.

ANAT 521
Plasticity in the Nervous System 2 hrs.
Neural plasticity is the ability to adaptively modify neural structure or function. Topics range from developmental plasticity to aging, including response to injury and neurodegenerative diseases, trophic factors, learning and memory, and neural transplantation.
Prerequisite(s): ANAT 403 or consent of instructor.

ANAT 523
Biology of MicroRNAs and other Small RNAs 2 hrs.
History, overview, and biology of small RNA pathways, including microRNAs, siRNAs, RNA interference, roles in various biological processes, implication in disease pathophysiology, and potential therapies. Satisfactory/Unsatisfactory grading only.

ANAT 525
Molecular and Cellular Mechanisms of Neurodegenerative Diseases 2 hrs.
Molecular, cellular, and physiological mechanisms underlying neuropathology in neurodegenerative diseases and trauma to the central and peripheral nervous system of humans. **Same as** BIOS 525. Recommended background: A basic course in neuroscience.

ANAT 527
Cellular and Systems Neurobiology 3 hrs.
Molecular and cellular properties of ion channels in neurons and sensory cells and their relationship to brain and sensory systems. **Same as** BIOS 527.
Prerequisite(s): Credit in one neuroscience course or consent of the instructor.

ANAT 544
Advanced Craniofacial Anatomy 3 hrs.
Functional and clinical aspects of head and neck anatomy, based on detailed laboratory dissection, original readings, and project work. **Prerequisite(s):** Any human gross anatomy course or the equivalent.

ANAT 554
Neuroendocrinology 2 hrs.
Survey of neuroendocrine integration, including neuroendocrine regulation of development, homeostasis, reproduction, and behavior. The hypothalamohypophyseal axis receives special attention from both morphologic and functional viewpoints. **Prerequisite(s):** ANAT 403 or the equivalent.

ANAT 560
Practicum in the Teaching of Anatomy 1 hour.
Provides an opportunity for supervised discussion and evaluation of materials and methods in teaching the basic anatomical sciences. Satisfactory/Unsatisfactory grading only. May be repeated. No graduation credit. For anatomy and cell biology teaching assistants. **Prerequisite(s):** Consent of the instructor.

ANAT 585
Cell Biology 4 hrs.
Functional and structural organization of the cell with emphasis on the cellular basis of physiological activity. **Same as** MIM 585, and PHYB 585.

ANAT 586
Cell and Molecular Neurobiology 3 hrs.
Structure and function of voltage-dependent and neurotransmitter-gated ion channels; the role of these ion channels in synaptic transmission, synaptic modification, and neuromodulation. **Same as** BIOS 586. **Prerequisite(s):** BIOS 442 or consent of the instructor.

ANAT 595
Department Seminar 1 hour.
Oral presentations are made by students each session on timely journal articles, followed by in-depth discussions of the reported research. Presentation of research by invited lecturers. Satisfactory/Unsatisfactory grading only.

ANAT 596
Independent Study 1 TO 4 hrs.
Independent study under the direction of a faculty member.

ANAT 598
Master's Thesis Research 0 TO 16 hrs.
Thesis research under the direction of a faculty member. Satisfactory/Unsatisfactory grading only.

ANAT 599
Research in Anatomy 0 TO 16 hrs.
Independent research, directed by a faculty member. Satisfactory/Unsatisfactory grading only.

Ancient Greek

GKA 498 Advanced Topics in Ancient Greek Literature 3 OR 4 hrs.

Intensive reading of ancient Greek literature. Topics vary. 3 undergraduate hours. 4 graduate hours. May be repeated to a maximum of 9 hours. Students may register in more than one section per term. **Prerequisite(s):** 4 hours of ancient Greek at the 200-level or the equivalent.

GKA 499 Independent Reading 3 OR 4 hrs.

Individual study under faculty direction. For students qualified by preparation and interest. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 4 hours of ancient Greek at the 200-level or the equivalent.

Anthropology

ANTH 401 Linguistic Anthropology 3 OR 4 hrs.

Exploration of the relationship between language and culture in a cross-cultural perspective. Attention to methods of field research as well as theory and substantive issues. 3 undergraduate hours. 4 graduate hours.

ANTH 405 Human Growth and Nutrition 3 hrs.

Worldwide variation in human growth and the factors that contribute to differences between populations and individuals in the timing and pattern of growth and development. **Same as** EPID 405.

ANTH 409 Ancient Maya Writing, Language, and Culture 3 OR 4 hrs.

Recent trends in Maya epigraphy, information gained from Maya hieroglyphs, linguistics, and historical ethnographies are applied to anthropological analyses of past lifeways. **Same as** LALS 409. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing or above; and consent of the instructor.

ANTH 411 Urban Cultural Problems 3 OR 4 hrs.

A study of the processes of urbanization and of cultural and social adjustments to the city; illustrated by case studies. 3 undergraduate hours. 4 graduate hours.

ANTH 413 Social Organization 3 OR 4 hrs.

Theory and method in the study of kinship and social organization, for advanced undergraduate and graduate students. 3 undergraduate hours. 4 graduate hours.

Prerequisite(s): ANTH 213 or graduate standing or consent of the instructor.

ANTH 414 Symbolic Anthropology 3 OR 4 hrs.

The interpretation of cultures through their rituals, religions, culture, and other types of symbolism. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ANTH 101 or consent of the instructor.

ANTH 415 Foundations in Anthropology and Global Health I 3 OR 4 hrs.

Explores the field of cultural medical anthropology and provides a theoretical foundation allowing for understanding and exploration of anthropology's role in international health. **Same as** IPHS 415. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of B or better in ANTH 216; and junior standing or above; or consent of the instructor.

ANTH 416 Foundations in Anthropology and Global Health II 3 OR 4 hrs.

Provides an evolutionary and biocultural approach to human biology, physiology, health, and disease. **Same as** IPHS 416. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of B or better in ANTH 232; and junior standing or above; or consent of the instructor.

ANTH 417 Marxist Approaches to Anthropology 3 OR 4 hrs.

Issues concerning Marx's theories on primitive societies, the development of his evolutionary model from Morgan's work, and current use of Marxist concepts in anthropology. 3 undergraduate hours. 4 graduate hours.

ANTH 418 Ethnographic and Qualitative Research Methods 3 OR 4 hrs.

Practical introduction to the techniques of social scientists for research in natural social settings: participant observation, nonparticipant observation, interviewing, use of documentary sources, etc. **Same as** GEOG 418. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing or above.

ANTH 420 Seminar in Archaeology and Ethnography 3 OR 4 hrs.

Case studies of investigations in archeology using research monographs and other primary sources. Substantive data and related theoretical problems are examined simultaneously. 3 undergraduate hours. 4 graduate hours. May be repeated to a maximum of 15 hours. **Prerequisite(s):** Junior standing or consent of the instructor.

ANTH 421 Geomorphology and Archaeology 3 OR 4 hrs.

Relevance of geomorphic processes and landform development to archaeology; role of geomorphology in archaeological surveys, paleogeographic reconstruction, and archaeological interpretation. Elements of geoarchaeology. **Same as** GEOG 432. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** GEOG 131 or EAES 101 or consent of the instructor.

ANTH 422 Prehistory of the Levant and the Nile Valley 3 OR 4 hrs.

Detailed analysis of Levantine and Nile Valley prehistory during the Pleistocene and early Holocene. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ANTH 221 or ANTH 222 or consent of the instructor.

ANTH 423 Andean Prehistory 3 OR 4 hrs.

An overview of the cultural evolution of the Andean region from the arrival of the first inhabitants to the development of the Inca empire. **Same as** LALS 423. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ANTH 228 or ANTH 269; or consent of the instructor.

ANTH 424 Violence 3 OR 4 hrs.

Explores how men and women have experienced violence historically and in modern times. Students examine how violence is perpetrated through words, pictures, physical harm, and silences. **Same as** CLJ 423. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CLJ 101 and CLJ 200.

ANTH 425 Field Techniques in Archaeology 4 hrs.

Exposure to field methods in archaeology through participation in an actual research project. Students are instructed in field excavation techniques. Usually offered in summer session. **Same as** GEOG 425. May be repeated to a maximum of 8 hours. **Prerequisite(s):** ANTH 102 or consent of the instructor. Recommended: Concurrent registration in ANTH 426 or GEOG 426.

ANTH 426 Laboratory Techniques in Archaeology 4 hrs.

Exposes students to laboratory methods in archaeology through the analysis of excavated materials. Students are instructed in laboratory techniques. **Same as** GEOG 426. May be repeated to a maximum of 8 hours. **Prerequisite(s):** ANTH 102 or consent of the instructor. Recommended: Concurrent registration in ANTH 425 or GEOG 425.

ANTH 427 Theory and Application in Ethnoarchaeology 3 OR 4 hrs.

Focuses on the application of scientific experimentation and ethnographic information to enhance our understanding of the archaeological record, material culture, and past human behavior. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** One 100- or 200-level archaeology course; or graduate standing and consent of the instructor.

ANTH 428 Chieftdoms 3 OR 4 hrs.

Focus on traditional nonstate, yet complex, societies known as "chieftdoms." Examine the organization and evolution of such societies through a combination of ethnographic, historical, and archaeological data. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ANTH 101 or ANTH 102; or consent of the instructor.

ANTH 429 Archaeological Methods 3 OR 4 hrs.

This course will familiarize students with various methodologies used by archaeologists and geoarchaeologists. Course will concentrate on a different method each time it is taught. **Same as** GEOG 429. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). Students may register for more than one section per term.

ANTH 430 Seminar in Primate Biology 4 OR 5 hrs.

Theoretical and substantive issues in the study of nonhuman primates and hominids, as represented in current journals and topical volumes. 4 undergraduate hours. 5 graduate hours. May be repeated up to 2 time(s). Students may register for more than one section per term.

ANTH 437 Bioarchaeology 5 hrs.

Provides an overview of mortuary theory and the bioarchaeological methods used to study health and disease, diet, activity patterns, kinship, and cultural practices in archaeological populations. **Prerequisite(s):** Grade of B or better in ANTH 237; and consent of the instructor.

ANTH 440 The Experience of Culture Difference: Culture Shock 3 OR 4 hrs.

Explores experience of different cultures, the process of learning a different culture, and issues arising from the nature of the encounter in fieldwork. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** One course in social or cultural anthropology, or experience in another culture.

ANTH 441
Psychoanalytic Anthropology I: Cross-Cultural Theory 3 OR 4 hrs.
Introduction for social scientists to psychoanalytic theory and methods including Freud's theories and more recent developments. Cross-cultural tests and applications of psychoanalytic theories. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** One course in anthropology or psychology; or consent of the instructor.

ANTH 442
Psychoanalytic Anthropology II: Cross-Cultural Applications 3 OR 4 hrs.
Explores ways in which anthropologists and analysts have used psychoanalysis to understand individuals, practices, and institutions of other cultures. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ANTH 441 or consent of the instructor.

ANTH 443
Leadership: Psychology, Strategy, Culture 3 OR 4 hrs.
Psychological and anthropological theories of leadership developed on our culture will be tested against descriptions of leadership in diverse non-Western societies. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** One course in anthropology.

ANTH 444
Dreams, Dreaming, and Dream Beliefs 3 OR 4 hrs.
The dreaming experience examined from the point of view of psychological interpretation, laboratory experiments, and anthropological study of dreams in other cultures. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** One course in anthropology or psychology and junior or senior standing; or consent of the instructor.

ANTH 445
Structuralism in Anthropology 3 OR 4 hrs.
Explores the theoretical approach offered by structuralism emphasizing that elements of culture must be understood in terms of their relationship to the entire system. 3 undergraduate hours. 4 graduate hours.

ANTH 453
Seminar in Cultural Ecology 3 OR 4 hrs.
Cultural ecology and cultural evolution, emphasizing peasant farming and other subsistence systems. Soil management under shifting and sedentary agriculture. **Same as** GEOG 453. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ANTH 101 or GEOG 151 or consent of the instructor.

ANTH 454
A Dynamic Human Habitat: Amazonia Past, Present, and Future 3 OR 4 hrs.
Traces the dynamic interaction of humans and their habitats in Amazonia from prehistory until today, illustrating the co-evolution of its environments and populations. 3 undergraduate hours. 4 graduate hours.

ANTH 455
Quantitative Methods 3 OR 4 hrs.
Introductory statistics course in statistical methods for anthropological problem solving. Primary emphasis is on univariate and bivariate statistics, such as means standard deviations, correlation, chi square, t-tests, and simple regressions. **Same as** GEOG 455. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** Junior standing or above; and consent of the instructor.

ANTH 461
Museum Collecting: Documentation, Registration, and Curation 4 hrs.
Introduction to the collection of anthropological objects for museum curation. Ethics of collecting, standards for documentation, legal aspects of collecting, ethnographic interviewing, registration of objects and archives, curation, and housing.

ANTH 462
Museum Exhibit Research and Design 4 hrs.
Introduction to anthropological museum exhibitions. Issues of representation and cultural politics, museums' roles in the communities they serve, developing a story around objects, and the technical aspects of exhibit design.

ANTH 470
Classic Ethnographies 3 OR 4 hrs.
Analysis of method and theory reflected in selected classic anthropological works, studied in their historical contexts and contemporary uses. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ANTH 101 or ANTH 213 or consent of the instructor.

ANTH 474
Urban Cultures of Africa 3 OR 4 hrs.
A study of the indigenous urban centers of sub-Saharan Africa, the multicultural cities of colonial and contemporary Africa, and the processes of detribalization. 3 undergraduate hours. 4 graduate hours.

ANTH 475
Indians of the Andes and the Amazon 3 OR 4 hrs.
Intensive research in theoretical and ethnographic problems in South American Indian social structures and cultures. Special attention will be given Levi-Strauss' ideas on the formulation of cultural theory in South America. **Same as** LALS 475. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ANTH 213 or consent of the instructor.

ANTH 476
Rise and Fall of the Inca Empire 3 hrs.
Using an integration of ethnographic, historical, and archaeological information, this course is designed to provide a thorough introduction to the study of the Incas. **Prerequisite(s):** Sophomore standing or above.

ANTH 477
Remote Sensing of the Environment 4 hrs.
Principles and practices of processing and interpretation of remotely sensed imagery including aerial photographs, radar, and multispectral satellite images. Hands-on use of image-processing software. **Same as** GEOG 477. Extensive computer use required.

ANTH 478
Paleoindians and Peopling of the Americas: From Alaska to Tierra del Fuego 3 OR 4 hrs.
Summarizes current knowledge of the first migration of humans to the New World, analyzes its significance, and evaluates the controversies. 3 undergraduate hours. 4 graduate hours.

ANTH 479
Culture and Colonialism in South Asia 3 OR 4 hrs.
Examines the emergence of colonial cultures of domination and resistance on the Indian subcontinent from the eighteenth century to 1947. **Same as** ASST 479 and HIST 479. 3 undergraduate hours. 4 graduate hours.

ANTH 480
Sociolinguistics 3 OR 4 hrs.
Variations in language that correlate with variation in societies and smaller social groups; interactions of languages and societies. **Same as** LING 480. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** LING 405 or junior standing and consent of the instructor.

ANTH 481
Geographic Information Systems I 4 hrs.
Components and performance properties of geographic information systems. Geographic hierarchies and data structures. Problems and solutions in handling large geographic files. Geocoding. **Same as** GEOG 481. **Prerequisite(s):** GEOG 100 and one from GEOG 278, GEOG 386, IDS 100; or consent of the instructor.

ANTH 482
Geographic Information Systems II 4 hrs.
Application of raster- or grid-based geographic information systems to the spatial analysis of landscapes. **Same as** GEOG 482.

ANTH 483
Geographic Information Systems III 4 hrs.
Problems encountered in the analysis and portrayal of geographic data. Topics include taxonomy, regionalization, trend surface analysis, time series, Markov probabilities, and computer cartographic procedures for displaying output from analytic procedures. **Same as** GEOG 483. **Prerequisite(s):** GEOG 482 or ANTH 482 or consent of the instructor.

ANTH 484
Mapping with Microcomputers 4 hrs.
Microcomputer applications including computer principles for mapping, alternative design for coordinate files, kinds of devices for mapping, direct control of devices for mapping, characteristics, and limitations of mapping programs. **Same as** GEOG 478. **Prerequisite(s):** GEOG 475 or consent of the instructor.

ANTH 485
Computer Cartography 4 hrs.
The fundamentals of cartography and cartographic design. The use of state-of-the-art, Windows-based computer mapping software for querying and displaying cartographic data contained in GIS databases. **Same as** GEOG 485.

ANTH 490
Independent Study 1 TO 6 hrs.
Independent reading under the supervision of a faculty member. May be repeated to a maximum of 8 hours with approval. Students may register in more than one section per term. **Prerequisite(s):** Junior standing and consent of the instructor.

**ANTH 494
Special Topics in
Anthropology** 3 OR 4 hrs.
Reading, study, and discussion of selected problems for graduate students and majors in Anthropology. 3 undergraduate hours. 4 graduate hours. May be repeated to a maximum of 12 hours. Students may register in more than one section per term.
Prerequisite(s): Junior standing or approval of the department.

**ANTH 496
Internship** 1 TO 4 hrs.
Professional field experience with an agency or organization in the private or public sector on projects related to the student's area of specialization. **Same as** GEOG 496. May be repeated to a maximum of 8 hours. Only 4 hours of credit may be applied toward the Minor in Geography.
Prerequisite(s): Declared major in Anthropology, minor in Geography or full graduate standing in Anthropology or Geography, and consent of the faculty advisor, head of the department, or the director of internship programs.

**ANTH 500
Social and
Cultural Theory I** 4 hrs.
Historical survey of approaches to field and library research in anthropology.

**ANTH 501
Social and
Cultural Theory II** 4 hrs.
Continuation of ANTH 500.
Prerequisite(s): ANTH 500.

**ANTH 502
Theory and
Method in
Archaeology** 4 hrs.
Middle-range and general theory in prehistoric archaeology: the reconstruction of prehistoric economic, social, and political systems; cultural materialism and its critiques; cultural ecology and systems theory; social evolution.

**ANTH 503
Hominid, Phylogeny,
and Adaptations** 5 hrs.
Data, methods, and approaches for reconstruction of genealogical relationships of species; interpretation of adaptations of extinct species in an evolutionary context.

**ANTH 508
Research Design
and Grant Writing** 4 hrs.
Each student will produce a research grant proposal, similar in style and length to an NSF proposal. May be repeated.
Prerequisite(s): Approval of the department.

**ANTH 510
Seminar in Social
Organization** 4 hrs.
Theoretical and substantive issues about how societies are organized. **Same as** GEOG 510. May be repeated to a maximum of 12 hours.

**ANTH 514
Gender Issues in
Cross-Cultural
Perspectives** 4 hrs.
Selected substantive and theoretical issues in the cross-cultural study of gender roles, conceptions, and relations. **Same as** GWS 514.
Prerequisite(s): ANTH 500 or consent of the instructor.

**ANTH 516
Anthropology and
Global Health
Integrative Seminar** 4 hrs.
Critical examination of global health issues from social science and public health perspectives. Includes consideration of cultural underpinnings, geopolitical influences, design of appropriate and effective interventions, and policy formation. **Same as** IPHS 516. **Prerequisite(s):** Graduate or professional standing; and consent of the instructor.

**ANTH 520
Seminar in
Archaeological Theory
and Method** 4 hrs.
Theoretical and substantive issues in the study of prehistory and the recovery and interpretation of the archaeological record. May be repeated. **Prerequisite(s):** ANTH 502 or consent of the instructor.

**ANTH 521
Analysis of Stone
Artifacts** 4 hrs.
Analyzing stone objects.

**ANTH 530
Seminar in Physical
Anthropology** 5 hrs.
A critical examination of current literature on methods and theories dealing with the evolution of primate biology and behavior. May be repeated. Students may register in more than one section per term.

**ANTH 531
Anthropological
Genetics** 4 hrs.
Basic overview of genetic theory and techniques, followed by a survey of the contributions of human genetics to human adaptation and evolution.
Prerequisite(s): Grade of B or better in ANTH 508 or grade of B or better in BIOS 220; or consent of the instructor.

**ANTH 532
Advances in
Ancient DNA** 4 hrs.
Basic techniques and special concerns in the application of molecular biology techniques to the study of ancient DNA, followed by a discussion of recent advances and contributions to the field. **Prerequisite(s):** Grade of B or better in ANTH 531 or grade of B or better in BIOS 220.

**ANTH 533
Lab Methods
for Ancient DNA** 2 hrs.
Provides students with laboratory training in molecular biology techniques commonly used in studies of ancient DNA.
Prerequisite(s): Consent of the instructor.

**ANTH 534
Dental and Medical
Anthropology
Within Human
Evolution** 1 TO 3 hrs.
Studies the biological and physical anthropology of hominid teeth and the craniofacial complex with relevant medical anthropology, ethnopharmacology, forensic sciences, and paleopathology topics. **Same as** OSCI 534 and PMPG 534. Fieldwork required. A lab experience, independent study, and a research paper is required for 3 hours of credit. **Prerequisite(s):** Graduate standing and consent of the instructor.

**ANTH 555
Landscape
Archaeology and GIS** 4 hrs.
Study of the space between settlements; meanings these spaces have for peoples of the past and today; theoretical approaches to landscape; methods for archaeological landscape analysis through GIS and remote sensing techniques. **Prerequisite(s):** Consent of the instructor.

**ANTH 570
Regional Application
of Anthropology** 4 hrs.
Application of a specific theory or the testing of competing theoretical frameworks to data provided by one of the major geographical or cultural areas of the world. Emphasis on deductive reasoning and the derivation and testing of hypotheses with data from several cultures of a single culture area. May be repeated.

**ANTH 591
Readings in
Anthropology and
Global Health** 1 TO 8 hrs.
Student along with his/her advisor will develop a series of readings focused on a specific topic of interest to the student. **Same as** IPHS 591. May be repeated up to 1 time(s). **Prerequisite(s):** Consent of the instructor.

**ANTH 592
Research in
Anthropology and
Global Health** 1 TO 8 hrs.
Research and methods class combined with practical fieldwork in anthropology and global health. **Same as** IPHS 592. May be repeated to a maximum of 8 hours. Fieldwork required.
Prerequisite(s): Consent of the instructor.

**ANTH 593
Special Topics in
Anthropology and
Global Health** 4 hrs.
Covers special topics in anthropology and global health. **Same as** IPHS 593. May be repeated if topics vary.
Prerequisite(s): Graduate or professional standing; and consent of the instructor.

**ANTH 594
Special Topics
in Anthropology** 4 hrs.
Study of a selected topic in anthropology. May be repeated to a maximum of 12 hours. Students may register in more than one section per term.

**ANTH 595
Graduate Seminar
in Anthropology** 1 hour.
Presentations of current research by faculty followed by student discussion. Course is to be taken during student's first year in the graduate program as one of the core courses. Satisfactory/Unsatisfactory grading only.
Prerequisite(s): Admission to the graduate program in anthropology.

**ANTH 596
Independent
Study** 2 TO 6 hrs.
Independent research is done under the supervision of a faculty member. May be repeated to a maximum of 12 hours with approval. Students may register in more than one section per term. Approval to repeat course granted by the department. **Prerequisite(s):** Consent of the instructor.

**ANTH 597
Project
Research** 2 TO 6 hrs.
The student will do an independent research project with the aid of a faculty advisor. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**ANTH 599
PhD Thesis
Research** 0 TO 16 hrs.
Research on doctoral dissertation topic. Satisfactory/Unsatisfactory grading only. May be repeated.
Prerequisite(s): Advancement to candidacy for the PhD in Anthropology.

Architecture

**ARCH 412
Women and
the Environment** 3 OR 4 hrs.
Women's place in the built environment; the role of gender in environmental experience, including women as users, designers, planners, policy makers, and critics. **Same as** GWS 412. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Advanced undergraduate or graduate standing, or consent of the instructor.

**ARCH 414
Professional
Practices** 3 hrs.
Relationship of the discipline of architecture to the profession. Exposure to interdisciplinary studies that may lead to alternative careers in allied businesses and professions. **Prerequisite(s):** ARCH 252 and approval of the department.

ARCH 443
Professional Practice I 2 hrs.
Legal and ethical considerations in architectural practice; operation and management guidelines. Overview of the history of the professional architectural practice. **Prerequisite(s):** ARCH 443 or approval of the school.

ARCH 444
Professional Practice II 2 hrs.
Business and financial considerations in architectural practice; scope of services communications and marketing guidelines. Interrelationship with clients, consultants, collaborators, and the manufacturing and construction industry. **Prerequisite(s):** ARCH 443 and approval of the school.

ARCH 465
Comprehensive Studio 6 hrs.
Capstone senior design studio that culminates in a comprehensive project that explores the relationship of architecture to society, technological change, and structural and environmental innovation. Extensive computer use required. Field trip required at a nominal fee. Fieldwork required. Students will use the city as a research laboratory with fieldwork on project sites. Additional scheduled field trips will be made to significant or historical architectural buildings as part of preliminary design research and analysis. **Prerequisite(s):** Average grade of C or better in both ARCH 365 and 366; ARCH 360 ARCH 372 and junior standing or above and approval of the department.

ARCH 466
Option Studio 6 hrs.
Topic options studio that culminates BS studio sequence exploring topics at the scale of room, building, city, and region dependent on interests of faculty. Extensive computer use required. Field trip required at a nominal fee. Fieldwork required. Students will use the city as a research laboratory with fieldwork on project sites. Additional scheduled field trips will be made to significant or historical architectural buildings as part of preliminary design research and analysis. **Prerequisite(s):** ARCH 465 and approval of the department.

ARCH 470
Structures I: Statics 4 hrs.
Introduction to the analysis of structural elements. Introduction to fundamental structural planning criteria and relevant concepts of tension, compression, and bending. Introduction to historical and contemporary structural precedents. **Prerequisite(s):** MATH 180 and PHYS 105 and PHYS 106.

ARCH 471
Structures II: Strength of Materials 3 hrs.
Introduction to material properties; strength characteristics of building materials and material assemblies; stress and strain; rigidity and deformation; temperature effects; torsion effects; combined loading of elements and systems. **Prerequisite(s):** ARCH 470 and approval of the school.

ARCH 486
Urban Ecologies and Infrastructures 4 hrs.
Introduction to dynamic relationship of ecology and infrastructure in the context of contemporary urban landscape. Built and natural environments as inseparable networks of a dynamic process. **Prerequisite(s):** Graduate standing in the Master of Architecture program or, for students in the Bachelor of Arts in Architectural Studies program, consent of the instructor.

ARCH 494
Special Topics in Architecture 2 TO 4 hrs.
Current problems. May be repeated to a maximum of 8 hours. Students may register in more than one section per term. **Prerequisite(s):** 12 hours of history of architecture and art and graduate standing in the Master of Architecture program.

ARCH 499
Special Topics 3 OR 4 hrs.
Special topics in theory, design, technology, or graphic skills and craft (manual or digital). 3 undergraduate hours. 4 graduate hours. May be repeated up to 3 time(s). **Prerequisite(s):** Senior standing or above.

ARCH 500
Best Practices: Space 3 hrs.
Issues of planning and programming including context awareness and analysis; site and facilities master planning; workload analysis, existing facility capacity analysis, and facilities programming. **Prerequisite(s):** Approval of the department.

ARCH 501
Best Practices: Type 3 hrs.
An understanding of operations, activities, and functions associated with health settings, including facilities planning and design, departmental planning and design, space planning and design, and equipment planning. **Prerequisite(s):** Approval of the department.

ARCH 502
Best Practices: Process 3 hrs.
Regulatory constraints on the design process are discussed: government and licensing agencies including review of building codes, zoning controls, Certificate of Need, licensing agencies, and other regulatory issues. **Prerequisite(s):** Approval of the department.

ARCH 503
Best Practices: Institution 3 hrs.
A basic understanding of health delivery organizations including funding mechanisms and economics. Topics in the supply and demand for health services, the role of insurance, public policy issues of cost, and quality regulation. **Prerequisite(s):** Approval of the department.

ARCH 504
Ethics in Health Design 3 hrs.
An understanding of the ethical foundations of health design, including multicultural definitions of health. Issues of sustainable design; universal design; health equity; global access to health; gender equality; and health as a human right. **Prerequisite(s):** Approval of the department.

ARCH 505
Introduction to Evidence Based Design 3 hrs.
Evidence-based health design recognizes the need to be problem-oriented using, as needed, the theories and methods of related disciplines (e.g., psychology, sociology, anthropology, biology and ecology). **Prerequisite(s):** Approval of the department.

ARCH 510
Advanced Architectural Design I 8 hrs.
Design of multiple or complex building types with emphasis on varying topics related to architectural design. **Prerequisite(s):** ARCH 454 and ARCH 464 and ARCH 474 or approval of the school. Restricted to students in the final year of study in the Master of Architecture program.

ARCH 511
Advanced Architectural Design II 8 hrs.
Design of a comprehensive, single case study with emphasis on varying topics related to architectural design. **Prerequisite(s):** ARCH 491 or ARCH 510 or ARCH 512 or ARCH 514 or ARCH 516 or ARCH 518 or ARCH 551 or ARCH 554 or ARCH 596. Restricted to students in the final year of study in the Master of Architecture program.

ARCH 512
Advanced Architectural Design I: Activist Practice 8 hrs.
Design of multiple or complex building types with an emphasis on the theoretical, technical, political, and economic considerations relating to community activism and identity politics. **Prerequisite(s):** ARCH 454 and ARCH 464 and ARCH 474 or approval of the school. Restricted to students in the final year of study in the Master of Architecture program.

ARCH 513
Advanced Architectural Design II: Activist Practice 8 hrs.
Design of a comprehensive, single case study with emphasis on theory and site planning, interior space, building systems, and materials relating to community activism, and identity politics. **Prerequisite(s):** ARCH 491 or ARCH 510 or ARCH 512 or ARCH 514 or ARCH 516 or ARCH 518 or ARCH 551 or ARCH 554 or ARCH 596. Restricted to students in the final year of study in the Master of Architecture program.

ARCH 514
Advanced Architectural Design I: Architectural Technologies 8 hrs.
Design of multiple public buildings with an emphasis on the relationship of aesthetics and construction methods in the making of comprehensive architecture. **Prerequisite(s):** ARCH 454 and ARCH 464 and ARCH 474 or approval of the school. Restricted to students in the final year of study in the Master of Architecture program.

ARCH 515
Advanced Architectural Design II: Architectural Technologies 8 hrs.
Design of a single public building with an emphasis on the relationship of aesthetics and construction methods in the making of comprehensive architecture. **Prerequisite(s):** ARCH 491 or ARCH 510 or ARCH 512 or ARCH 514 or ARCH 516 or ARCH 518 or ARCH 551 or ARCH 554 or ARCH 596. Restricted to students in the final year of study in the Master of Architecture program.

ARCH 516
Advanced Architectural Design I: Digital Media 8 hrs.
Design of multiple or complex building types with an emphasis on the theoretical, technical, societal, and economic considerations relating to digital media. Extensive computer use required. **Prerequisite(s):** ARCH 430 and ARCH 454 and ARCH 464 and ARCH 474; or approval of the school. Restricted to students in the final year of study in the Master of Architecture program.

ARCH 517
Advanced Architectural Design II: Digital Media 8 hrs.
Design of a comprehensive, single case study with emphasis on theory and site planning, interior space, building systems, and materials relating to digital media. Extensive computer use required. **Prerequisite(s):** ARCH 491 or ARCH 510 or ARCH 512 or ARCH 514 or ARCH 516 or ARCH 518 or ARCH 551 or ARCH 554 or ARCH 596. Restricted to students in the final year of study in the Master of Architecture program.

ARCH 518
Advanced Architectural Design I: Landscape Urbanism 8 hrs.
Design of urban landscapes and public spaces as informed by large-scale infrastructures, natural environments, and urban systems. **Prerequisite(s):** ARCH 454 and ARCH 464 and ARCH 474 or approval of the school. Restricted to students in the final year of study in the Master of Architecture program.

ARCH 519
Advanced Architectural Design II: Landscape Urbanism 8 hrs.
Design of public building and/or space including surrounding urban landscape with emphasis on perceptual, phenomenal, and temporal aspects of design. **Prerequisite(s):** ARCH 491 or ARCH 510 or ARCH 512 or ARCH 514 or ARCH 516 or ARCH 518 or ARCH 551 or ARCH 554 or ARCH 596. Restricted to students in the final year of study in the Master of Architecture program.

ARCH 520
Topics in Architectural Theory and History 4 hrs.
Seminar on a current topic in the criticism, theory, or history of architecture and urbanism. May be repeated to a maximum of 12 hours.

ARCH 521
Advanced Elective in Architectural Technologies 4 hrs.
Examination and analysis of influences on architecture relating to concept, program, function, location, cost, systems, regulation, materials, assemblage, and environmental influences on the resulting building aesthetic. Restricted to students in the final year of study in the Master of Architecture program.

ARCH 522
Topics in Architectural Technology 4 hrs.
Seminar on a current topic in technology, structures, or digital fabrication and new media. May be repeated to a maximum of 12 hours.

ARCH 523
Advanced Elective in Landscape Urbanism 4 hrs.
Examination of urban landscape projects from historical, theoretical, ecological, and infrastructural points of view. Restricted to students in the final year of study in the Master of Architecture program.

ARCH 524
Advanced Elective: Special Topics 4 hrs.
Advanced study in varying topics related to architecture. Restricted to students in the final year of study in the Master of Architecture program.

ARCH 531
Architectural Theory and History I 4 hrs.
Discusses a diversity of critical and generative approaches to twentieth-century architecture and theory, with an emphasis on how architects invent and instrumentalize history. **Corequisite(s):** ARCH 551 and ARCH 561.

ARCH 532
Architectural Theory and History II 4 hrs.
The emergence of the metropolis beginning in the mid-19th century is examined through a survey of the forces that produced it, and the ideologies and practices that have attempted to organize, control, and simulate it.

ARCH 535
Quantitative Methods in Evidence-Based Design 4 hrs.
Basic experimental and survey design for health design research and associated methods for data analysis. The unit is intended to develop students' capabilities in a range of exploratory and hypothesis-testing data analytic techniques. **Prerequisite(s):** Approval of the department.

ARCH 536
Critical Design Methodologies 4 hrs.
Introduction to current critical design methodologies in health design including integrated practice; building information modeling; GIS; and other advanced forms of visualization and imaging. **Prerequisite(s):** Approval of the department.

ARCH 544
Professional Practices 4 hrs.
An introduction to the law and business of architecture, with an emphasis on alternative models for contemporary professional practice. **Prerequisite(s):** Approval of the department.

ARCH 551
Architectural Design I 6 hrs.
Introduction to the architectural design discipline as an instigator of qualities and as a function of technique and geometry. Exercises address issues of scale, proportion, intricacy, and formal organizing systems through analog and digital media. Previously listed as ARCH 451. **Corequisite(s):** ARCH 531 and ARCH 561.

ARCH 552
Architectural Design II 6 hrs.
Introduction to the architectural design discipline as an organizer of quantities and as a function of argument and scenario. Exercises confront issues of size, number, expediency, and activity through diagramming, modeling, and graphic techniques. Previously listed as ARCH 452. **Prerequisite(s):** ARCH 551.

ARCH 553
Architectural Design III 6 hrs.
Addresses contemporary collective space through the development of a large, mixed-use complex on an urban site, and the communication with diverse audiences by synthesizing information and identity from multiple programs and publics. Previously listed as ARCH 453. **Prerequisite(s):** ARCH 552 or advanced standing in the second year of the three-year Master of Architecture program.

ARCH 554
Architectural Design IV 6 hrs.
Comprehensive housing design studio using building codes, structural and mechanical systems, and material life cycles as generative design parameters to attain the scale of detail development and the level of construction documents. Previously listed as ARCH 454. **Prerequisite(s):** ARCH 553.

ARCH 561
Architectural Technology I 4 hrs.
Introduction to building construction processes, terminology, conventions, standards, materials, principles of structural behavior, application of components and assemblies, and communication and specifications. Previously listed as ARCH 461. **Corequisite(s):** ARCH 531 and ARCH 551.

ARCH 562
Architectural Technology II 4 hrs.
Focuses on the relationship between architecture and the environment, including the high performance, material specification, adaptive behavior, and assembly systems at their primary interface, the building's envelope. Previously listed as ARCH 462. **Prerequisite(s):** ARCH 561.

ARCH 563
Architectural Technology III 4 hrs.
Focuses on the relationship between architecture and its occupant, through an analysis and integration of building and core systems: HVAC, electrical, plumbing, ADA and universal design, vertical transport, egress, and life safety systems. Previously listed as ARCH 463. **Prerequisite(s):** ARCH 562 or advanced standing in the second year of the three-year Master of Architecture program.

ARCH 564
Architectural Technology IV 4 hrs.
An advanced seminar/lab in architectural technologies, structures, new materials, and fabrication techniques; students choose by lottery into one of several sections with diverse content. Previously listed as ARCH 464. **Prerequisite(s):** ARCH 561 and credit or concurrent registration in ARCH 562 and ARCH 563; and credit or concurrent registration in ARCH 573 and ARCH 574. Students who are admitted advanced standing into the second year of the three-year Master of Architecture program have the option to take ARCH 562 or ARCH 573 concurrently with ARCH 564.

ARCH 565
Topic Studio 8 hrs.
Advanced studio that pursues specific design and research agendas of current significance; students choose by lottery from among several options that are offered by permanent and distinguished visiting faculty. Extensive computer use required. Fieldwork, field trips required at a nominal fee. **Prerequisite(s):** ARCH 554.

ARCH 566
Research Seminar 4 hrs.
The first part of a year-long design-research project, the seminar establishes the information base to be developed into publishable form in the subsequent research studio. Extensive computer use required. Fieldwork; field trips required at a nominal fee. **Prerequisite(s):** ARCH 554.

ARCH 567
Research Studio 8 hrs.
Collaborative and individual design-research, in multiple genres, that addresses concerns at the edge of the contemporary discipline and results from a year-long course of study. Extensive computer use required. Fieldwork; field trips required at a nominal fee. **Prerequisite(s):** ARCH 566.

ARCH 568
Topics Studio in Regional Intervention 8 hrs.
Design of a complex project with emphasis on extra-large-scale intervention (e.g., transportation infrastructure) supported by the theoretical, technical, social, and economic considerations relating to the culture and production of architecture. Extensive computer use required. Fieldwork; field trips required at a nominal fee. **Prerequisite(s):** Approval of the department. **Corequisite(s):** Requires concurrent registration in ARCH 595.

**ARCH 573
Architectural
Structures I** 4 hrs.
Introduction to the analysis of elementary structures by quantitative and graphical means; introduction to historical and contemporary structural precedents. Previously listed as ARCH 473. **Prerequisite(s):** ARCH 561.

**ARCH 574
Architectural
Structures II** 4 hrs.
Introduction to the design of structural elements and systems in steel, concrete, and wood including the application of computer-aided engineering software and approximate methods. Previously listed as ARCH 474. **Prerequisite(s):** ARCH 561 or advanced standing into the second year of the three-year Master of Architecture program.

**ARCH 577
Health Design
Preceptorship** 1 TO 3 hrs.
Preceptor-guided field experience in health intended to promote evidence-based design problem-solving skills, and application of critical knowledge and skills in architecture practice. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 7 hours. Fieldwork required. **Prerequisite(s):** Approval of the department.

**ARCH 579
Capstone
Colloquium** 4 hrs.
Intensive, advanced program of readings, documentation, presentations, and discussion that structures and supports research activity related to individual capstone projects. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Approval of the department.

**ARCH 585
Architectural
Theory and
History III** 4 hrs.
Focuses on ten contemporary practices through close attention to the distinct design concepts, theoretical and formal argumentation, built production, critical reception, and legacies and genealogies that those practices have sponsored. Previously listed as ARCH 485.

**ARCH 586
Architectural
Theory and
History IV** 4 hrs.
An advanced seminar in architectural and urban criticism, theory, and history; students choose by lottery one of several sections with diverse content.

**ARCH 591
Architectural
Study Abroad** 0 TO 17 hrs.
Lectures, seminars, studio, and independent travel/study abroad. Architectural design, planning, structures, history, and technology. May be repeated to a maximum of 34 hours. Previously listed as ARCH 491. Fieldwork required. **Prerequisite(s):** Completion of at least one year of architectural graduate course work; 3.00 cumulative grade point average in Architecture; and approval of the school.

**ARCH 595
Thesis Seminar** 4 hrs.
This seminar is an intensive, advanced program of readings, documentation, presentations, and discussion that structures and supports research activity related to individual thesis projects. Satisfactory/Unsatisfactory grading only. Fieldwork required. **Prerequisite(s):** Approval of the department. Students who wish to take the ARCH 595/ARCH 598 thesis sequence must submit a proposal and have it approved by the program before being permitted to register.

**ARCH 596
Independent Study
for Graduate
Students** 1 TO 8 hrs.
Individual study. May be repeated to a maximum of 16 hours. **Prerequisite(s):** ARCH 491 or ARCH 510 or ARCH 512 or ARCH 514 or ARCH 516 or ARCH 518 or ARCH 551; or ARCH 554; and approval of the school. Restricted to students in the final year of study in the Master of Architecture program.

**ARCH 597
Capstone
Project** 0 TO 8 hrs.
Comprehensive project that explores the relationship of architecture to healthcare delivery, evidence-based health design, facilities planning, multidisciplinary research methods, technological adaptive design, and environmental innovation. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 8 hours. **Prerequisite(s):** ARCH 579; and approval of the department.

**ARCH 598
Thesis Studio** 0 TO 16 hrs.
Individual research under faculty direction. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 8 hours. **Prerequisite(s):** ARCH 595; and approval of the department.

Art and Design
**AD 400
Foreign
Studies in Art
and Design** 1 TO 16 hrs.
Study abroad within approved programs of foreign exchange and/or education. Satisfactory/Unsatisfactory grading only. May be repeated with approval.

Approval to repeat course granted by the appropriate major area faculty committee, the director of the school, and/or director of graduate studies. Graduate credit only with approval of the director of the school and the director of graduate studies. **Prerequisite(s):** Junior or graduate standing within a major program within the School of Art and Design and approval of the appropriate major area faculty committee, director of the school, and/or director of graduate studies.

**AD 405
Smart Art:
Physical
Computing** 0 TO 5 hrs.
A practical and conceptual exploration into electronic sensors, processors, and effectors as applied to interactive media and interaction design. 4 undergraduate hours. 5 graduate hours. Extensive computer use required. **Prerequisite(s):** AD 309 and credit or concurrent registration in AD 407; and senior standing or above; or consent of the instructor.

**AD 406
Advanced Special
Topics in
Art and Design** 0 TO 5 hrs.
Intensive workshops in specific art- and design-related topics and techniques directed and announced by the instructor. 1 to 4 undergraduate hours. 2 to 5 graduate hours. May be repeated. **Prerequisite(s):** Junior or graduate standing, and consent of the instructor.

**AD 407
Virtual
Reality I** 0 TO 5 hrs.
A practical and conceptual exploration into the production of interactive virtual reality experiences for art and design. Virtual reality authoring tools and scripting. 4 undergraduate hours. 5 graduate hours. Extensive computer use required. **Prerequisite(s):** AD 309 and credit or concurrent registration in AD 405; and senior standing or above; or consent of the instructor.

**AD 408
Virtual
Reality II** 0 TO 5 hrs.
Advanced concepts and methods in interactive media and virtual reality production for art and design. Programming for customized software tool development. 4 undergraduate hours. 5 graduate hours. Extensive computer use required. **Prerequisite(s):** AD 405 and AD 407 and credit or concurrent registration in AD 409; and credit or concurrent registration in AD 415; and senior standing or above; or consent of the instructor.

**AD 409
Electronic
Visualization:
Senior Project** 0 TO 5 hrs.
A practical and conceptual exploration into the production of a public interactive media event. 4 undergraduate hours. 5 graduate hours. Extensive computer use required. **Prerequisite(s):** AD 405 and AD 407 and credit or concurrent registration in AD 408; and senior standing or above; or consent of the instructor.

**AD 410
Advanced Special
Topics in
Graphic Design** 1 TO 5 hrs.
Intensive workshops in specific graphic-design-related topics and techniques directed and announced by the instructor. 1 to 4 undergraduate hours. 2 to 5 graduate hours. May be repeated. A maximum of 8 hours of credit is allowed for undergraduates; 10 hours for graduate students. Extensive computer use required. **Prerequisite(s):** AD 315; and junior standing or above; and consent of the instructor. Portfolio review required.

**AD 411
Graphic Design
Professional
Practice** 0 TO 5 hrs.
Design projects with real-world clients in the private or public sector. The designer/client relationship. 4 undergraduate hours. 5 graduate hours. **Prerequisite(s):** AD 315 and AD 317; and senior standing or above; and consent of the instructor.

**AD 412
Graphic Design
Thesis** 0 TO 5 hrs.
Thesis topics chosen in consultation with graphic design faculty. 4 undergraduate hours. 5 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** Credit or concurrent registration in AD 315 and credit or concurrent registration in AD 317 and credit or concurrent registration in AD 411; and consent of the instructor.

**AD 413
Interactive
Design** 0 TO 5 hrs.
Advanced examination of graphic design in the new media technologies. 4 undergraduate hours. 5 graduate hours. Extensive computer use required. **Prerequisite(s):** AD 315 and credit or concurrent registration in AD 412, and senior standing or above.

**AD 414
Interactivity in
Graphic Design** 0 TO 5 hrs.
Advanced examination of graphic design in the new media technologies. 4 undergraduate hours. 5 graduate hours. Extensive computer use required. **Prerequisite(s):** AD 315 and AD 317 and credit or concurrent registration in AD 412.

**AD 415
Design
Colloquium** 4 OR 5 hrs.
Presentations, lectures, and discussions conducted by faculty, design professionals, and individuals from design-related disciplines. Overview and contextual understanding of design theory, practice, process, and research. 4 undergraduate hours. 5 graduate hours. **Prerequisite(s):** Senior standing or above, and consent of the instructor. Senior students must be in their final semester and preparing to graduate at the end of that semester.

**AD 418
Independent
Study in
Graphic Design** 1 TO 5 hrs.
Supervised independent study in graphic design. 1 to 4 undergraduate hours. 2 to 5 graduate hours. May be repeated. A maximum of 8 hours of credit is allowed for undergraduates; 10 hours for graduate students. Extensive computer use required. **Prerequisite(s):** Senior standing or above and consent of the instructor. Taken by faculty invitation only.

**AD 420
Interdisciplinary
Product
Development I** 0 TO 5 hrs.
Real-world simulation collaborating in teams with other disciplines gathering, assimilating, and synthesizing information for problem identification to investigate and solve a problem. 4 undergraduate hours. 5 graduate hours. Extensive computer use required. **Prerequisite(s):** AD 321 and AD 326 and credit or concurrent registration in AD 422; and senior standing or above; or consent of the instructor.

**AD 421
Interdisciplinary
Product
Development II** 0 TO 5 hrs.
Real-world simulation collaborating in teams with other disciplines to assimilate and synthesize information into action plan, design development, and implementation within structured stage-gated product development process. 4 undergraduate hours. 5 graduate hours. Extensive computer use required. **Prerequisite(s):** AD 420 and AD 422 and credit or concurrent registration in AD 423; and credit or concurrent registration in AD 415; and senior standing or above; or consent of the instructor.

**AD 422
Interactive
Product Design II** 0 TO 5 hrs.
Advanced 2-D and 3-D methods in the design of interactive products and art works. Includes human factors, 3-D modeling, and design of 3-D virtual products. 4 undergraduate hours. 5 graduate hours. Extensive computer use required. **Prerequisite(s):** AD 321 and AD 326 and credit or concurrent registration in AD 420; and senior standing or above; or consent of the instructor.

**AD 423
Industrial Design
Thesis** 0 TO 5 hrs.
Capstone course that enables students to select and explore an area of industrial design research. 4 undergraduate hours. 5 graduate hours. Extensive computer use required. **Prerequisite(s):** AD 420 and AD 422 and credit or concurrent registration in AD 421; and credit or concurrent registration in AD 415; and senior standing or above; and consent of the instructor.

**AD 424
Industrial Design
Independent
Study** 4 OR 5 hrs.
Supervised independent study in any area of industrial design activity not covered in the regular curriculum. 4 undergraduate hours. 5 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** AD 320 and AD 321 and senior standing or above; and consent of the instructor.

**AD 425
Design
Visualization** 0 TO 5 hrs.
Advanced principles, methodologies, and tools for designing both mechanical and electronic interactive products using digital tools as well as analysis utilizing prototyping and user testing methods. Applications include interactive Web site design. 4 undergraduate hours. 5 graduate hours. May be repeated up to 1 time(s). Extensive computer use required. **Prerequisite(s):** AD 322 and senior standing or above; and consent of the instructor.

**AD 462
Advanced
Art/Studio Critique** 6 hrs.
Critique/discussion for advanced art majors. **Prerequisite(s):** AD 391 and senior standing or above; and consent of the instructor. Open only to Studio Arts, Photography, and Moving Image majors who have completed their major art requirements.

**AD 463
Art/Studio Thesis** 6 hrs.
Exhibition/thesis production and seminar culminating in an exhibition/final thesis show for graduating seniors. **Prerequisite(s):** AD 462 and senior standing or above; and consent of the instructor. Open only to Studio Arts, Photography, and Moving Image majors who have completed all requirements and are prepared to graduate.

**AD 471
Advanced
Film/Video/
Animation** 0 TO 5 hrs.
Investigation of contemporary concerns in various areas of film and/or video activity under the direction of an instructor. 4 undergraduate hours. 5 graduate hours. May be repeated up to 2 time(s). **Prerequisite(s):** AD 272 or AD 474, and consent of the instructor.

**AD 472
Independent Study
in Film/Video/
Electronic
Visualization** 4 TO 12 hrs.
Supervised independent study in any areas of cinema, video production, or electronic visualization. May be repeated to a maximum of 12 hours. Students may register for more than one four-hour section per term, or repeat the course in four-hour sections in subsequent terms. **Prerequisite(s):** 12 hours in any film, video, and/or electronic visualization courses and consent of the instructor.

**AD 482
Visual and Verbal
Literacy in
Art Education** 4 hrs.
Explores relevance of critical theory, text-based contemporary art, cultural studies, and aesthetics to the school art curriculum. Strategies for incorporating reading and writing into arts education. May be repeated once if grade is lower than B. Fieldwork required. **Prerequisite(s):** Grade of B or better in AD 281; and credit or concurrent registration in AD 382; and junior standing or above; and approval of the school.

**AD 484
Educational
Practice with
Seminar I** 6 hrs.
The first half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Field experience plus lecture, demonstration, and discussion. May be repeated once if grade lower than B. Graduate credit only with approval of the school. **Prerequisite(s):** Grade of B or better in AD 281 and grade of B or better in AD 382 and grade of B or better in AD 482; and credit or concurrent registration in AD 485; and senior standing or above and completion of 100 clock hours of pre-student-teaching field experiences; and approval of the school.

**AD 485
Educational
Practice with
Seminar II** 6 hrs.
The second half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Field experience, plus lecture, demonstration, and discussion. May be repeated once if grade is lower than B. Graduate credit only with approval of the school. **Prerequisite(s):** Grade of B or better in AD 281 and grade of B or better in AD 382 and grade of B or better in AD 482; and credit or concurrent registration in AD 484; and senior standing or above and good academic standing in a teacher education program and completion of 100 clock hours of pre-student-teaching field experience and approval of the school.

**AD 488
Computer
Graphics I** 0 TO 4 hrs.
Principles of interactive computer graphics. Raster and vector display, techniques, and hardware considerations. Introduction to two-dimensional and three-dimensional rendering. Laboratory. **Same as** CS 488. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Credit or concurrent registration in CS 340.

**AD 494
Special Topics
in Art Therapy** 1 TO 5 hrs.
Specializations, new developments in the field, in-depth study of theory, process, application, or independent study. 1 to 4 undergraduate hours. 2 to 5 graduate hours. May be repeated. Students may register in more than one section per term. A maximum of 8 hours of credit is allowed for undergraduates; 10 hours for graduate students. **Prerequisite(s):** Consent of the instructor.

**AD 499
Cooperative
Education** 0 TO 4 hrs.
Introduction to professional practice offering students the opportunity to couple academic learning with professional experience in an off-campus placement. Satisfactory/Unsatisfactory grading only. May be repeated. Only 8 hours of credit may be counted toward satisfying requirements for any art and design major. **Prerequisite(s):** Junior standing, a minimum cumulative grade point average of 3.00, and approval of the school.

**AD 500
Art and
Design Teaching
Internship** 0 TO 2 hrs.
Practical and theoretical aspects of teaching lecture/lab studio, and/or seminar courses in Art and Design. Satisfactory/Unsatisfactory grading only. May be repeated. No graduation credit. **Prerequisite(s):** Consent of the instructor and consent of director of graduate studies.

**AD 502
Seminar in
Contemporary
Theory** 4 hrs.
Developments and current issues in contemporary design, studio and media arts: major philosophies, debates, and social/environmental aspects (may include visiting lecturers, critics, and discussants). May be repeated. Must be repeated for a minimum of 16 hours of credit. **Prerequisite(s):** Consent of the school, graduate faculty committee, and the student's advisor.

AD 507
Special Projects in Art and Design 0 TO 16 hrs.
Student-initiated projects not covered in available curriculum. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the sponsoring instructor and the graduate faculty committee in the student's area of specialization.

AD 508
Advanced Electronic Visualization and Critique 4 hrs.
Individualized graduate study; creative projects and research in electronic visualization through a consultative agreement with graduate faculty committee. May be repeated. **Prerequisite(s):** Approval of the school graduate faculty committee.

AD 509
Advanced Electronic Visualization 5 hrs.
Individualized graduate study; creative projects and research in electronic visualization through a consultative agreement with graduate advisor. May be repeated. **Prerequisite(s):** Consent of the school graduate faculty committee and the student's advisor.

AD 510
Advanced Graphic Design and Critique 4 hrs.
Individualized graduate study; creative projects and research in graphic design by each student through consultative agreement with graduate faculty committee. May be repeated. **Prerequisite(s):** Approval of the school graduate faculty committee.

AD 511
Advanced Graphic Design 5 hrs.
Individualized graduate study; creative projects and research in graphic design by each student through consultative agreement with graduate advisor. May be repeated. **Prerequisite(s):** Consent of the school graduate faculty committee and the student's advisor.

AD 520
Advanced Industrial Design and Critique 4 hrs.
Individualized graduate study; creative projects and research in industrial design by each student through consultative agreement with graduate faculty committee. May be repeated. **Prerequisite(s):** Approval of the school graduate faculty committee.

AD 521
Advanced Industrial Design 5 hrs.
Individualized graduate study; creative projects and research in industrial design by each student through consultative agreement with graduate advisor. May be repeated. **Prerequisite(s):** Consent of the school graduate faculty committee and the student's advisor.

AD 530
Advanced Studio Arts and Critique 4 hrs.
Individualized graduate study; creative projects and research in studio arts by each student through consultative agreement with graduate faculty committee. May be repeated. **Prerequisite(s):** Approval of the school graduate faculty committee.

AD 531
Advanced Studio Arts 5 hrs.
Individualized graduate study; creative projects and research in studio arts by each student through consultative agreement with graduate advisor. May be repeated. **Prerequisite(s):** Consent of the school graduate faculty committee and the student's advisor.

AD 560
Advanced Photography and Critique 4 hrs.
A forum for presenting and discussing individual work with all photography graduates and faculty participating. May be repeated. **Prerequisite(s):** Approval of the school graduate faculty committee.

AD 561
Advanced Photography 5 hrs.
Individualized graduate study; creative projects and research in photography by each student through consultative agreement with graduate advisor. May be repeated. **Prerequisite(s):** Consent of the school graduate faculty committee and the student's advisor(s).

AD 570
Advanced Moving Image and Critique 4 hrs.
Individualized graduate study; projects for creative research in film, video, and animation by each student through conference and consultative agreement with graduate faculty committee. May involve supportive consultation in other areas. May be repeated. **Prerequisite(s):** Approval of the school graduate faculty committee.

AD 571
Advanced Moving Image 5 hrs.
Individualized graduate study; projects for creative research in film, video, and animation by each student through consultative agreement with graduate advisor. May involve supportive consultation in other areas. May be repeated. **Prerequisite(s):** Approval of the school graduate faculty committee and the student's advisor.

AD 588
Computer Graphics II 4 hrs.
State of the art in computer graphics and interactive techniques: three-dimensional surface and volumetric models. A laboratory is required. **Same as** CS 526. **Prerequisite(s):** CS 488.

AD 594
Special Topics in Art and Design 1 TO 4 hrs.
Specialized research topics in art and design directed and announced by the instructor. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor and the student's advisor.

AD 597
Master's Project 0 TO 16 hrs.
Independent research under faculty supervision in a specific area of interest. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 16 hours. **Prerequisite(s):** 20 hours of 500-level courses and consent of the instructor.

Art History

AH 404
Topics in Architecture, Art, and Design 3 OR 4 hrs.
Selected topics in the history of European and North American architecture, art, and design. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s) if topics vary. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of art history at the 200-level or consent of the instructor.

AH 420
History of Architecture I 4 hrs.
Introduction to architecture, urbanism, and architectural theory worldwide from antiquity to 1450. **Prerequisite(s):** Graduate standing.

AH 421
History of Architecture II 4 hrs.
Introduction to architecture, urbanism, and architectural theory worldwide from 1450 to the present. **Prerequisite(s):** Graduate standing and AH 420.

AH 422
Topics in the Literature of Architecture 3 OR 4 hrs.
Discussion of selected readings in the theory and criticism of architecture. 3 undergraduate hours. 4 graduate hours. May be repeated if topics vary. **Prerequisite(s):** 3 hours in the history of architecture or consent of the instructor.

AH 423
Topics in Modern and Contemporary Architecture 4 hrs.
Selected topics in modern and contemporary architecture. May be repeated if topics vary. **Prerequisite(s):** Graduate standing, and four hours in the history of architecture or consent of the instructor.

AH 424
Special Topics in Architecture and Urban Form in Chicago 2 TO 4 hrs.
Topics on the development of the built environment of the Chicago area, and the effect on its architecture of social, political, and economic forces.

AH 430
Contemporary Photography 3 OR 4 hrs.
Developments in the history of photography since 1950. 3 undergraduate hours. 4 graduate hours. May be repeated if topics vary. **Prerequisite(s):** 3 hours in the history of photography or consent of the instructor.

AH 432
Topics in Film and Video 3 OR 4 hrs.
Selected studies in genres, schools, individual artists, critics, and theorists of film and video. 3 undergraduate hours. 4 graduate hours. May be repeated if topics vary. **Prerequisite(s):** Graduate standing or 3 hours in the history of film or consent of the instructor.

AH 434
Women and Film 3 OR 4 hrs.
Roles and representations of women in classical Hollywood, European art, and independent feminist cinemas. **Same as** ENGL 472, and GWS 472. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ENGL 302 or ENGL 342 or ENGL 361 or ENGL 362 or ENGL 363; and senior standing or above; or consent of instructor.

AH 435
Topics in Modern and Contemporary Design 3 OR 4 hrs.
Topics in modern and contemporary design. 3 undergraduate hours. 4 graduate hours. May be repeated if topics vary. **Prerequisite(s):** 3 hours in the history of design or consent of the instructor.

AH 441
Topics in Medieval Art and Architecture 3 OR 4 hrs.
Selected topics in European art and architecture of the Middle Ages. 3 undergraduate hours. 4 graduate hours. May be repeated if topics vary. **Prerequisite(s):** 3 hours of medieval art and architecture or consent of the instructor.

AH 450
Topics in Renaissance Art 3 OR 4 hrs.
Selected topics in Early Renaissance, High Renaissance, or mannerist art and architecture. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** 3 hours in art history at the 200-level or above, or consent of the instructor.

AH 460
Topics in Modern and Contemporary Art 3 OR 4 hrs.
Selected topics in nineteenth- and twentieth-century modern and contemporary art. 3 undergraduate hours. 4 graduate hours. May be repeated if topics vary. **Prerequisite(s):** 3 hours of modern art and architecture or consent of the instructor.

AH 463
Topics in North American Art and Architecture 3 OR 4 hrs.
Selected topics in North American art and architecture from colonial times to 1945. 3 undergraduate hours. 4 graduate hours. May be repeated if topics vary. **Prerequisite(s):** 3 hours of North American art and architecture or consent of the instructor.

AH 464
Topics on Art in Chicago 2 TO 4 hrs.
Topics on the survey of art in Chicago, from the nineteenth century to the present, with an emphasis on contemporary Chicago art expressions.

AH 465
Arts of the Black Atlantic 3 OR 4 hrs.
Interdisciplinary and discursive explorations of the visual and artistic expressions of artists of African descent in the New World. 3 undergraduate hours. 4 graduate hours.

AH 470
Topics in Non-Western Art and Architecture 3 OR 4 hrs.
Selected topics in the art and architecture of Africa, Asia, Oceania, and the indigenous peoples of the Americas. 3 undergraduate hours. 4 graduate hours. May be repeated if topics vary.

AH 471
Topics in Asian Art and Architecture 3 OR 4 hrs.
Selected topics in the art and architecture of Asia. **Same as ASST 471.** 3 undergraduate hours. 4 graduate hours. May be repeated if topics vary. **Prerequisite(s):** 3 hours of Asian art and/or architecture or consent of the instructor.

AH 480
History of Collecting and Museology 3 OR 4 hrs.
The history of collecting and patronage: public and private collections, museums, and commercial art galleries, government funding and the arts. Exhibition planning, research, selection, and catalog preparation. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** AH 110 and AH 111 or consent of the instructor.

AH 481
Museum Practices 3 OR 4 hrs.
Administration of visual arts organizations, their budgets, staffing, structures, accreditation, and long-range planning. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** AH 480 or consent of the instructor.

AH 482
Museology Internship 6 OR 8 hrs.
Practical supervised experience in institutions serving the visual arts. Placements in museums, community art centers, college, commercial, or nontraditional galleries, and public agencies. **Prerequisite(s):** AH 481 or consent of the instructor.

AH 485
Introduction to Historic Preservation 3 OR 4 hrs.
Preservation planning, historic building restoration, and the political and economic factors affecting the conservation of historic resources. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of art history at the 200- level or consent of the instructor.

AH 490
Honors Thesis 3 hrs.
Individual study on a project selected with the approval of the advisor. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Open only to seniors.

AH 491
Study Abroad in Art History 0 TO 12 hrs.
Study abroad within an approved foreign exchange program or department-sponsored program. May be repeated with approval by the department. **Prerequisite(s):** Approval of the department.

AH 492
Readings in Art and Architecture History 3 OR 4 hrs.
Individually planned readings on selected topics under the supervision of a faculty member. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). Students may register in more than one section per term. **Prerequisite(s):** Junior standing and 3 hours of art history above the 100-level and consent of the instructor. Enrollment priority will be given to majors and graduate students in Art History.

AH 510
Historiography of the Visual Arts, 1750 to 1960 4 hrs.
Examines some of the intellectual underpinnings of art history, theory, and criticism, and explores ways of doing research and making arguments in art history. **Prerequisite(s):** Graduate standing in Art History or consent of the instructor.

AH 511
Toward New Histories of the Visual Arts, 1960 to the Present 4 hrs.
Examines the transformation of art history, theory, and criticism since 1960 with regard to issues of gender, class, ethnicity, popular culture, postcolonialism, and contemporary aesthetics. **Prerequisite(s):** Graduate standing in Art History or consent of the instructor.

AH 512
Art History Teaching Seminar 0 hrs.
Theoretical and practical aspects of teaching in undergraduate courses in the history of the visual arts. Satisfactory/Unsatisfactory grading only. May be repeated up to 1 time(s). **Prerequisite(s):** Graduate standing in the Art History program and appointment as a teaching assistant in the department.

AH 513
PhD Proseminar 4 hrs.
Historical, theoretical, and critical issues in art history. May be repeated for credit.

AH 522
Issues in Architecture, Design, and Urbanism 4 hrs.
Theories and contemporary critical issues relating to the history of the environment created and modified by people. Readings and presentations on historic and regional variations.

AH 530
Seminar in The History of Photography 4 hrs.
Selected topics in the history of photography with emphasis on primary source materials for research purposes. May be repeated if topics vary.

AH 540
Topics in Medieval, Byzantine, and Islamic Art and Architecture 4 hrs.
Selected topics in the art, architecture, and archaeology of the medieval West, Byzantium, and Islam. May be repeated if topics vary. **Prerequisite(s):** Consent of the instructor.

AH 550
Seminar in Renaissance and Baroque Art and Architecture 4 hrs.
European art and architecture of the Renaissance. May be repeated if topics vary.

AH 560
Seminar in Modern Architecture, Art, and Design 4 hrs.
North American and European art, architecture, and design between 1780 and 1945. May be repeated if topics vary. Students may register in more than one section per term.

AH 561
Seminar in Contemporary Architecture and Art 4 hrs.
Selected topics in recent North American or European art, architecture, and design. **Prerequisite(s):** Consent of the instructor.

AH 562
Issues in the Art of the Americas 4 hrs.
Historical, theoretical, and critical issues in the art of the Americas and the Caribbean; indigenous, imported, and diasporan cultures and the interaction between them.

AH 563
Seminar in North American Architecture and Art 4 hrs.
North American art and architecture from the colonial period to 1945. May be repeated if topics vary. **Prerequisite(s):** Consent of the instructor.

AH 570
Seminar in Non-Western Art and Architecture 4 hrs.
Selected topics in pre-Columbian, North American Indian, African, and Oceanic art.

AH 590
MA Paper Research 0 hrs.
Student will work with advisors on two qualifying papers. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

AH 592
Preliminary Examination Research 0 TO 16 hrs.
Supervised research and reading in preparation for the preliminary examinations. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 12 hours. **Prerequisite(s):** Open only to PhD degree students. Only by consent of the director of graduate studies and after all other course work has been completed.

AH 596
Readings in Art and Architecture 1 TO 4 hrs.
Individually planned readings on selected topics under the supervision of a faculty member. **Prerequisite(s):** Consent of the instructor.

AH 598
Master's Thesis Research 0 TO 8 hrs.
Individual research under faculty direction. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 8 hours. **Prerequisite(s):** Consent of the instructor.

AH 599
PhD Dissertation Research 0 TO 16 hrs.
Supervised research on the part of the student. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 24 hours. **Prerequisite(s):** Consent of the instructor and satisfactory completion of the preliminary examination.

Asian American Studies

ASAM 428

Asian/Asian American Women in the Global Economy

3 OR 4 hrs.

Examines the racialization and feminization of a global division of labor. Focuses primarily on Asian and Asian American women's participation and incorporation as workers and key actors in the development of the global economy. **Same as** GWS 428 and SOC 428. 3 undergraduate hours; 4 graduate hours. **Prerequisite(s):** ASAM 125 or ENGL 125 or SOC 125 or AAST 225 or LALS 225 or SOC 225 or ASAM 228 or ASST 228 or SOC 228 or ASAM 290 or two 200-level courses in either SOC, GWS, or ASAM, or a combination of these.

ASAM 441

Topics in Asian American Literature and Culture

3 OR 4 hrs.

An advanced seminar that examines various forms of cultural production by Asian American artists of diverse ethnic backgrounds. Topics vary. **Same as** ENGL 441. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 327 or ENGL 328 or ENGL 359; and senior standing or above; or consent of the instructor.

ASAM 490

Advanced Topics in Asian American Studies

3 OR 4 hrs.

Study of a specific advanced topic within Asian American studies. May be repeated if content does not duplicate previous course work. May be repeated to a maximum of 12 hours.

Asian Studies

ASST 471

Topics in Asian Art and Architecture

3 OR 4 hrs.

Selected topics in the art and architecture of Asia. **Same as** AH 471. 3 undergraduate hours. 4 graduate hours. May be repeated if topics vary. **Prerequisite(s):** 3 hours of Asian art and/or architecture or consent of the instructor.

ASST 472

Issues and Events in Twentieth-Century China

3 OR 4 hrs.

Covers the events, places, people, political movements, ideologies, and issues that shaped twentieth-century China, and considers different approaches to the writing of that history. **Same as** HIST 472. 3 undergraduate hours. 4 graduate hours. Recommended background: Previous course work in Chinese history at the 100- or 200-level.

ASST 473

Topics in East Asian History

3 OR 4 hrs.

Specific topics are announced each term. **Same as** HIST 473. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of East Asian history or consent of the instructor.

ASST 478

Women in Chinese History

3 OR 4 hrs.

Focuses on scholarship on women in Chinese society throughout history, dealing with topics such as marriage and family, literacy, career options, women in revolution, and the historiography of the field. **Same as** GWS 478, and HIST 478. 3 undergraduate hours. 4 graduate hours. Recommended background: Previous course work in Chinese history or women's studies.

ASST 479

Culture and Colonialism in South Asia

3 OR 4 hrs.

Examines the emergence of colonial cultures of domination and resistance on the Indian subcontinent from the 18th century to 1947. **Same as** ANTH 479 and HIST 479. 3 undergraduate hours. 4 graduate hours.

Associated Health Sciences

AHS 495

Urban Health Multicultural Seminar

1 hour.

Students attend multicultural and urban health-related seminars, and participate in faculty-student discussion, academic presentations, and directed reading groups to integrate issues of cultural difference into students' professional development. Satisfactory/Unsatisfactory grading only. May be repeated. All academy seminars are pre-approved; other approved events will be announced to students. Any off-campus events must have prior approval. One academic year is allotted for completion of seminar. Students should register the semester they begin attending lectures; grades will be deferred until course is completed. **Prerequisite(s):** Sophomore standing or above.

AHS 510

Research Methods in Allied Health

3 hrs.

Application of basic concepts of research methodology to allied health, including problem formulation, research design, sampling, measurement, and data analysis. Emphasis on critique of research studies and preliminary proposal writing. **Prerequisite(s):** Consent of the instructor.

AHS 594

Special Topics in Associated Health Sciences

1 TO 4 hrs.

Selected topics of interest within disciplinary specialty areas of the allied health professions. Particular attention is given to topics of cross-cutting importance to these professions.

AHS 595

Seminar in Associated Health Sciences

1 hour.

Topics of current interest in a discipline of associated health sciences. Includes discussions of current journal articles and important new developments in the specific disciplines. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

AHS 596

Independent Study

1 TO 4 hrs.

For graduate students who wish to pursue independent study not related to their project/thesis research. May be repeated. Students may register in more than one section per term.

AHS 597

Project Research in Associated Health Sciences

1 TO 4 hrs.

Independent investigation of a topic to contribute to the associated health professions. Students investigate a topic/problem in this area, write an article/report, and/or make an oral presentation. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

Biochemistry and Molecular Genetics

BCMG 411

Introduction to Biological Chemistry

4 hrs.

Includes chemistry of cellular constituents; enzymology; metabolism of sugars, proteins, lipids, and nucleic acids; and regulation of metabolism. **Prerequisite(s):** Organic chemistry. Lecture course designed primarily for students in the College of Dentistry.

BCMG 501

Faculty Research Seminars

1 hour.

Faculty presentation of research areas within molecular genetics. Satisfactory/Unsatisfactory grading only. Should be taken in the first year in the PhD in Biochemistry and Molecular Genetics program. **Prerequisite(s):** Graduate standing in the PhD in Biochemistry and Molecular Genetics program or consent of the instructor.

BCMG 502

Somatic Cell and Human Genetics

4 hrs.

The genetics of somatic cells and advanced human genetics. Gene transfer, mutagenesis, drosophila genetics, genetic linkage and human disease, cancer genetics, and gene therapy. **Prerequisite(s):** GCLS 501 or consent of the instructor.

BCMG 503

Research Methods in Biochemistry and Molecular Genetics

5 hrs.

Laboratory course in experimental methods in biochemistry and molecular genetics. May be repeated to a maximum of 10 hours. **Prerequisite(s):** Consent of the instructor. Open only to students entering as PhD students in Biochemistry and Molecular Genetics.

BCMG 512

Experimental Design and Analysis in Molecular Genetics

4 hrs.

Methods and logic in the analysis of gene function, gene cloning, analysis of genetic changes, studies of gene expression, and design of experimental controls. **Prerequisite(s):** GCLS 501 or consent of the instructor.

BCMG 513
Structure of Biopolymers 3 hrs.
Explores the relationship between structural stability, kinetic properties, and function of biopolymers, with particular emphasis on proteins and nucleic acids. **Same as** MIM 513, and PMPG 513. **Prerequisite(s):** GCLS 501 and one year of physical chemistry, or consent of the instructor.

BCMG 514
Structure and Function of Nucleic Acids 4 hrs.
Describes the structure and function of nucleic acids. Unravels the basic molecular mechanisms underlying heredity, including replication, transcription, and recombination. **Prerequisite(s):** GCLS 501 or consent of the instructor.

BCMG 515
Journal Club 1 hour.
Student presentation and critical analysis of recent journal articles and current topics in biochemistry and molecular genetics. May be repeated. **Prerequisite(s):** Consent of the instructor.

BCMG 522
Strategies for Effective Scientific Communication 1 hour.
Development of critical skills for evaluation, development, and execution of forms of scientific communication, including research and grant proposals, manuscripts describing original research, and review summaries. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

BCMG 526
Molecular and Genetic Analysis of Development 3 hrs.
Examines developmental mechanisms used in animal model systems. **Same as** BIOS 526. **Prerequisite(s):** Graduate standing or consent of the instructor.

BCMG 531
Medical Biochemistry I 3 hrs.
Chemistry of biopolymers; enzymology; metabolism of carbohydrates, lipids, amino acids, and proteins; molecular biology. **Prerequisite(s):** Membership in the medical school class or consent of the instructor. Intended primarily for first-year medical students.

BCMG 532
Introduction to Molecular Medicine and Genetics 3 hrs.
Introduction to the principles of molecular medicine and genetics, including molecular biology, hemostasis, gene therapy, mechanisms of mutation, pharmacogenomics, cancer genetics, and immunogenetics. Intended primarily for medical students. **Prerequisite(s):** BCMG 531 and membership in the medical school and consent of the course coordinator.

BCMG 533
Nutrition for Medical Students 2 hrs.
Biochemical and nutritional basis of disease including heart disease, hypertension, obesity, malnutrition, and cancer. **Prerequisite(s):** BCMG 531 and BCMG 532 and membership in the medical school or consent of the instructor. Intended primarily for medical students.

BCMG 561
Biochemistry of Cellular Regulation 3 hrs.
Membrane structure and function, transport, receptor and signal transduction mechanisms, and growth factors. Cytoskeleton and motility, cell-cell communication, enzyme cascades, and cellular control mechanisms.

BCMG 563
Principles of Molecular Medicine 3 hrs.
A lecture/discussion/writing course that integrates biochemical and molecular biological concepts into a clinical context. Diseases will be described in terms of molecular mechanisms. **Prerequisite(s):** Consent of the instructor.

BCMG 575
Topics in Biochemistry and Molecular Genetics 3 hrs.
Students will be exposed to, present, and discuss recent scientific literature in biochemistry and molecular genetics. **Prerequisite(s):** Completion of the first year of the program and consent of the instructor.

BCMG 594
Special Topics in Biochemistry and Molecular Genetics 1 TO 3 hrs.
Topics of current interest in the field of biochemistry and molecular genetics, protein structure, membrane proteins and trafficking, development and gene regulation, signal transduction, and cancer biology. May be repeated to a maximum of 6 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

BCMG 595
Student Research Seminars 1 hour.
Research presentations by graduate students in the biochemistry and molecular genetics program. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

BCMG 598
Masters Thesis Research 0 TO 16 hrs.
Investigation carried out by MS candidate under the direction of a faculty member leading to the MS in Biochemistry and Molecular Genetics. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

BCMG 599
PhD Thesis Research 0 TO 16 hrs.
Independent dissertation research by the student, under the guidance of the advisor. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Advanced standing in the PhD in Biochemistry and Molecular Genetics program.

Bioengineering

BIOE 402
Medical Technology Assessment 2 OR 3 hrs.
Bioentrepreneur course. Assessment of medical technology in the context of commercialization. Objectives, competition, market share, funding, pricing, manufacturing, growth, and intellectual property; many issues unique to biomedical products. 2 undergraduate hours. 3 graduate hours. **Prerequisite(s):** Junior standing or above and consent of the instructor.

BIOE 405
Atomic and Molecular Nanotechnology 3 OR 4 hrs.
Nanoscale structures and phenomena. Simulation methods for nanosystems, and molecular assemblies. Molecular building blocks, scanning probe and atomic force microscopy, and quantum mechanical phenomena. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Senior standing or above. Recommended background: Engineering or Physical Science major.

BIOE 406
Regulation and Manufacturing Practices in Medical Technology 2 OR 3 hrs.
Bioentrepreneur course. Product requirement definition, FDA, quality system regulation, community Europe, medical device directive, role of management, United States pharmacopoeia, toxicity testing, hazard analysis, risk assessment, and import/export. 2 undergraduate hours. 3 graduate hours. **Prerequisite(s):** Junior standing or above and consent of the instructor.

BIOE 407
Pattern Recognition I 3 OR 4 hrs.
The design of automated systems for detection, recognition, classification, and diagnosis. Parametric and nonparametric decision-making techniques. Applications in computerized medical and industrial image and waveform analysis. **Same as** ECE 407. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** MATH 220.

BIOE 408
Medical Product Development 2 OR 3 hrs.
Bioentrepreneur course. Major stages of medical product development (investigative, feasibility, development, commercialization, maturation, and growth), regulatory issues, product performance, failure mode and effect analysis, and hazard analysis. 2 undergraduate hours. 3 graduate hours. **Prerequisite(s):** Junior standing or above and consent of the instructor.

BIOE 415
Biomechanics 3 OR 4 hrs.
Use of rigid and deformable body statics and rigid body dynamics to analyze various aspects of the human musculoskeletal system. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 204 and ME 210; and either BIOS 442 or BIOS 443.

BIOE 420
Introduction to Field and Waves in Biological Tissues 3 OR 4 hrs.
Principles of electromagnetic and ultrasonic interaction with biological systems; characterization of biological materials; diagnostic and therapeutic uses; and techniques of dosimetry and measurement. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ECE 310.

BIOE 421
Biomedical Imaging 3 OR 4 hrs.
Introduction to engineering and scientific principles associated with X-ray, magnetic resonance, ultrasound, computed tomographic, and nuclear imaging. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** MATH 210 and PHYS 142.

BIOE 430
Bioinstrumentation and Measurements I 3 OR 4 hrs.
Theory and application of instrumentation used for physiological and medical measurements. Characteristics of physiological variables, signal conditioning devices and transducers. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ECE 210; and BIOS 100 or higher.

BIOE 431
Bioinstrumentation and Measurement Laboratory 2 hrs.
Practical experience in the use of biomedical instrumentation for physiological measurements. **Prerequisite(s):** Credit or concurrent registration in BIOE 430.

BIOE 432
Bioinstrumentation and Measurements II 3 OR 4 hrs.
Principles of bioinstrumentation for the assessment of physiological function and therapeutic intervention. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** BIOE 430.

BIOE 433
Bioinstrumentation and Measurements II Laboratory 1 hour.
Laboratory experiments using instruments to assess physiological function. **Prerequisite(s):** Credit or concurrent registration in BIOE 432.

BIOE 439
Biostatistics II 4 hrs.
Statistical treatment of data, model estimation, and inference are treated in a framework of biological experiments and attributes of data generated from such experiments. Credit is not given for BIOE 439 if the student has credit for BSTT 400. Extensive computer use required. **Prerequisite(s):** MATH 210 and CS 108; and consent of the instructor. Recommended background: Knowledge of MATLAB.

BIOE 440
Biological Signal Analysis 3 OR 4 hrs.
Analysis of signals of biological origin, including transient signals, stability analysis, control, probabilities, stochastic processes, and medical applications. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** MATH 210 and senior or graduate standing.

BIOE 450
Molecular Biophysics of the Cell 4 hrs.
Introduction to molecular length, time, force, energy scales; statistical thermodynamics of solutions; DNA, RNA, and protein structure and function; and experimental methods. **Same as** PHYS 450. **Prerequisite(s):** PHYS 245 or the equivalent.

BIOE 452
Biocontrol 3 OR 4 hrs.
Considers the unique characteristics of physiological systems using the framework of linear systems and control theory. Static and dynamic operating characteristics, stability, and the relationship of pathology to control function. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ECE 310; and either BIOS 442 or BIOS 443.

BIOE 455
Introduction to Cell and Tissue Engineering 3 OR 4 hrs.
Foundation of cell and tissue engineering covering cell technology, construct technology, and cell-substrate interactions. Emphasis in emerging trends and technologies in tissue engineering. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** BIOS 100 and CME 260 or the equivalent.

BIOE 456
Cell and Tissue Engineering Laboratory 2 hrs.
Includes polymer scaffold fabrication, microstamping biomolecules, cellular adhesion and proliferation assays, and immo/ fluorescent tagging. **Prerequisite(s):** BIOE 455 or consent of the instructor.

BIOE 460
Materials in Bioengineering 3 OR 4 hrs.
Analysis and design considerations of problems associated with prostheses and other implanted biomedical devices. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 260 and either BIOS 442 or BIOS 443.

BIOE 465
Metabolic Engineering 3 OR 4 hrs.
Quantitative descriptions of biochemical networks; modeling, control, and design of metabolic pathways to achieve industrial and medical goals. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** BIOE 310 or ECE 310 or ME 312; or consent of the instructor.

BIOE 470
Bio-Optics 3 OR 4 hrs.
Physical principles and instrumentation relevant to the use of light in biomedical research. Several current and developing clinical applications are explored. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** PHYS 142.

BIOE 472
Models of the Nervous System 3 OR 4 hrs.
Mathematical models of neural excitation and nerve conduction, stochastic models and simulation of neuronal activity, and models of neuron pools and information processing, and models of specific neural networks. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ECE 310; and either BIOS 442 or BIOS 443.

BIOE 475
Neural Engineering I: Introduction to Hybrid Neural Systems 3 OR 4 hrs.
Modeling, design, and analysis of hybrid systems comprised of living neurons and artificial components; examples drawn from neural and neuromuscular prostheses, biosensors, and biopotential control of robotics. **Same as** BIOS 475. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** BIOS 442 and credit or concurrent registration in BIOE 472.

BIOE 476
Neural Engineering I Laboratory 2 hrs.
Hands-on experience with computational and experimental models of engineered neural systems, with emphasis on neuroprostheses and biosensors. Animals used in instruction. **Prerequisite(s):** Credit or concurrent registration in BIOE 475.

BIOE 480
Introduction to Bioinformatics 3 OR 4 hrs.
Computational analysis of genomic sequences and other high throughput data. Sequence alignment, dynamic programming, database search, protein motifs, cDNA expression array, and structural bioinformatics. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** BIOS 100 and CS 201; or consent of the instructor.

BIOE 481
Bioinformatics Laboratory 2 hrs.
How to use bioinformatics tools, including sequence alignment methods such as Blast, FASTA, and Pfam, as well as structural bioinformatics tools, such as Rasmol and CastP. Extensive computer use required. **Prerequisite(s):** Credit or concurrent registration in BIOE 480; and senior standing or above; and consent of the instructor.

BIOE 482
Introduction to Optimization Methods in Bioinformatics 3 OR 4 hrs.
The objectives are to provide the students with a basis for understanding principles of the optimization methods and an insight on how these methods are used in bioinformatics. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** BIOS 100 and CS 201.

BIOE 483
Molecular Modeling in Bioinformatics 3 OR 4 hrs.
Basic structural and dynamics tools in protein structure prediction, structure comparison, function prediction, Monte Carlo, and molecular dynamics simulations. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of B or better in BIOE 480.

BIOE 494
Special Topics in Bioengineering 1 TO 4 hrs.
Special topics to be arranged. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

BIOE 500
Interfacial Biosystems Engineering 4 hrs.
Advanced and detailed exposition of the fundamentals of biological systems using quantitative approaches. Areas of concentration include bioinformatics, cell and tissue engineering, and neuroengineering. **Prerequisite(s):** BIOS 442.

BIOE 504
Emerging Medical Technologies 2 hrs.
Investigates new and emerging medical technologies following the technical due diligence process, a methodical evaluation of strengths, weaknesses, opportunities, and threats of the identified technology. **Prerequisite(s):** BIOE 401 or BIOE 402 or BIOE 403 or the equivalent.

BIOE 505
Nanobiotechnology 4 hrs.
Nanotechnology theory and applications in biology and medicine. Molecular simulations, combinatorial chemistry. Nanoscale structures, molecular building blocks, integrated nano-bio complexes. Positional and self-assembly, self-replication. Recommended background: Engineering or physical sciences.

BIOE 514
Biotransport 4 hrs.
Diffusion and flow in living systems. Blood rheology and flow. Microcirculation, oxygen transport, and diffusive transport across membranes. Membrane structure; water and ion flows, active transport. **Same as** CHE 514. **Prerequisite(s):** CHE 410 or consent of the instructor.

BIOE 515
Mechanics of the Human Spine 4 hrs.
Biomechanics as applied to the human spine. Spinal loading. Experimentation methods and modeling of intact ligamentous spine. Nature and treatment of adolescent idiopathic scoliosis. Thoracolumbar injuries. **Prerequisite(s):** BIOE 415 or the equivalent.

BIOE 518
Controlled Drug Delivery 3 hrs.
Controlled drug delivery systems utilizing polymers, synthesis of different types of devices, and the delivery expected from these devices, and mathematical modeling of delivery systems. **Same as** BPS 518. **Prerequisite(s):** MATH 220 or approval of the department.

BIOE 521
Imaging Systems for Biological Tissues 4 hrs.
Examination of major imaging systems using ionizing and nonionizing energy for characterization of biological tissues and physiological lesions. **Prerequisite(s):** BIOE 420.

BIOE 522
Principles of Polymeric Science and Engineering 3 hrs.
Intermediate polymer science, thermodynamics of polymer solutions, phase separations, MW determination, crystallization, elasticity, kinetics, and processing. **Same as BPS 522. Prerequisite(s):** MATH 220 or consent of the instructor.

BIOE 525
Physiological and Cellular Effects of Biomechanical Forces 4 hrs.
Discusses how biomechanical forces are generated, the impact the forces have on cells and tissues, plus methods for studying them. Mechanisms by which cells may sense forces and transduce this information to the nucleus are also covered. **Prerequisite(s):** Consent of the instructor.

BIOE 548
Micro and Nanotechnology for Biomedical Applications 4 hrs.
This course covers selected topics in micro- and nano-technology underlying biomedical applications. Topics include: microfabrication and nanofabrication; microfluidic processes; neuroMEMS and nanoscale structures as functional bio-interfaces. **Prerequisite(s):** PHYS 244.

BIOE 550
Principles of Cell and Tissue Engineering 4 hrs.
Introduction to tissue engineering. Presents principles of biomedical, biochemical, and biomaterials science applied to tissue-engineered organ replacements, implantable medical devices, and drug delivery systems. **Prerequisite(s):** BIOS 442 or BIOS 443; and CEMM 260. Recommended background: A course in cell biology.

BIOE 552
Advanced Biocontrol 4 hrs.
Modeling and analysis of physiological systems including such topics as adaptive control, statistical analysis, error signal analysis, and the characterization of individual neural control elements. **Prerequisite(s):** BIOE 452.

BIOE 560
Processing and Properties of Structural Biomaterials 4 hrs.
Considers the interrelationships between atomic bonding, atomic/molecular structure, and material processing to provide a fundamental understanding of the properties and performance of advanced biomaterials. **Prerequisite(s):** CME 260. Recommended background: Credit in BIOE 460.

BIOE 575
Neural Engineering II —Neural Coding 4 hrs.
Analytical techniques and models used to assess and predict neural activity. Emphasis on information coding in sensory systems. **Prerequisite(s):** Consent of the instructor. Recommended background: Working knowledge of MATLAB.

BIOE 576
Sensory Prostheses Engineering 4 hrs.
Critical review of existing and emerging prosthetic devices for sensory systems damaged by trauma or disease. Technology and information flow in hybrid systems are emphasized. **Prerequisite(s):** BIOE 475 and BIOS 442; or consent of the instructor.

BIOE 579
Neural and Neuromuscular Prostheses 4 hrs.
Neuromuscular electrical stimulation for ambulation by paraplegics, of upper limb in tetraplegics, of vocal cord and breathing functions, and stimulation of bladder, cochlea, retina, and visual cortex. **Prerequisite(s):** Consent of the instructor.

BIOE 580
Principles of Bioinformatics 4 hrs.
Bioinformatics analysis of sequence, phylogeny, and molecular structure. Focus on probabilistic models and algorithms, as well as structural analysis. Extensive computer use required. **Prerequisite(s):** BIOE 480; and graduate or professional standing; or consent of the instructor. Recommended background: Exposure to biochemistry, molecular biology, or evolution.

BIOE 582
Computational Functional Genomics 4 hrs.
Modern statistical and computational methods relevant to functional genomics. Cell function, gene regulation and protein expression. Microarray technology and use; cluster analysis; and prediction of protein function. **Prerequisite(s):** BIOE 480. Recommended background: Basic knowledge of probability, statistics, vector algebra, calculus, and cell biology.

BIOE 590
Internship in Bioengineering 1 TO 4 hrs.
Current clinical practice experience in a healthcare setting culminating in a written and oral report. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** BIOE 430 and BIOE 431 and BIOE 479.

BIOE 594
Advanced Special Topics in Bioengineering 1 TO 4 hrs.
Systematic review of selected topics in bioengineering theory and practice. Subjects vary from year to year. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

BIOE 595
Seminar on Bioengineering 0 TO 1 hrs.
Recent innovations in bioengineering theory and practice presented by invited speakers, faculty, and graduate students. Satisfactory/Unsatisfactory grading only. May be repeated. Students who are presenting seminars should register for 1 hour, others for 0 hour.

BIOE 596
Independent Study 1 TO 5 hrs.
Research on special problems not included in thesis research. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

BIOE 598
Masters Thesis Research 0 TO 16 hrs.
Research in MS thesis project. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term.

BIOE 599
PhD Thesis Research 0 TO 16 hrs.
Research in PhD thesis project. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term.

Biological Sciences

BIOS 402
Educational Practice with Seminar I 6 hrs.
The first half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, and approval of the department.

BIOS 403
Educational Practice with Seminar II 6 hrs.
The second half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, credit or concurrent registration in BIOS 402, and approval of the department.

BIOS 416
Natural Products 3 OR 4 hrs.
Biogenetic approach to secondary metabolites. General principles and selected studies of phenolic compounds, terpenes, alkaloids, and other interesting natural products. **Same as** CHEM 456. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** One year of organic chemistry.

BIOS 424
Mammalian Histology 4 hrs.
The microscopic anatomy of tissues and organs in relation to their function. **Prerequisite(s):** BIOS 272 or BIOS 325.

BIOS 429
Laboratory in Electron Microscopy 3 hrs.
Laboratory instruction in cell preparation and instrument operation in transmission and scanning electron microscopy. Satisfactory/Unsatisfactory grading only. Animals used in instruction. **Prerequisite(s):** Consent of the instructor.

BIOS 430
Evolution 4 hrs.
Mechanisms of genetic and phenotypic stability and change in populations and species; modes of speciation and macroevolution; and trends in evolution. Lecture and discussion. **Prerequisite(s):** BIOS 220.

BIOS 431
Plant and Animal Interactions 3 hrs.
Ecology of nonsymbiotic relationships of plants and animals, including protection mutualisms, pollination, seed dispersal, animal herbivory, and plant defense. **Prerequisite(s):** BIOS 100 and BIOS 101 and any 200- or 300-level course in Biological Sciences.

BIOS 432
Restoration Ecology 3 hrs.
Philosophical, historical, and ecological basis for ecological restoration, with emphasis on readings in the primary literature and writing. **Prerequisite(s):** BIOS 230 or the equivalent.

**BIOS 433
Plant Diversity and
Conservation 4 hrs.**

Focus on seed-plant diversity; morphological features and family identification; major evolutionary process; evolutionary relationships among plant groups; and goals, problems, and progress in the conservation of plant diversity. **Prerequisite(s):** BIOS 230.

**BIOS 443
Animal Physiological
Systems 4 hrs.**

Basic function of renal, respiratory, and digestive systems. Integrative role of endocrine systems. Animals used in instruction. **Prerequisite(s):** Four courses in the Biological Sciences.

**BIOS 450
Advanced
Microbiology 3 hrs.**

Comprehensive analysis of metabolic, ecological, phylogenetic, and cytological diversity among the major groups of eubacteria and archaeobacteria. **Prerequisite(s):** BIOS 350.

**BIOS 452
Biochemistry I 4 hrs.**

Chemistry of proteins, nucleic acids, carbohydrates, and lipids. **Same as** CHEM 452. **Prerequisite(s):** Credit or concurrent registration in CHEM 234.

**BIOS 454
Biochemistry II 4 hrs.**

Continues BIOS 452. Carbohydrate and lipid metabolism, electron transport; metabolism of amino acids, nucleic acids, and proteins; and biosynthesis of macromolecules and regulation of macromolecular synthesis. **Same as** CHEM 454. **Prerequisite(s):** BIOS 452 or CHEM 452.

**BIOS 457
General Virology 4 hrs.**

Nature of viruses, their morphology, chemical composition, assay, host-parasite interactions, and life cycles. **Prerequisite(s):** BIOS 220; and either BIOS 222 or BIOS 350.

**BIOS 466
Principles of
Paleontology 4 hrs.**

Theory and methods of evolutionary paleobiology; includes paleoecology, functional morphology, and major features of organic evolution. **Same as** EAES 466. **Prerequisite(s):** EAES 360 or BIOS 360 or consent of the instructor.

**BIOS 475
Neural Engineering I:
Introduction to
Hybrid Neural
Systems 3 OR 4 hrs.**

Modeling, design, and analysis of hybrid systems comprised of living neurons and artificial components; examples drawn from neural and neuromuscular prostheses, biosensors, and biopotential control of robotics. **Same as** BIOE 475. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** BIOS 442 and credit or concurrent registration in BIOE 472.

**BIOS 483
Neuroanatomy 4 hrs.**

Organization of the nervous system, with an emphasis on mammals. **Same as** PSCH 483 and NEUS 483. Animals used in instruction. **Prerequisite(s):** BIOS 272 or BIOS 286 or BIOS 325 or PSCH 262; or consent of the instructor.

**BIOS 484
Neuroscience I 3 hrs.**

Neuroscience as an integrative discipline. Neuroanatomy of vertebrates, neural development, cellular neurobiology, action potential mechanisms, synaptic transmission, and neuropharmacology. **Same as** PHIL 484 and PSCH 484. **Prerequisite(s):** BIOS 286 or PSCH 262.

**BIOS 485
Neuroscience II 3 hrs.**

Intergrative neuroscience, continuation of BIOS/PSCH/PHIL 484. Sensory and motor systems; learning, memory, and language. Pathology of nervous systems. Philosophical perspectives, and modeling. **Same as** PHIL 485 and PSCH 485. **Prerequisite(s):** BIOS 484.

**BIOS 486
Animal Behavior and
Neuroethology 4 hrs.**

Neural and behavioral mechanisms of environmental information processing and interaction throughout the animal kingdom; emphasis on invertebrate and lower vertebrates. Laboratory emphasizing individual research projects with a final report, and occasional field trips required. Animals used in instruction. **Prerequisite(s):** One advanced course in zoology and animal physiology.

**BIOS 488
Developmental
Neurogenetics 3 hrs.**

Classical and molecular genetic approaches to the study of the development of the nervous system, concentrating on studies in fruit flies, nematodes, and vertebrates. **Prerequisite(s):** BIOS 220 and either BIOS 225 or BIOS 420.

**BIOS 489
Cellular
Neurobiology
Laboratory 3 hrs.**

Recording from and analyzing the activity of nerve cells, neuronal networks, and other electrically excitable tissues. **Prerequisite(s):** BIOS 286 or the equivalent.

**BIOS 490
Topics in Ecology
and Evolution 3 TO 4 hrs.**

In-depth analysis of advanced topics in ecology and evolution, involving reading primary literature, term paper, student presentations, and critical discussion. Credit varies according to topic offered. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Graduate standing or consent of the instructor.

**BIOS 520
Topics in Genetics 2 hrs.**

Discussion of selected topics of current interest in genetics. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** BIOS 220 and BIOS 221 and consent of the instructor.

**BIOS 524
Molecular Biology I 5 hrs.**

Structural properties and analysis of DNA, RNA, and proteins; principles of cloning and recombinant DNA technologies; and DNA replication, repair, recombination, and transposition. **Prerequisite(s):** Consent of instructor.

**BIOS 525
Molecular Biology II 5 hrs.**

Gene organization and function in lambda, prokaryotes, and eukaryotes; promoters, enhancers, RNA splicing, developmental regulation; and protein secretion and targeting. **Prerequisite(s):** BIOS 524 or consent of the instructor.

**BIOS 526
Molecular and
Genetic Analysis of
Development 3 hrs.**

Examines developmental mechanisms used in animal model systems. **Same as** BCMG 526. **Prerequisite(s):** Graduate standing or consent of the instructor.

**BIOS 527
Cellular and
Systems
Neurobiology 3 hrs.**

Molecular and cellular properties of ion channels in neurons and sensory cells and their relationship to brain and sensory systems. **Same as** ANAT 527. **Prerequisite(s):** Credit in one neuroscience course or consent of the instructor.

**BIOS 530
Population Ecology 3 hrs.**

Life histories, population processes and interactions, and theories of distribution and abundance. **Prerequisite(s):** BIOS 220 and BIOS 221 and BIOS 330 and BIOS 331 and consent of the instructor.

**BIOS 531
Introduction to
Ecology and
Evolution I 3 hrs.**

Concepts, techniques, and skills needed for research in ecology and evolution. **Prerequisite(s):** Consent of the instructor.

**BIOS 532
Introduction to
Ecology and
Evolution II 3 hrs.**

Evolutionary and physiological research. **Prerequisite(s):** Consent of the instructor.

**BIOS 535
Ecosystems 3 hrs.**

Flow of energy and nutrients in aquatic and terrestrial environments. **Prerequisite(s):** BIOS 330.

**BIOS 539
Seminar in
Ecology and
Evolution 0 TO 1 hrs.**

Graduate student and faculty seminars on selected topics in ecology and evolution. Credit is given only upon completion of a seminar presentation. Satisfactory/Unsatisfactory grading only. May be repeated.

**BIOS 540
Interdisciplinary
Approaches to the
Study of Integrated
Human and Natural
Landscapes 3 hrs.**

Examination of ecological, biogeochemical, and evolutionary principles; techniques and philosophies of ecological remediation, restoration, and conservation; environmental regulation and policy; and sustainability in theory and practice. **Same as** EAES 540 and CME 540. **Prerequisite(s):** Consent of the instructor.

**BIOS 546
Research Methods
for Landscape
Ecological and
Anthropogenic
Processes 4 hrs.**

Students will develop the skills to choose and utilize relevant methods and tools used in the study and management of altered natural landscapes to achieve research and management objectives through hands-on interdisciplinary laboratory modules. **Same as** CME 546 and EAES 546. **Prerequisite(s):** Consent of the instructor.

**BIOS 547
Field Experiences in
Landscape Ecological
and Anthropogenic
Processes 4 hrs.**

Evaluation of the issues and needs of various landscape restorations and related urban-impacted sites in the Chicago metropolitan area based upon selected readings, site visits and presentations and discussions with the site manager/coordinators. **Same as** CME 547 and EAES 547. **Prerequisite(s):** Consent of the instructor.

BIOS 552
Chemical Biology 4 hrs.
Major trends and recent developments in research at the interface of chemistry and biology. **Same as** CHEM 552.

BIOS 559
Special Topics in Biochemistry 3 TO 4 hrs.
Selected topics of current interest in biochemistry. **Same as** CHEM 559. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** CHEM 454 or BIOS 454 or consent of the instructor.

BIOS 560
Topics in Paleontology 3 TO 4 hrs.
In-depth analysis of current problems and issues in paleontology, involving reading primary literature, student presentations, and critical discussions. **Same as** EAES 560. May be repeated if topics vary. **Prerequisite(s):** Consent of the instructor.

BIOS 582
Methods in Modern Neuroscience 2 hrs.
Underlying principles and applications of techniques used to analyze nervous system organization and function. Behavioral, electrophysiological, anatomical, and biochemical approaches are considered. **Same as** NEUS 582. Animals used in instruction.

BIOS 584
Foundations of Neuroscience I 3 hrs.
Provides a core understanding of modern neuroscience. Focuses on topics in cell and molecular neuroscience. Taught by faculty from multiple units. **Same as** NEUS 501. Recommended background: Credit or concurrent registration in GCLS 503.

BIOS 585
Foundations of Neuroscience II 3 hrs.
A core understanding of modern neuroscience. Focus is on topics in systems, cognitive and behavioral neuroscience. Will be taught by faculty from multiple units. Continuation of NEUS 501. **Same as** NEUS 502. **Prerequisite(s):** NEUS 501 or BIOS 584. Recommended background: Credit or concurrent registration in NEUS 403.

BIOS 586
Cell and Molecular Neurobiology 3 hrs.
Structure and function of voltage-dependent and neurotransmitter-gated ion channels; the role of these ion channels in synaptic transmission, synaptic modification, and neuromodulation. **Same as** ANAT 586. **Prerequisite(s):** BIOS 442 or consent of the instructor.

BIOS 587
Topics in Neurobiology 1 TO 2 hrs.
In-depth analysis of advanced topics in neurobiology, involving reading primary literature, student presentations, and critical discussion. Credit varies according to the topic offered. May be repeated. Students may register in more than one section per term.

BIOS 592
Research Seminar 1 TO 2 hrs.
Presentation of student research with an emphasis on problem-solving and theoretical implications. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of instructor.

BIOS 593
Introduction to Laboratory Research 2 TO 6 hrs.
A hands-on, in-depth introduction to selected research topics and laboratory techniques designed for the beginning graduate student. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

BIOS 594
Special Topics in Biological Sciences 1 TO 2 hrs.
Selected aspects in biological sciences. Credit varies according to the seminar offered. May be repeated. Students may register in more than one section per term.

BIOS 595
Departmental Seminar 0 hrs.
Weekly seminar by staff and invited speakers. Required of graduate students every semester. Satisfactory/Unsatisfactory grading only. May be repeated.

BIOS 597
Project Research 2 TO 8 hrs.
Guided research projects on selected topics in specific fields of advanced modern biology. Not to be used for thesis research. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

BIOS 598
Master's Thesis Research 0 TO 16 hrs.
Independent research in specialized projects under the direction of a faculty member with appropriate graduate standing, leading to completion of master's thesis. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

BIOS 599
Doctoral Thesis Research 0 TO 16 hrs.
Independent research on specialized topics under the direction of a faculty member with appropriate graduate standing, leading to completion of PhD thesis. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

Biomedical and Health Information Sciences

BHIS 405
Medical Sciences and Human Pathophysiology 0 TO 4 hrs.
Introduction of fundamental concepts in pathophysiology. Specific disorders of major organ systems including etiology, manifestations, diagnostic tests, treatment modalities, pharmacotherapy, and complications. Credit is not given for BHIS 405 if the student has credit for AHS 420 or HIM 313 or HIM 314. Students who require a medical terminology component register for 4 hours and participate in both laboratory and lecture-discussion; all others register for 3 hours and attend lecture-discussion only. Restricted to students who require this course for graduation. Students outside these restrictions may be admitted with consent of the instructor.

BHIS 410
Health Data Structures and Management 3 hrs.
Data structures in clinical information systems, including database design and management, networking, and security. Emphasis on "intrapreneurial" skills required to solve organizational information management problems. **Prerequisite(s):** BHIS 460 and BHIS 461 and BHIS 480.

BHIS 433
Principles of Evidence-Based Healthcare 2 hrs.
Qualitative and quantitative assessment of human subject clinical research: locating, evaluating, and comparing scientific papers as bases for healthcare education and practice. **Same as** MHPE 433. **Prerequisite(s):** Graduate or professional standing and approval of the school.

BHIS 437
Healthcare Data 3 hrs.
Review of data types in a healthcare information system. How data is transformed into information and then again transformed into knowledge through integrated computer systems. **Same as** HPA 437. Taught online only. A UIC netid is required. **Prerequisite(s):** Graduate standing and consent of the instructor.

BHIS 460
Introduction to Health Informatics 1 hour.
Introduction to information technology and systems in a healthcare setting; collection, analysis, and management of healthcare data; storage, retrieval, and networking; and system security. Taught online. Students must have an active UIC netid with valid password and access to a computer and the Internet. **Prerequisite(s):** Students should demonstrate basic computing skills including knowledge of an office productivity suite (MS Office or other), electronic mail, and Internet browsers. Recommended background: IDS 200 or the equivalent.

BHIS 461
Information Systems for Health Information Management 2 hrs.
Advanced topics in information technology and systems in a healthcare setting; collection, analysis, and management of healthcare data; special issues related to the role of health information administrators. Extensive computer use required. **Prerequisite(s):** IDS 200 and credit or concurrent registration in BHIS 460.

BHIS 480
Management and Business Practices 3 hrs.
Principles of management with emphasis on business functions, procedures, and organizational structure as applied to various healthcare settings, including private and institutional practice. **Prerequisite(s):** Advanced undergraduate or graduate standing in the Department of Biomedical and Health Information Sciences, or consent of the instructor.

BHIS 499
Information Sources in Biomedical & Health Information Sciences 1 hour.
Prepares students to locate, interpret, and evaluate pertinent research information sources. Includes discussion on writing literature reviews. Assignments require the use of a computer with Internet access. **Prerequisite(s):** Junior standing or above required; or consent of the instructor.

BHIS 500
Strategic Inquiry in BHIS 3 hrs.
An overview of research methods appropriate for BHIS, in order to better enable students to make research method decisions appropriate for their self-selected research project topics. **Prerequisite(s):** Consent of the instructor.

**BHIS 503
Communication
Skills in Health
Informatics 2 hrs.**

An application course in which students assess and practice effective written and oral methods of communication skills necessary for health informatics professionals. **Prerequisite(s):** Consent of the instructor.

**BHIS 504
Methods in
Qualitative Inquiry 3 hrs.**

Qualitative research methods to account for systematic description of environments where quantitative methods are not sufficient. **Prerequisite(s):** BHIS 500 and BHIS 510 or consent of the instructor.

**BHIS 505
Ethics and Legal
Issues in Health
Informatics 3 hrs.**

Examination of the legal and ethical issues involved in computerized health information systems. Taught online only. A UIC netid is required. **Prerequisite(s):** Consent of the instructor.

**BHIS 509
Informatics for
the Clinical
Investigator 3 hrs.**

This course provides the foundation of requisite knowledge of computer and healthcare information sciences for the clinical investigator. Extensive computer use required. Taught online only. A UIC netid is required.

**BHIS 510
Healthcare
Information Systems 4 hrs.**

Examination, through case studies, group and class discussions, and problem-based learning, of the effective utilization of information technology applications currently in place and on the horizon in healthcare organizations. **Same as** HPA 510. Taught online only. A UIC netid is required. **Prerequisite(s):** Graduate standing and consent of the instructor.

**BHIS 511
Application of
Healthcare
Information Systems 2 hrs.**

Experience with a variety of healthcare applications utilizing current information technology and systems implemented in healthcare provider organizations. Students are expected and required to attend computer training laboratory sessions in the UICMC, times to be arranged with training department personnel. Students will be working in UICMC and are required to comply with security, patient confidentiality, and HIPAA regulations. **Prerequisite(s):** BHIS 510 or consent of the instructor. Registration restriction(s): Certification of completion of NetLearning HIPAA training module is required for admission to this course.

**BHIS 515
Management of
Healthcare
Communication
Systems 4 hrs.**

Examination and management of data communications in and between healthcare facilities, including examination of issues, standards, technologies, and system configurations. **Same as** HPA 520. Taught online only. A UIC netid is required. **Prerequisite(s):** BHIS 510 or HPA 510; and graduate standing and consent of the instructor.

**BHIS 517
Healthcare
Information
Security 3 TO 4 hrs.**

Health information security and methods to achieve it; stresses risk assessment and preemptive action; outlines important role of security policies and procedures; surveys security technology with focus on nontechnical security approaches. Taught online only. A UIC netid is required. **Prerequisite(s):** BHIS 437 and BHIS 510, or consent of the instructor.

**BHIS 520
Health Information
Systems Analysis
and Design 4 hrs.**

A project course applying systems analysis and design theory to healthcare systems evaluation, modeling, and implementation. **Same as** HPA 531. Taught online only. A UIC netid is required. **Prerequisite(s):** BHIS 510 or HPA 510; and graduate standing and consent of the instructor.

**BHIS 525
Social and
Organizational
Issues in Health
Informatics 4 hrs.**

Examines the impact of information systems on the healthcare organization and applies theory through case study analysis. **Same as** HPA 540. Taught online only. A UIC netid is required. **Prerequisite(s):** BHIS 510 or HPA 510; and BHIS 515 or BHIS 520 or BHIS 530 or HPA 520 or HPA 531 or HPA 550; or consent of the instructor.

**BHIS 527
Knowledge
Management
in Healthcare
Organizations 3 hrs.**

An examination, through readings, case studies, research publications, and discussion, of the current issues, concepts, and technologies of knowledge management in healthcare organizations. Extensive computer use required. May be offered online, using synchronous and asynchronous discussion, in conjunction with seminar format. **Prerequisite(s):** Grade of B or better in BHIS 510; and consent of the instructor.

**BHIS 528
Consumer Health
Informatics 3 hrs.**

Examines the developing area of consumer health informatics from both theoretical and practical knowledge management perspectives through class discussions. **Prerequisite(s):** BHIS 510 and BHIS 527 or consent of the instructor. Recommended background: BHIS 505.

**BHIS 530
Topics in Health
Informatics 4 hrs.**

Current theories and methods in health informatics. **Same as** HPA 550. Taught online only. A UIC netid is required. **Prerequisite(s):** BHIS 510 or HPA 510; and BHIS 515 or HPA 520, or BHIS 520 or HPA 531, or BHIS 525 or HPA 540; and graduate standing and consent of the instructor.

**BHIS 535
Group Dynamics
for HI Professionals 2 hrs.**

Team and negotiation skills as well as developing project management competencies unique to the health informatics profession. **Prerequisite(s):** Consent of the instructor.

**BHIS 537
Healthcare IT
Vendor Management 3 hrs.**

Examines the environment and activities necessary to plan, select, contract, and implement systems from suppliers in the healthcare IT industry. **Prerequisite(s):** BHIS 510 or consent of the instructor.

**BHIS 538
Healthcare IT
Administration 3 hrs.**

Examines organizational and management issues in healthcare IT. **Prerequisite(s):** BHIS 510 and BHIS 511 and BHIS 537 or consent of the instructor.

**BHIS 546
Leadership
Development in
Health Informatics 3 hrs.**

Students will analyze, evaluate, and practice the competencies necessary for leadership unique to the health informatics profession. **Prerequisite(s):** Consent of the instructor.

**BHIS 580
Practicum in
Biomedical
and Health
Information
Sciences 3 TO 12 hrs.**

Field experience under supervision of a professional expert in a biomedical and health information sciences setting that is consistent with the student's area of study and career goals. May be repeated. **Prerequisite(s):** Consent of the instructor.

**BHIS 594
Special Topics
in Biomedical
and Health
Information
Sciences 1 TO 3 hrs.**

An in-depth study of a health informatics topic of importance selected by the faculty. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**BHIS 595
Seminar in
Biomedical and
Health Information
Sciences 1 hour.**

Provides students with an opportunity to present preliminary research for critique by peers and faculty. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** BHIS 499 and BHIS 500 or consent of the instructor.

**BHIS 596
Independent
Study 1 TO 4 hrs.**

For graduate students who wish to pursue independent study not related to their project/thesis research. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**BHIS 597
Project Research in
Biomedical and
Health Information
Sciences 0 TO 5 hrs.**

Independent investigation that draws upon the professional experience and knowledge synthesis of the student. Students investigate a topic/problem in their field, write an article, and deliver an oral presentation. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** BHIS 499, 500, and 595; and consent of the instructor.

**BHIS 598
Thesis Research
in Biomedical
and Health
Information
Sciences 0 TO 16 hrs.**

Independent research in one area of health informatics directed by a faculty member. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** BHIS 499 and BHIS 500 and BHIS 595 and consent of the instructor.

Biomedical Visualization

BVIS 400 Clinical Sciences for Biomedical Visualization 2 hrs.

The application of neuroanatomy, genetics, immunology, imaging, and pharmacology to biomedical visualization. An introduction to visual information processing, visual perception, and related technology. **Prerequisite(s):** Graduate standing.

BVIS 405 Anatomical Visualization 3 hrs.

Graphic manipulation and representation of human morphology and gross anatomy. Graphic construction skills, visual standards and conventions, data collection methods, and personal sketch style development. **Prerequisite(s):** Graduate standing and consent of the instructor.

BVIS 415 Computer Applications 2 hrs.

Using the Internet as a communication tool with emphasis on the World Wide Web: FTP, Telnet, HTML authoring, image processing, navigation, and interface design. **Prerequisite(s):** Graduate standing and consent of the instructor.

BVIS 420 Illustration Techniques 3 hrs.

Introduction to line, continuous tone, and color-rendering techniques. Digital image creation and manipulation, color theory and design, print and electronic publication issues. **Prerequisite(s):** Graduate standing; and BVIS 405 or consent of the instructor.

BVIS 430 Surgical Orientation 1 hour.

Survey of surgical specialties, including an historical survey and relationship to visual communication. Instruments, aseptic technique, incisions, suturing, principles of wound healing, imaging modalities, and surgical terminology. **Prerequisite(s):** Graduate standing; and BVIS 405 and consent of the instructor.

BVIS 440 Instructional Design 2 hrs.

Instructional design process for print and audiovisual media development in the health sciences. Emphasis on theory in communication, learning, and the instructional design process. **Prerequisite(s):** Graduate standing and consent of the instructor.

BVIS 450 Graphic Design 2 hrs.

Fundamentals of graphic design techniques and imagery production as applied to health science print media. **Prerequisite(s):** Graduate standing and one year of basic design courses.

BVIS 460 3-D Model Design 2 hrs.

Introduction to the biocommunicator's role in 3-D models, anatomical simulators, prosthetics, and healthcare exhibits. Exploration of materials and techniques for impression taking, sculpting, mold construction, and casting. **Prerequisite(s):** Graduate standing.

BVIS 480 Business Practices 2 hrs.

Business procedures and organizational structures associated with the role of a biocommunicator in institutional, freelance, and small business settings. Topics range from business forms and procedures to legal and ethical issues. **Prerequisite(s):** Graduate standing and consent of the instructor.

BVIS 515 Advanced Graphic Design 3 hrs.

Application of graphic design techniques to a simulated, multicomponent client project. Exploration of conceptualizing techniques and project management. **Prerequisite(s):** BVIS 450.

BVIS 520 Advanced Imaging Applications 3 hrs.

Instruction in advanced line imaging and visualization for patient education, editorial and product, and diagnostic image interpretation. **Prerequisite(s):** BVIS 420 or consent of the instructor.

BVIS 525 Animation and Multimedia 4 hrs.

Production experiences in selected biomedical communications specialties: electronic print media, multimedia, animation, and Web site design. Guest instructors with special expertise utilized wherever feasible. **Prerequisite(s):** BVIS 542 or consent of the instructor.

BVIS 530 Surgical Illustration 4 hrs.

Students attend surgery, research surgical procedures, and prepare illustrations for educational and commercial use. Students integrate knowledge of instructional design, anatomy, graphic design, and illustration techniques.

Prerequisite(s): ANAT 441 and BVIS 420 and BVIS 430 and BVIS 440 and BVIS 450.

BVIS 540 Computer Visualization 4 hrs.

Construction of three-dimensional computer models of biological and anatomical structures using software modelers, 3-D input devices, and medical scans and data. **Prerequisite(s):** BVIS 415.

BVIS 542 Computer Animation 4 hrs.

Investigates principles of motion using computer animation techniques to solve contemporary problems in medical education and communication where motion can effectively be used. Involves production from concept to final presentation. **Prerequisite(s):** BVIS 415 and BVIS 540 and consent of instructor.

BVIS 543 Computer Animation II 4 hrs.

Builds on concepts introduced in BVIS 542. Further investigation of motion using computer animation techniques to solve contemporary problems in medical education and communication where motion can effectively be used. **Prerequisite(s):** BVIS 542 and consent of the instructor.

BVIS 545 Computer-Based Multimedia 4 hrs.

An introduction to the use of desktop multimedia development systems. Software options for creating, manipulating, animating, and combining graphics, text, video, and sound for presentation and electronic publication. **Prerequisite(s):** BVIS 415 and BVIS 440.

BVIS 546 Virtual Reality and Stereography in Biomedical Visualization 2 hrs.

Introduction to 3-D perception; digital 3-D model creation; 3-D presentation methods; computer configuration for 3-D display; virtual reality in medicine. **Prerequisite(s):** Consent of the instructor.

BVIS 550 Simulators and Models 2 hrs.

An extension of the principles learned in BVIS 460. Emphasis on materials research and problem solving strategies for complex 3-D projects. **Prerequisite(s):** BVIS 460.

BVIS 554 Anaplastology Materials and Techniques 2 hrs.

Hands-on experience with prosthetic materials and techniques. Emphasis on health and safety issues related to laboratory equipment and clinical procedures. **Prerequisite(s):** AHS 420 and ANAT 441 and BVIS 460.

BVIS 555 Clinical Anaplastology 4 hrs.

Concepts of prosthetic rehabilitation. Provision of facial/somato prosthetic services in a multidisciplinary clinical setting requiring direct interaction with patients with disfigurements. Emphasis on prosthetic techniques and materials. **Prerequisite(s):** ANAT 441 and AHS 420 and BVIS 460 or consent of the instructor.

BVIS 580 Practicum in Biomedical Visualization 2 TO 12 hrs.

Field experience under supervision of a professional expert in a biomedical communication setting that is consistent with the student's area of concentration and career goals. May be repeated. **Prerequisite(s):** Consent of the instructor.

BVIS 594 Special Topics in Biomedical Visualization 1 TO 4 hrs.

Selected topics in specialty areas of biomedical visualization, depending on sufficient student demand and faculty availability, such as pharmaceutical illustration and ocular prosthetic design. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

BVIS 595 Seminar in Biomedical Visualization 1 hour.

Topics of current interest in biomedical visualization. Includes discussion of current journal articles and important new developments in the field. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

BVIS 596 Independent Study 1 TO 4 hrs.

For students who wish to pursue independent study not related to their project research. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

BVIS 597 Project Research 0 TO 5 hrs.

Independent investigation that engenders the responsibilities of professionals to contribute to their field. Students investigate a topic/problem in their field, write an article, and deliver an oral presentation. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

BVIS 598 Research in Biomedical Visualization 0 TO 16 hrs.

Independent research in biomedical visualization directed by a faculty member. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Foundation courses in research and statistics, or consent of instructor.

Biopharmaceutical Sciences

BPS 423 Adverse Drug Reactions 2 hrs.

Attention focused on the epidemiology and characterization of adverse reactions. Factors which interplay in adverse reactions to medications are discussed. Reactions characterized in relation to organ systems. **Prerequisite(s):** PHAR 403 and PHAR 404; or consent of the instructor.

BPS 430 Principles of Toxicology 2 hrs.

Examines the toxic effects of drugs and chemicals on organ systems. Lectures emphasize basic principles, effects on specific organ systems, major classes of toxic chemicals, and specialized topics such as forensic and industrial toxicology. **Same as** PCOL 430. Credit is not given for BPS 430 if student has credit for EOHS 457.

BPS 470 Clinical Pharmacology I 1 hour.

Basic principles of clinical pharmacology/toxicology including clinical trial design, statistical interpretation, pharmacokinetics, drug interactions (side effects), as well as basic mechanisms involved in the above. **Prerequisite(s):** Open only to students with third-year professional standing in the Doctor of Pharmacy program or with graduate standing.

BPS 471 Clinical Pharmacology II 1 hour.

Basic principles of clinical pharmacology applied to critical analysis of patient case histories in major disease states and FDA requirements. **Prerequisite(s):** BPS 470.

BPS 480 Application of Science to the Law 4 hrs.

Issues affecting the development, accessibility, and admissibility of forensic science services by the criminal justice system; problems which may compromise the quality, fairness, and effectiveness of scientific inquiries. **Same as** CLJ 480. **Prerequisite(s):** CLJ 210 and CLJ 260; or graduate standing.

BPS 494 Special Topics of Current Interest in Biopharmaceutical Sciences 1 TO 3 hrs.

Courses offered by faculty or a visiting lecturer on a current topic of selected interest. Topics are available on an experimental basis for one offering only. May be repeated to a maximum of 6 hours. **Prerequisite(s):** Consent of the instructor; good academic standing as defined by UIC policies.

BPS 501 Biopharmaceutical Sciences I 4 hrs.

First part of the fundamental didactic core courses in biopharmaceutical sciences, including fundamental principles of pharmaceutics, pharmacokinetics, scientific ethics, and research design.

Prerequisite(s): Graduate standing in the Biopharmaceutical Sciences program; or approval of the department.

BPS 502 Biopharmaceutical Sciences II 4 hrs.

Second part of fundamental didactic core courses in biopharmaceutical sciences; fundamental principles of cell and molecular biology and pharmacogenomics, pharmacodynamics including toxicology, research communication, and regulatory processes. **Prerequisite(s):** BPS 501; and graduate standing in the Biopharmaceutical Sciences program; or approval of the department.

BPS 503 Laboratory Techniques in Biopharmaceutical Sciences 3 hrs.

Laboratory-based core course in methods and techniques employed in biopharmaceutical sciences research. Credit is not given for BPS 503 if the student has credit for PMPD 500. **Prerequisite(s):** BPS 502; or consent of the instructor.

BPS 506 Industrial Experience 4 TO 10 hrs.

Recommended to graduate students with no industrial experience. Students spend time working in the pharmaceutical, imaging, or cosmetic industry under academic supervision to obtain practical experience. Satisfactory/Unsatisfactory grading only.

BPS 507 Drug Discovery, Design, and Development 3 hrs.

Overview of drug development process from target identification and screening through clinical trials and FDA evaluation. **Same as** MDCH 507 and PMPG 507.

BPS 510 Principles of Interfacial Phenomena 3 hrs.

Quantitative and theoretical principles of physical and chemical sciences as applied to pharmacy. Thermodynamics, kinetics, and colloid and surface chemistry in evaluation of pharmaceutical formulations. **Prerequisite(s):** MATH 480.

BPS 515 Dissolution and Bioavailability of Dosage Forms 2 hrs.

Theories and testing of the release of drug from solid dosage forms including the effect of dissolution rate on bioavailability.

Prerequisite(s): PHAR 323; and approval of the department.

BPS 518 Controlled Drug Delivery 3 hrs.

Controlled drug delivery systems utilizing polymers, synthesis of different types of devices, and the delivery expected from these devices, and mathematical modeling of delivery systems. **Same as** BIOE 518.

Prerequisite(s): MATH 220 or approval of the department.

BPS 519 Percutaneous Drug Delivery 2 hrs.

Modern methods of drug delivery covering the use of enhancers, prodrugs, iontophoresis, and ultrasound are presented. Toxicity testing, regulatory issues for successful marketing, and production issues. **Prerequisite(s):** Consent of the instructor.

BPS 520 Lipid-Based Drug Delivery Systems 2 hrs.

The preparation, characterization, stability, pharmaceutical, cosmetic, and diagnostic applications of lipid-based drug delivery systems, including liposomes, micelles, and emulsions prepared with phospholipids. **Prerequisite(s):** PHAR 323; and approval of the department.

BPS 522 Principles of Polymeric Science and Engineering 3 hrs.

Intermediate polymer science, thermodynamics of polymer solutions, phase separations, MW determination, crystallization, elasticity, kinetics, and processing. **Same as** BIOE 522.

Prerequisite(s): MATH 220 or consent of the instructor.

BPS 539 Biopharmaceutical Sciences Research Rotation 3 hrs.

Research rotation course in which first year students from the BPS program will undertake projects in laboratories affiliated with this program. May be repeated to a maximum of 9 hours. Animals used in instruction.

Prerequisite(s): Consent of the instructor.

BPS 540 Topics in Adverse Drug Reactions 2 hrs.

Advanced treatment of current adverse drug reaction incidents, involving evaluation of the issues. **Prerequisite(s):** Consent of the instructor.

BPS 542 Pharmacodynamics of Substance Abuse 2 hrs.

Considers the mechanisms of action, responses, pharmacokinetics, and dependence factors of substance abuse.

Emphasis will be placed on research strategies in studying the biological aspects of drug abuse.

Prerequisite(s): Consent of the instructor and a course in basic pharmacology.

BPS 543 Psychoneuro- immunology 2 hrs.

The interactions between the immune system, the endocrine system, and the central nervous system, specifically as they relate to stress and immunity.

BPS 544 Immunotoxicology 2 hrs.

Basic mechanisms of toxicologic responses to drugs and chemicals due to immediate and delayed hypersensitivity reactions.

Emphasis on laboratory methods used in the study of immunotoxicology.

Prerequisite(s): Consent of the instructor.

BPS 545 Advanced Pharmacokinetics 3 hrs.

Kinetics of absorption, distribution, metabolism, and excretion of drugs; factors affecting these kinetics and their relationship to pharmacodynamics.

Prerequisite(s): Consent of the instructor.

BPS 551 Pharmacological Basis of Therapeutics I 2 hrs.

Pharmacological basis of drugs for the treatment of diseases, including cancer, and conditions, including inflammation, of the nervous and gastrointestinal systems.

Prerequisite(s): Credit or concurrent registration in BCHE 460 and BPS 502; or approval of the department.

BPS 552 Pharmacological Basis of Therapeutics II 2 hrs.

Pharmacological basis of drugs for treatment of diseases, including cancer, and conditions, including inflammation, of the cardiovascular, renal, and endocrine systems. **Prerequisite(s):** BPS 551; or approval of the department.

BPS 553 Cancer Biology and Therapeutics 2 hrs.

Fundamentals of cancer biology with emphasis on biological, hormonal, and chemotherapeutic drug therapies currently used and in development. Specific treatment approaches to breast, ovarian, prostate, and colon cancers will be explored. **Same as** MDCH 553 and PMPG 553. **Prerequisite(s):** Consent of the instructor. Recommended background: Molecular and cellular biology.

BPS 555
Principles of Pharmacogenomics 2 hrs.
Concept and application of pharmacogenomics in disease diagnosis, prevention, and treatment. **Prerequisite(s):** BPS 502 or consent of the instructor.

BPS 580
Forensic Science: Survey and Foundations 2 hrs.
Survey course for forensic sciences with emphasis on criminalistics; unique characteristics, underlying philosophies; nature, analytical methods, significance of results with chemical, biological, trace, and pattern evidence. **Same as CLJ 580. Prerequisite(s):** Approval of the department.

BPS 581
Forensic Analysis of Biological Evidence 4 hrs.
Forensic blood and physiological fluid identification; DNA typing of biological evidence; report writing; expert testimony. **Prerequisite(s):** Consent of the instructor.

BPS 582
Forensic Chemistry and Trace Evidence Analysis 4 hrs.
Trace evidence: hairs, fibers, glass, soil, paint, and miscellaneous; nature, chemical, instrumental, and microscopical methods of analysis; interpretation and significance of trace similarities; expert testimony. **Prerequisite(s):** Consent of the director of graduate studies.

BPS 583
Physical Pattern Evidence Analysis 4 hrs.
Pattern evidence: individualization, reconstruction; fingerprint classification; questioned documents; handwriting comparison; firearms and toolmarks comparisons; scene patterns and reconstruction will be studied in-depth. **Prerequisite(s):** Consent of the instructor.

BPS 584
Forensic Drug Analysis and Toxicology 4 hrs.
Analysis of commonly abused drugs in their solid-dosage form and in biological media, with emphasis on modern instrumental methods and interpretation of results. **Prerequisite(s):** Consent of the instructor.

BPS 586
Topics in Specialty Forensic Examinations 1 TO 4 hrs.
Topics may vary but will revolve around specialty forensic examinations, covering specific evidentiary classes (e.g., drug identification, DNA typing, fingerprints), including forensic laboratory methods, approaches and data interpretation. May be repeated if topics vary. Students may register in more than one section per term. **Prerequisite(s):** BPS 581 or BPS 582 or BPS 583 or BPS 584; and consent of the instructor. Students must have credit in the Forensic Science program core course that covers the specific topic.

BPS 588
Expert Witness Testimony and Courtroom Demeanor 3 hrs.
Trials, hearings, grand jury; expert versus lay witness; personal and behavioral characteristics on the stand; results, reports, and courtroom testimony. **Prerequisite(s):** Approval of the department.

BPS 589
Special Topics in Forensic Science 3 hrs.
Content may vary but will revolve around the philosophic, moral, and managerial problems associated with criminalistics practice. Topics may include evidence collection, analysis, reporting, and testimony to noncriminalistics fields. **Same as CLJ 589.** May be repeated if topics vary. **Prerequisite(s):** Consent of the instructor.

BPS 590
Forensic Science Residency 1 TO 8 hrs.
In-depth training for casework analysis in a specific forensic discipline (e.g., drug identification, DNA typing, fingerprints) in an approved forensic science laboratory. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 24 hours. **Prerequisite(s):** BPS 581 or BPS 582 or BPS 583 or BPS 584; and consent of the instructor. Students must have credit in the Forensic Science program core course that covers the specific topic.

BPS 591
Topics in Forensic Microscopy 1 TO 4 hrs.
Topic may vary but will revolve around microscopical characterization of various materials, with emphasis on forensic laboratory methods and approaches, and interpretation of materials comparisons as evidence. May be repeated if topics vary. Students may register in more than one section per term. **Prerequisite(s):** BPS 582 and consent of the instructor.

BPS 592
Forensic Science Internship 2 TO 4 hrs.
Placement in a forensic science or toxicology laboratory or setting, under the supervision of a faculty member, with an accepted research project or paper required. May be repeated to a maximum of 4 hours. Students may register in more than one section per term. **Prerequisite(s):** BPS 580; and consent of the instructor and a minimum of 15 hours of credit earned in the MS in Forensic Science program.

BPS 593
Research in Biopharmaceutical Sciences 0 TO 16 hrs.
Research in biopharmaceutical sciences with the guidance of a faculty mentor. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Approval of the department.

BPS 594
Special Topics in Biopharmaceutical Sciences 1 TO 4 hrs.
Content varies. Special topics in biopharmaceutical sciences not covered in regular core or elective offerings. May be repeated to a maximum of 4 hours if topics vary. **Prerequisite(s):** Consent of the instructor.

BPS 595
Departmental Seminar 1 TO 2 hrs.
Weekly seminar series on research and experimental techniques in biopharmaceutical sciences. Also consists of journal club at which students will present an article once a year. Satisfactory/Unsatisfactory grading only. May be repeated. Weekly seminar and journal club meet separately from one another. **Prerequisite(s):** Approval of the department.

BPS 596
Independent Study in Forensic Science 1 TO 8 hrs.
Supervised projects may consist of extensive reading or laboratory work, or both, on topics not covered in regular course offerings. Research undertaken for this course may not duplicate that being done for BPS 597 or BPS 598. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

BPS 597
Forensic Science Project Research 3 hrs.
Supervised research in forensic science; a research project to be designed and completed within one semester. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** BPS 580; and at least the core course in the MS in Forensic Science program covering the subject area in which the research is to be conducted and consent of the instructor.

BPS 598
MS Thesis Research 0 TO 16 hrs.
For students doing MS thesis research or thesis writing. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 10 hours. A minimum of 6 hours is required. **Prerequisite(s):** Consent of the instructor.

BPS 599
Dissertation Research 0 TO 16 hrs.
PhD thesis research. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

Biostatistics

BSTT 400
Biostatistics I 4 hrs.
Descriptive statistics, basic probability concepts, one- and two-sample statistical inference, analysis of variance, and simple linear regression. Introduction to statistical data analysis software. Enrollment restricted to public health students and healthcare administration students; other graduate, professional, and advanced undergraduate students admitted by consent as space permits. To obtain consent, see the SPH registrar.

BSTT 401
Biostatistics II 4 hrs.
Simple and multiple linear regression, stepwise regression, multifactor analysis of variance and covariance, nonparametric methods, logistic regression, and analysis of categorical data; extensive use of computer software. **Prerequisite(s):** BSTT 400.

BSTT 494
Introductory Special Topics in Biostatistics 1 TO 4 hrs.
Special topics in biostatistics. Content varies. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

BSTT 505
Logistic Regression and Survival Analysis 2 hrs.
Interpretation of logistic regression and survival analysis models. Running logistic and proportional hazards regression models and constructing life-tables using SAS. Previously listed as BSTT 402. **Prerequisite(s):** BSTT 400 and BSTT 401.

BSTT 506
Design of Clinical Trials 3 hrs.
Rationale for clinical trials, blinding, ethical issues, methods of randomization, crossover trials, power and sample size calculations, data management, protocol deviation, data analysis, and interim analysis. Previously listed as BSTT 430. **Prerequisite(s):** BSTT 400 and BSTT 401.

**BSTT 507
Sampling
and Estimation
Methods Applied to
Public Health 3 hrs.**

The purpose of this course is to provide a comprehensive overview of current methods and issues in survey sample design and associated estimation procedures. Previously listed as BSTT 440. Credit is not given for BSTT 507 if the student has credit in STAT 431. Restriction applies only to certification for students pursuing the Interdepartmental Graduate Concentration in Survey Methodology. **Prerequisite(s):** BSTT 401 or BSTT 523 or consent of the instructor.

**BSTT 521
Applied Multivariate
Analysis 3 hrs.**

Analysis of vector of responses; MANOVA, data reduction methods; introduction to cluster analysis, discriminant analysis, and structural equation models. **Prerequisite(s):** BSTT 537 and consent of the instructor.

**BSTT 523
Biostatistics
Methods I 4 hrs.**

Foundations for and introduction to statistical inference, including one- and two-sample problems; regression analysis, including multiple regression and indicator variables. Previously listed as BSTT 502. **Prerequisite(s):** College calculus, including multivariable calculus, concurrent registration in BSTT 524, and consent of the instructor.

**BSTT 524
Biostatistics
Laboratory 2 hrs.**

Use of spreadsheets for statistical investigations; use of statistical software; matrix theory, including methods relevant in biostatistical analysis. Previously listed as BSTT 503. **Prerequisite(s):** Concurrent registration in BSTT 523 and consent of the instructor.

**BSTT 525
Biostatistics
Methods II 4 hrs.**

Analysis of variance and multiple comparisons; model building and diagnostics; generalized linear models; logistic and Poisson regression; introduction to repeated measures and mixed models. Previously listed as BSTT 504. **Prerequisite(s):** Grade of B or better in BSTT 523 and Grade of B or better in BSTT 524, or consent of the instructor.

**BSTT 535
Categorical Data
Analysis 3 hrs.**

Contingency tables and their tests, measures of association, stratified analysis, logistic regression, generalized linear model, Poisson regression, log-linear model, matched data, marginal homogeneity, ordinal data. Previously listed as BSTT 511. **Prerequisite(s):** Grade of B or better in BSTT 525; and STAT 411, or consent of the instructor.

**BSTT 536
Survival Analysis 3 hrs.**

Concepts of lifetime or survival distributions, especially with censored data; nonparametric estimation of the survival function; rank tests; proportional hazards regression models; parametric models. Previously listed as BSTT 512. **Prerequisite(s):** Grade of B or better in BSTT 525 and grade of B or better in STAT 411, or consent of the instructor.

**BSTT 537
Longitudinal Data
Analysis 4 hrs.**

Application and theory of models for longitudinal data analysis for both continuous and categorical response data, including use of statistical software for these methods. Previously listed as BSTT 513. **Prerequisite(s):** Grade of B or better in STAT 411 and Grade of B or better in BSTT 525, or consent of the instructor.

**BSTT 538
Biostatistical
Consulting 2 hrs.**

Discussion of techniques required for successful biostatistical consultation; effective communication, problem formulation, data analysis, oral and written reports, supervised consulting experience. Previously listed as BSTT 514. **Prerequisite(s):** Grade of B or better in BSTT 525 and consent of the instructor. Restricted to students enrolled in the Biostatistics major.

**BSTT 550
Biostatistical
Investigations 4 hrs.**

Analysis of several large data sets that will require integration of numerous biostatistical tools; written summarization and discussion of results. Previously listed as BSTT 522. **Prerequisite(s):** Grade of B or better in BSTT 535 and grade of B or better in BSTT 536 and grade of B or better in BSTT 537 and grade of B or better in BSTT 538 and grade of B or better or concurrent registration in BSTT 521.

**BSTT 560
Large Sample Theory 2 hrs.**

Deriving and applying large sample statistical theories. The primary focus will be in limit theorems and their applications in biostatistical problems. Meets eight weeks of the semester. Previously listed as BSTT 534. **Prerequisite(s):** Open only to PhD degree students; or consent of the instructor. Adequate training at the level of intermediate mathematical statistics. Master's degree in Biostatistics or Mathematics.

**BSTT 561
Advanced Statistical
Inference 3 hrs.**

An in-depth consideration of some important ideas of statistical inference including large-sample theory, estimation, and testing. Specific topics to be covered include asymptotic theory, parameter estimation, methods and hypothesis testing. Some computer use in class. Previously listed as BSTT 531. **Prerequisite(s):** Open only to PhD degree students; and consent of the instructor. Recommended background: MS degree in Biostatistics or the equivalent.

**BSTT 562
Linear Models 4 hrs.**

Generalized inverse matrices; distributions for quadratic forms; estimability and testable hypotheses; constrained linear model; applications to regression, ANOVA, ANCOVA models; variance component models. Previously listed as BSTT 533. **Prerequisite(s):** Open only to PhD degree students; or consent of the instructor. Recommended background: MS degree in Biostatistics or the equivalent.

**BSTT 563
Generalized Linear
Models 4 hrs.**

Teaches students the components of generalized linear models and their extensions. Previously listed as BSTT 541. **Prerequisite(s):** BSTT 561 and concurrent registration in or prior completion of BSTT 560. Open only to PhD degree students; or consent of the instructor. Adequate training at level of intermediate mathematical statistics. Master's degree in Biostatistics, Mathematical Statistics, or Mathematics.

**BSTT 564
Missing Data 4 hrs.**

Students will learn the statistical methods used for analyzing data with missing values. Previously listed as BSTT 542. **Prerequisite(s):** BSTT 561 and concurrent registration in or prior completion of BSTT 560. Open only to PhD degree students; or consent of the instructor. Adequate training at level of intermediate mathematical statistics. Master's degree in Biostatistics, Mathematical Statistics, or Mathematics.

**BSTT 565
Computational
Statistics 4 hrs.**

Developing a broad and thorough working knowledge of modern statistical computing and computational statistics on a practical, conceptual, philosophical, and mathematical level. Previously listed as BSTT 543. Extensive computer use required. **Prerequisite(s):** Concurrent registration in or prior completion of BSTT 560. Open only to PhD degree students; or consent of the instructor. Adequate training at level of intermediate mathematical statistics. Master's degree in Biostatistics, Mathematical Statistics, or Mathematics.

**BSTT 566
Bayesian Methods 4 hrs.**

Developing a broad and thorough working knowledge of Bayesian applications on a practical, conceptual, philosophical, and mathematical level. Previously listed as BSTT 544. **Prerequisite(s):** Concurrent registration in or prior completion of BSTT 560. Open only to PhD degree students; or consent of the instructor. Adequate training at level of intermediate mathematical statistics. Master's degree in Biostatistics, Mathematical Statistics, or Mathematics.

**BSTT 567
Advanced Survival
Analysis 4 hrs.**

Methods of analysis for multivariate survival data, including transition models and shared frailty models. Theory behind existing methodology is covered as well as implementation. **Prerequisite(s):** Grade of B or better or concurrent registration in BSTT 536; and consent of the instructor. Recommended background: Intended for students in the Biostatistics PhD program.

**BSTT 594
Special Topics in
Biostatistics 1 TO 4 hrs.**

Advanced special topics. Content varies. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**BSTT 595
Biostatistics
Research Seminar 1 hour.**

Current developments in theory and application of biostatistics and epidemiology with presentations by faculty and visiting scientists. Satisfactory/Unsatisfactory grading only. May be repeated.

Business Administration

BA 495 Business Strategy 3 hrs.
Strategic management and business policy formulation and implementation. Students will utilize knowledge from all functional areas of business to formulate business strategy and implementation plans through case analysis (may include simulation). Extensive computer use required. **Prerequisite(s):** ACTG 210 and ACTG 211 and BA 200 and ECON 218 and IDS 200 and IDS 270; and IDS 355 and FIN 300 and MGMT 340 and MGMT 350 and MKTG 360; and senior standing or above.

BA 589 Corporate Business Internship Program 0 TO 3 hrs.
Corporate business internship provides graduate students an opportunity to gain practical work experience in their field of study and to test their career choice. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 6 hours. No graduation credit for students in the following: MS in Accounting or MS in Management Information Systems. **Prerequisite(s):** Consent of the director of the Business Career Center. Approval by the director of graduate studies prior to registration is required for students in the MS in Accounting and MS in Management Information Systems programs.

BA 594 Special Topics in Business Administration 1 TO 4 hrs.
An intensive study of a selected topic in business administration. Topics vary by section and by term. May be repeated to a maximum of 16 hours if topics vary. Students may register in more than one section per term. **Prerequisite(s):** Consent of the graduate business program advisor.

Campus Courses

CC 400 Urbana Registration 0 TO 16 hrs.
Special course created to represent Urbana registration for upper-division undergraduate and graduate students pursuing a degree on the Chicago campus. Facilitates proper UIC assessment, application of financial aid awards, and registration. Satisfactory/Unsatisfactory grading only. May be repeated. No graduation credit.

CC 401 Springfield Registration 0 TO 16 hrs.
Special course created to represent Springfield registration for upper-division undergraduate and graduate students pursuing a degree on the Chicago campus. Facilitates proper UIC assessment, application of financial aid awards, and registration. Satisfactory/Unsatisfactory grading only. May be repeated. No graduation credit.

Chemical Engineering

CHE 410 Transport Phenomena 3 OR 4 hrs.
Continuum theory of momentum, energy, and mass transfer. Viscous behavior of fluids. Laminar and turbulent flow. Thermal conduction and convection, diffusion, and coupled operations. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CHE 312 or consent of the instructor.

CHE 413 Introduction to Flow in Porous Media 3 OR 4 hrs.
Theoretical modeling of single-phase and multiphase flow in porous media. Darcy's law and relative permeabilities. Oil production and hydrology. Capillary phenomena. Dispersion and miscible displacement. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CHE 312 or consent of the instructor.

CHE 421 Combustion Engineering 3 OR 4 hrs.
Combustion chemistry and thermochemistry. Kinetics and mechanism of combustion; ignition and pollutant formation. Detonation and deflagration; premixed and diffusion flames. Surface reaction and droplet combustion. Applications. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CHE 301 and CHE 321.

CHE 422 Biochemical Engineering 3 OR 4 hrs.
Enzyme-catalyzed and microbially mediated processes. Free and immobilized enzymes. Batch and continuous cell cultures. Transport phenomena in microbial systems and fermentation processes. Design of biological reactors. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Consent of the instructor.

CHE 423 Catalytic Reaction Engineering 3 OR 4 hrs.
Catalytic reactions which occur under conditions for which heat and mass transfer cannot be neglected are considered. Includes porosimetry, surface area measurements, and catalyst deactivation. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CHE 321 or consent of the instructor.

CHE 431 Numerical Methods in Chemical Engineering 3 OR 4 hrs.
Introduction to the application of numerical methods to the solution of complex and often nonlinear mathematical problems in chemical engineering. Includes methods for the solution of problems arising in phase and chemical reaction equilibria, chemical kinetics, and transport. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Graduate or advanced undergraduate standing.

CHE 438 Computational Molecular Modeling 3 OR 4 hrs.
Provide students with a fundamental understanding of the methods, capabilities, and limitations of molecular simulations. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** CHE 301. Recommended background: Engineering/science.

CHE 440 Non-Newtonian Fluids 3 OR 4 hrs.
Fluid mechanics and transport processes involving non-Newtonian fluids. Purely viscous and viscoelastic behavior. Viscometric functions and rheometry. Heat and mass transfer in non-Newtonian fluids. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CHE 410 or consent of the instructor.

CHE 441 Computer Applications in Chemical Engineering 3 OR 4 hrs.
Nonnumerical applications of computers: artificial intelligence and expert systems for chemical engineering design and online diagnosis; data acquisition and control for digital process control; process design calculations. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Senior standing in Chemical Engineering.

CHE 445 Mathematical Methods in Chemical Engineering 3 OR 4 hrs.
Advanced mathematical techniques in chemical engineering. Includes infinite series in thermodynamic perturbation theory; Laplace transforms in process control; chemical diffusion transport theories and differential equations. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** MATH 220 or the equivalent.

CHE 450 Air Pollution Engineering 4 hrs.
Environmental aspects of combustion processes, pollutant formation. Control of pollutants and particulates. Air quality control. Fundamentals of combustion. **Same as** ME 450. **Prerequisite(s):** ME 321 or consent of the instructor.

CHE 456 Fundamentals and Design of Microelectronics Processes 3 OR 4 hrs.
Design and practical aspects of the most advanced state of micro- and nanoelectronics processing with emphasis on thin film deposition, substrate passivation, lithography and etching with thermodynamics, kinetics, reactor design, and optimization. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** Graduate standing or consent of the instructor. Recommended background: Engineering/science.

CHE 494 Selected Topics in Chemical Engineering 1 TO 4 hrs.
Systematic study of selected topics in chemical engineering theory and practice. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

CHE 501 Advanced Thermodynamics 4 hrs.
Laws of thermodynamics. General conditions for equilibrium and stability. Thermodynamic potentials. Phase transition and critical phenomena. Principle of irreversible thermodynamics, Onsager's fundamental theorem and engineering applications. **Prerequisite(s):** MATH 220 or the equivalent.

CHE 502 Fluid Phase Equilibria 4 hrs.
Application molecular theories of fluids to phase equilibrium systems. Intermolecular potentials, partition functions, correlation functions, chemical potentials, fugacity, and activity coefficient and their relationships. **Prerequisite(s):** CHE 301 or equivalent.

CHE 503 Thermodynamics of Multicomponent Mixtures 4 hrs.
Thermodynamic theories of mixtures. Molecular principles of various solution theories. Conformal solutions, lattice theories, group contribution function theories, and perturbation and variational theories. **Prerequisite(s):** CHE 502 or the equivalent.

CHE 505 Advanced Statistical Thermodynamics 4 hrs.
Development of the principles of statistical mechanics. Calculation of partition functions and properties for the ideal gas including polyatomic gases. Ensemble concepts and interacting subsystems. Applications. **Prerequisite(s):** CHE 502.

CHE 510
Separation Processes 4 hrs.
Advanced coverage of equilibrium stage separation. Multicomponent separation and distillation; unsteady state adsorption processes. Separation efficiencies and energy requirements. **Prerequisite(s):** CHE 410.

CHE 511
Advanced Mass Transfer 4 hrs.
Analysis of diffusion and mass transport in chemical engineering systems. Unsteady state diffusion, convective diffusion, mass transfer coefficient dispersion, and the study of diffusion and reaction and simultaneous mass transport. **Prerequisite(s):** CHE 410.

CHE 512
Microhydrodynamics, Diffusion, and Membrane Transport 4 hrs.
Theoretical and numerical fluid mechanics of microstructure: potential flow and virtual mass, quasi-static versus transient Stokes flow, integral theorems, multipole expansions, singularity solutions, fluctuations, and current applications. **Prerequisite(s):** CHE 410 and CHE 445 or consent of the instructor.

CHE 514
Biotransport 4 hrs.
Diffusion and flow in living systems. Blood rheology and flow. Microcirculation, oxygen transport, diffusive transport across membranes. Membrane structure; water, ion flows, and active transport. **Same as** BIOE 514. **Prerequisite(s):** CHE 410 or consent of the instructor.

CHE 524
Characterization Techniques in Catalysis 4 hrs.
The most common crystallographic, spectroscopic, and physicochemical techniques for characterization of bulk solids, solid surfaces, and gas-solid interactions are surveyed. **Prerequisite(s):** Consent of the instructor.

CHE 527
Advanced Chemical Reaction Engineering 4 hrs.
Multiplicities in chemically reacting systems nonideal reactors: effects of residence time distribution and mixing history. Heterogeneous noncatalytic reactions: gas-liquid, liquid-liquid, and solid-fluid systems. Heterogeneous catalytic reactions. **Prerequisite(s):** CHE 321.

CHE 530
Gas Kinetics 4 hrs.
Modern theory and experimental methods in the rates of gas reactions. Review of phenomenological kinetics, collision theory, energy transfer, unimolecular reactions, transition state, and RRKM theory. Modern applications. **Prerequisite(s):** CHE 505.

CHE 592
Specialized Problems 4 TO 8 hrs.
Specialized problems under faculty supervision. **Prerequisite(s):** Consent of the instructor.

CHE 594
Advanced Topics in Chemical Engineering 1 TO 4 hrs.
Systematic study of advanced topics in chemical engineering theory and practice. Subjects vary from year to year. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

CHE 595
Seminar in Chemical Engineering Research 1 hour.
Advances in chemical engineering research will be discussed in a seminar setting. Students will be expected to make presentations in areas of catalysis, thermodynamics, transport phenomena, and kinetics. **Prerequisite(s):** Graduate standing in chemical engineering.

CHE 597
Project Research 0 TO 4 hrs.
A research design or reading project approved by the committee appointed by the director of graduate studies. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor. Recommended background: Completed required classes in curriculum.

CHE 598
MS Thesis Preparation 0 TO 16 hrs.
Individual research in specialized problems under faculty supervision. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

CHE 599
PhD Thesis Preparation 0 TO 16 hrs.
Individual research in specialized problems under faculty supervision. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

Chemistry

CHEM 402
Chemical Information Systems 2 hrs.
Introduction to chemical information, including the use of databases for searching chemical information and the use of molecular modeling and related computational systems to determine calculated properties of chemical substances. Previously listed as CHEM 302. **Prerequisite(s):** Grade of C or better in CHEM 234 or consent of the instructor.

CHEM 414
Advanced Inorganic Chemistry 2 OR 3 hrs.
Introduction to the principles of inorganic chemistry. Structural and descriptive chemistry of the main-group elements. 2 undergraduate hours. 3 graduate hours. **Prerequisite(s):** Grade of C or better in CHEM 314; and grade of C or better in CHEM 340 or grade of C or better in CHEM 342; or consent of the instructor.

CHEM 415
Inorganic Chemistry Laboratory 0 TO 4 hrs.
Advanced inorganic chemistry laboratory. Preparative methods, Schlenk techniques, dry box, Fourier-transform infrared and UV-visible spectroscopy, crystal growth. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in CHEM 314.

CHEM 416
Inorganic Chemistry II 3 OR 4 hrs.
Structural and descriptive chemistry of the transition elements. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CHEM 414.

CHEM 421
Instrumental Analysis 4 hrs.
A survey of contemporary instrumentation for chemical analysis. Emphasis on fundamentals of instrumental methods with actual experience on typical equipment. Includes two weekly three-hour laboratories. **Prerequisite(s):** Grade of C or better in CHEM 222; and Grade of C or better in CHEM 340 or Grade of C or better in CHEM 342.

CHEM 432
Advanced Organic Chemistry 2 OR 3 hrs.
Rigorous treatment of the principles upon which modern organic chemistry is developed. 2 undergraduate hours. 3 graduate hours. **Prerequisite(s):** Grade of C or better in CHEM 333; and grade of C or better in CHEM 340 or grade of C or better in CHEM 342.

CHEM 444
Advanced Physical Chemistry 2 OR 3 hrs.
Application of quantum mechanics to molecular spectroscopy, statistical mechanics, and activated complex theory. 2 undergraduate hours. 3 graduate hours. **Prerequisite(s):** Grade of C or better in CHEM 346.

CHEM 448
Statistical Thermodynamics 3 OR 4 hrs.
Introduction to statistical mechanics, partition functions, chemical equilibrium, ensembles, fluctuations, real gases, Einstein and Debye models of solids, magnetic materials, electrolytes, and introduction to liquids. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CHEM 346.

CHEM 452
Biochemistry I 4 hrs.
Chemistry of proteins, nucleic acids, carbohydrates, and lipids. **Same as** BIOS 452. **Prerequisite(s):** Credit or concurrent registration in CHEM 234.

CHEM 454
Biochemistry II 4 hrs.
Continues CHEM 452. Carbohydrate and lipid metabolism, electron transport. Metabolism of amino acids, nucleic acids, proteins. Biosynthesis of macromolecules and regulation of macromolecular synthesis. **Same as** BIOS 454. **Prerequisite(s):** BIOS 452 or CHEM 452.

CHEM 455
Biochemistry Laboratory 3 hrs.
Introduction to modern biochemistry and molecular biology research. Includes recombinant DNA techniques, protein purification, site-directed mutagenesis, polymerase chain reaction, enzyme kinetics, protein structure data analysis, and molecular graphics. **Prerequisite(s):** CHEM 222 and CHEM 452.

CHEM 456
Natural Products 3 OR 4 hrs.
Biogenetic approach to secondary metabolites. General principles and selected studies of phenolic compounds, terpenes, alkaloids, and other interesting natural products. **Same as** BIOS 416. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** One year of organic chemistry.

CHEM 470
Educational Practice with Seminar I 6 hrs.
The first half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, and approval of the department.

CHEM 471
Educational Practice with Seminar II 6 hrs.

The second half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department.

Prerequisite(s): Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, credit or concurrent registration in CHEM 470, and approval of the department.

CHEM 472
Teaching Methods in Chemistry 2 OR 3 hrs.

A course in the methods of teaching high school chemistry, including the integration of technology. 2 undergraduate hours. 3 graduate hours. Extensive computer use required.

Prerequisite(s): 24 semester hours of undergraduate chemistry, including two semesters of laboratory chemistry. Recommended background: ED 210.

CHEM 474
Teaching Chemistry in High Schools 1 hour.

Modern ways to help beginning learners construct in their own minds an understanding of scientific concepts and scientific method. Emphasis on the concepts of chemistry. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Approval of the department.

CHEM 488
Cooperative Chemistry Practice 1 hour.

Off-campus participation in a governmental or industrial training program. Credit is contingent on the submission of a final report. Satisfactory/Unsatisfactory grading only. May be repeated. A maximum of 6 hours of CHEM 488, CHEM 492, and CHEM 499 combined may be credited toward departmental undergraduate degree course requirements. **Prerequisite(s):** Concurrent registration in LAS 289 or consent of the instructor.

CHEM 492
Independent Study 1 TO 2 hrs.

Individual study under supervision of a faculty member in areas not covered in standard courses. Credit is contingent on the submission of a final report. Satisfactory/Unsatisfactory grading only. May be repeated. A maximum of 6 hours of CHEM 488, CHEM 492, and CHEM 499 combined may be credited toward departmental undergraduate degree course requirements.

Prerequisite(s): 2.50 grade point average in science courses and consent of the instructor.

CHEM 494
Special Topics in Chemistry 1 TO 4 hrs.

Course content is announced prior to each term in which the course is given. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

CHEM 499
Supervised Research 3 hrs.

Individual research performed under supervision of a faculty member. Credit is contingent on the submission of a final report. Research experience is strongly encouraged for career students. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 6 hours. A maximum of 6 hours of CHEM 488, CHEM 492, and CHEM 499 combined may be credited toward departmental undergraduate degree course requirements.

Prerequisite(s): Junior standing or above, approval of the department, consent of the instructor, and a grade point average of 2.50 in science courses; or graduate standing. Recommended background: Credit in CHEM 333 or CHEM 314.

CHEM 500
Faculty Research 1 hour.

Mandatory for first-year students. Faculty present their research interests to new graduate students. Satisfactory/Unsatisfactory grading only.

CHEM 510
Literature Seminar in Inorganic Chemistry 1 hour.

Discussion of inorganic research from the current literature. Emphasis on student presentations. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Graduate standing or consent of the instructor.

CHEM 514
Advanced Inorganic Chemistry I 4 hrs.

The synthesis, structure, and bonding of selected main group and transition metal species. Describes materials science applications of these compounds. **Prerequisite(s):** CHEM 416 or the equivalent.

CHEM 516
Advanced Inorganic Chemistry II 4 hrs.

Structural and descriptive chemistry of the transition elements; spectroscopy and magnetism. **Prerequisite(s):** CHEM 416 or the equivalent.

CHEM 517
Organometallic Chemistry 4 hrs.

The fundamental and basic principles of the structure and reactivity of transition metal complexes towards organic molecules. **Prerequisite(s):** CHEM 432 or the equivalent, and credit or concurrent registration in CHEM 532.

CHEM 518
Advanced Inorganic Chemistry III 4 hrs.

Synthesis, structure, bonding, and properties of solid-state materials. **Prerequisite(s):** CHEM 416 or the equivalent or consent of the instructor.

CHEM 519
Special Topics in Inorganic Chemistry 3 TO 4 hrs.

Lectures on topics not represented in regularly scheduled courses. May be repeated. **Prerequisite(s):** Graduate standing or consent of instructor.

CHEM 520
Literature Seminar in Analytical Chemistry 1 hour.

Discussion of analytical chemical research from the current literature. Emphasis upon student presentations. Satisfactory/Unsatisfactory grading only.

CHEM 522
Techniques in Mass Spectrometry and Surface Analysis 4 hrs.

Various methods in mass spectrometry. Nonoptical applied surface analysis including X-ray photoelectron spectroscopy, Auger spectroscopy, and scanning probe microscopy. Instrumentation, applications, and data analysis. **Prerequisite(s):** CHEM 421 or the equivalent.

CHEM 524
Optical Spectroscopies in Analytical Chemistry 4 hrs.

Theory and experimental methods in infrared, ultraviolet, and visible spectroscopies, both absorption and emission. **Prerequisite(s):** CHEM 346 and CHEM 421; or consent of the instructor.

CHEM 526
NMR Spectroscopy in Analytical Chemistry 4 hrs.

Principles governing one- and multidimensional nuclear magnetic resonance (NMR) spectroscopy; applications of NMR to chemical analysis. **Prerequisite(s):** CHEM 346 and CHEM 421; or the equivalent or consent of the instructor.

CHEM 528
Chemical Separations 4 hrs.

Fundamentals and recent advances in techniques and technologies for the separation of chemical substances, including both chromatographic and electrophoretic methods. Special emphasis on trace and microscale methods. **Prerequisite(s):** CHEM 421; or approval of the department.

CHEM 529
Special Topics in Analytical Chemistry 3 TO 4 hrs.

Lectures and readings in areas not normally treated in standard courses. Discussion of topics of current interest in analytical chemistry. May be repeated. Students may register in more than one section per term.

Prerequisite(s): Consent of the instructor.

CHEM 530
Literature Seminar in Organic Chemistry 1 hour.

Discussion of organic chemical research from the current literature. Emphasis upon student presentations. Satisfactory/Unsatisfactory grading only.

Prerequisite(s): Consent of the instructor.

CHEM 531
Spectroscopic Organic Structure Determination 3 hrs.

Discussion of principles and modern practice in the elucidation of the structures of organic molecules using NMR, IR, UV, and mass spectrometry. With practical examples. **Prerequisite(s):** CHEM 234 or the equivalent.

CHEM 532
Advanced Organic Chemistry I 4 hrs.

Introduction to advanced organic chemistry, drawing molecules and mechanisms, FMO theory, stereochemistry, conformational analysis, stereoelectronic effects, selected functional group interconversions. Some computer use will be required. **Prerequisite(s):** CHEM 432 or the equivalent.

CHEM 533
Advanced Organic Chemistry II 4 hrs.

Continues CHEM 532. Chemical literature, chemical bonding, pericyclic reactions, physical organic chemistry, reactive intermediates, organic reaction mechanisms with an emphasis on physical principles. **Prerequisite(s):** CHEM 532 or the equivalent.

CHEM 534
Advanced Organic Chemistry III 4 hrs.

Continues CHEM 533. The major reactions in organic chemistry and their uses in organic synthesis. **Prerequisite(s):** CHEM 533 or the equivalent.

CHEM 535
Advanced Synthetic Chemistry 4 hrs.

Topics include: control of stereochemistry (cyclic and acyclic), synthesis of complex natural and unnatural products (such as alkaloids, terpenes), and new methodologies. **Prerequisite(s):** CHEM 533.

CHEM 536
Physical Organic Chemistry 4 hrs.
Theoretical and experimental methods of studying reaction mechanisms, with an emphasis on kinetic methods and linear free energy correlations. **Prerequisite(s):** CHEM 533 or consent of the instructor.

CHEM 539
Special Topics in Organic Chemistry 3 TO 4 hrs.
Discussion of topics of current interest. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** CHEM 533.

CHEM 540
Current Problems in Physical Chemistry 1 hour.
Student seminars presented on varied topics in physical chemistry. Special emphasis on the application of quantum mechanics and statistical mechanics to the solving of problems in molecular structure, dynamics, and spectroscopy. Satisfactory/Unsatisfactory grading only.

CHEM 542
Quantum Mechanics 4 hrs.
Exact solutions of the Schrödinger equation for simple systems; variational principle and perturbation theory; many-electron atoms and diatomic molecules and their electronic structures; angular momentum. **Prerequisite(s):** CHEM 346 or the equivalent.

CHEM 543
Molecular Spectroscopy and Group Theory 4 hrs.
Group theory and molecular symmetry. Rotations and vibrations of diatomics and polyatomics. Time-dependent quantum mechanics and UV, IR, and NMR spectroscopy. **Prerequisite(s):** CHEM 542.

CHEM 544
Angular Momentum in Quantum Mechanics 4 hrs.
Quantum-mechanical theory of angular momentum. Application to spectroscopy, reaction dynamics, coupling of angular momenta, rotational transformations, graphical methods, Wigner-Eckart theorem, spherical tensors, rotational spectroscopy. **Prerequisite(s):** CHEM 542 or consent of the instructor.

CHEM 549
Special Topics in Physical Chemistry 3 TO 4 hrs.
Lectures and readings in areas not normally treated in standard courses. Discussion of topics of current interest in physical chemistry. **Prerequisite(s):** Consent of the instructor.

CHEM 550
Literature Seminar in Biochemistry 1 hour.
Presentation of student papers on current research topics in biochemistry. Satisfactory/Unsatisfactory grading only.

CHEM 551
Advanced Biochemistry I 4 hrs.
Basic and current topics on proteins, including protein structure, protein stability, protein folding and misfolding, and proteomics. **Prerequisite(s):** CHEM 454; and CHEM 346 or CHEM 344.

CHEM 552
Chemical Biology 4 hrs.
Major trends and recent developments in research at the interface of chemistry and biology. **Same as** BIOS 552.

CHEM 554
Bioinorganic Chemistry 4 hrs.
Structure, function, and properties of metal ion coordination centers in metalloproteins, as well as the function of metal ions in enzyme activation and membrane transport. **Prerequisite(s):** CHEM 415 or CHEM 452.

CHEM 555
Advanced Biochemistry II 4 hrs.
The structure of nucleic acids and the role and processing of nucleic acids in various aspects of genetic regulation. **Prerequisite(s):** CHEM 454.

CHEM 558
Biophysical Chemistry 4 hrs.
The role of molecular interactions in determining the structure and function of complex biological systems, and the use of modern experimental techniques to study these interactions and systems. **Prerequisite(s):** CHEM 452 or consent of the instructor

CHEM 559
Special Topics in Biochemistry 3 TO 4 hrs.
Selected topics of current interest in biochemistry. **Same as** BIOS 559. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** CHEM 454 or BIOS 454 or consent of the instructor.

CHEM 572
Teaching Methods in Chemistry 3 hrs.
Special problems and techniques, including audio-visual methods, lecture demonstrations, the use of computers, and the design of experiments. May be repeated. A maximum of 3 hours may be credited toward departmental course requirements for the MS or PhD in Chemistry. **Prerequisite(s):** Approval of the department.

CHEM 590
Current Problems in Chemical Research 2 hrs.
In-depth discussion and analysis of selective aspects of contemporary research with particular emphasis on research carried out in the department. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of instructor.

CHEM 598
Master's Thesis Research 0 TO 16 hrs.
Master's thesis work under the supervision of a faculty member. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Approval of the department.

CHEM 599
PhD Thesis Research 0 TO 16 hrs.
PhD thesis work under the supervision of a faculty member. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Approval of the department.

Civil and Materials Engineering

CME 400
Advanced Design of Reinforced Concrete Structures 3 OR 4 hrs.
Design of reinforced concrete building structures, including design for lateral loads due to wind, structural systems for reinforced concrete buildings, shear walls, and design for seismic forces. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 310 or the equivalent.

CME 401
Advanced Design of Metal Structures 3 OR 4 hrs.
Plate girders; unsymmetrical bending; torsion of thin-walled structures; lateral-torsional instability; composite construction. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 301.

CME 402
Geometric Design of Highway Facilities 3 OR 4 hrs.
Elements of geometric design. Driver, vehicle, and roadway system characteristics. Horizontal and vertical alignment design. Intersection design and operation. Capacity and level of service. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 302.

CME 403
Hydraulic Design 3 OR 4 hrs.
Selected applications of hydraulics and hydrology: pipe, pipe network, and water distribution system design; unsteady pipe flow; open channel design; storm water engineering. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 215.

CME 405
Foundation Analysis and Design 3 TO 4 hrs.
Site characterization; analysis and design of shallow foundations, deep foundations and earth retaining structures; foundations on difficult soils; effects of construction; instrumentation and monitoring. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 315.

CME 406
Bridge Design 3 OR 4 hrs.
Theory and design procedures related to the analysis and design of modern bridges. Using the AASHTO Code, includes concrete and steel structures, construction practices and procedures. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 301 and CME 310.

CME 407
Soil and Site Improvement Methods 3 OR 4 hrs.
Compaction, preloading, vertical drains, grouting, admixture stabilization, thermal stabilization, soil reinforcement, geosynthetics; construction of embankments on soft clay, embankments on mechanically stabilized earth walls, hydraulic barriers; case studies. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 315.

CME 408
Traffic Engineering and Design 3 OR 4 hrs.
Highway traffic control with an emphasis on highway capacity analysis and traffic signal design. Queuing theory, traffic flow theory, corridor management, and traffic safety. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. Fieldwork required. **Prerequisite(s):** CME 302 or consent of the instructor.

CME 409
Structural Analysis II 3 OR 4 hrs.
Approximate analysis of structures including trusses and multistory frames. Influence lines, cables, and arches. Principles of limit analysis for structures and structural elements. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 205 or consent of the instructor.

CME 410
Design of Prestressed Concrete Structures 3 OR 4 hrs.
Principles of prestressed concrete. Analysis and design of statically determinate prestressed concrete members. Introduction to design and detailing of connections. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 310.

CME 411
Chemistry for Environmental Professionals 3 hrs.
Introductory atmospheric chemistry, aspects of air pollution, chemistry related to natural water and water treatment; priority organic pollutants and heavy metals. **Same as** EOHs 440. **Prerequisite(s):** One year of college chemistry.

**CME 415
Environmental
Geotechnology** 3 OR 4 hrs.
Environmental laws and regulations, sources and types of waste materials, waste materials in geotechnical engineering applications, geotechnical management of municipal, industrial, mine, and nuclear wastes. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 315.

**CME 419
Air Quality
Management I** 3 hrs.
Sources, control, dispersion, and effects upon receptors of air pollution: health and other adverse effects, meteorology and dispersion estimation, photochemistry, aerosol characterization. **Same as** EOHS 431. **Prerequisite(s):** EOHS 405 or CME 216 or consent of instructor.

**CME 420
Water and
Wastewater
Analysis
Laboratory** 0 TO 4 hrs.
Laboratory class for environmental engineering. Analysis of water, wastewater, and soil for nutrients, pollutants, physical parameters, and biological parameters. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 216; or graduate standing.

**CME 421
Water Treatment
Design** 3 OR 4 hrs.
Water-quality control systems. Physical-chemical unit processes applied to systems designed for treatment of municipal and industrial waters. 3 undergraduate hours. 4 graduate hours. Field trip required at nominal fee. **Prerequisite(s):** CME 216.

**CME 422
Wastewater
Treatment
Design** 3 OR 4 hrs.
Processes involved in the biological treatment of wastewater. Aerobic and anaerobic treatment, sludge stabilization, and nutrient removal. 3 undergraduate hours. 4 graduate hours. Field trip required. **Prerequisite(s):** CME 216 or the equivalent.

**CME 423
Management of
Solid and Hazardous
Wastes** 3 hrs.
Management of solid and hazardous waste, including radioactive waste: landfills, incineration, recycling, composting, source reduction, groundwater and air pollution impacts, control, regulations, siting, health impacts. **Same as** EOHS 472 and GEOG 444.

**CME 425
Environmental
Remediation
Engineering** 3 OR 4 hrs.
Sources of contamination, regulations, site characterization, impact assessment, waste disposal and containment options, waste treatment options, case studies. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 315.

**CME 427
Engineering
Hydrology** 3 OR 4 hrs.
Processes, techniques, and concepts in hydrology of interest to the engineer: precipitation, interception, evaporation, groundwater, unit hydrographs, flood routing, and statistics. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 215.

**CME 430
Theory of
Elasticity I** 3 OR 4 hrs.
The boundary value problems of linear elasticity. Uniqueness of solution. Reduction to two dimensions: the plane problems, torsion, bending. Polar coordinates and general orthogonal coordinates. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 204 and MATH 481 or the equivalents.

**CME 431
Introduction to
Continuum
Mechanics** 3 OR 4 hrs.
Vectors and tensors, stress, principal stresses and principal axes, deformation, compatibility conditions, constitutive equations, isotropy, and mechanical properties of fluids and solids. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 203 and CME 211; or CME 203 and ME 211.

**CME 432
Energy Methods
in Mechanics** 3 OR 4 hrs.
Variational theorems of elasticity. Applications to establish approximate systems and their solution. Beams, including shear deformation. Introduction to instability theory. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 205.

**CME 433
Fracture
Mechanics and
Failure Analysis I** 3 OR 4 hrs.
Classical theory of strength of materials. Fracture mechanisms maps. Continuum damage mechanics. Introduction to fracture mechanics. Singular problems of elasticity. Stress intensity. Energy release rates. Irwin-Orowan, Barenblatt-Dugdale theories. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 430.

**CME 434
Finite Element
Analysis I** 3 OR 4 hrs.
Establishment of basic finite element, matrix relations for one-dimensional heat conduction problems: truss, beam, and frame structural systems. Solution methods of the resulting equations. Introduction to two-dimensional analysis. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 205 or ME 401 and CS 108.

**CME 435
Theory of
Vibrations I** 3 OR 4 hrs.
Analytical and numerical treatment of linear, discrete systems. Nonlinear discrete systems. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 200 or the equivalent and MATH 220.

**CME 450
Probability and
Reliability in
Structural Design** 3 OR 4 hrs.
Maximum uncertainty principle and probability distributions of random variables. Distributions of extremes and their applications. Statistics of failure. The weakest-link theory. Time to failure. Structural reliability. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Consent of the instructor.

**CME 453
Experimental
Stress Analysis** 0 TO 4 hrs.
Structural similitude and dimensional analysis. Strain measurement techniques. Introduction to photoelasticity. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 430.

**CME 454
Structural Analysis
and Design of
Tall Buildings** 3 OR 4 hrs.
State-of-the-art introduction to structural analysis and design of tall buildings. Load impact on different structural systems. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 401 or CME 409 or the equivalent, or consent of the instructor. Recommended background: Major structural analysis and design courses.

**CME 460
Crystallography
and X-Ray Diffraction** 4 hrs.
Fundamentals of crystallography. Theory of X-ray diffraction, experimental methods, and applications. **Prerequisite(s):** CME 260.

**CME 470
Physical and
Mechanical Properties
of Materials** 4 hrs.
Basic metallurgical phenomena; kinetics and phase stability; diffusion and transformation rates. Mechanical properties of materials; creep; fatigue and fracture. **Prerequisite(s):** CME 260.

**CME 471
Thermodynamics
of Materials** 0 TO 4 hrs.
Application of chemical and thermodynamic principles to processing and characterization of materials. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 260.

**CME 480
Welding Metallurgy** 4 hrs.
Metallurgy of metals joining processes. Selection of processes and design of products manufactured by joining processes. **Prerequisite(s):** CME 260.

**CME 493
Seminar** 1 TO 3 hrs.
Topics of mutual interest to faculty and a group of students. Offered as announced in the *Schedule of Classes*.

**CME 494
Special Topics in
Civil Engineering,
Mechanics, and
Materials** 1 TO 4 hrs.
Subject matter varies from section to section and from semester to semester, depending on the specialties of the instructor. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**CME 496
Special Problems** 1 TO 4 hrs.
Special problems or reading by special arrangement with a faculty member. **Prerequisite(s):** Consent of the instructor.

**CME 500
Design of Concrete
Plate and Shell
Structures** 4 hrs.
Practical design of reinforced concrete slabs, walls, and shells of single and double curvatures. Includes barrel roofs, domes, and storage tanks. **Prerequisite(s):** CME 310.

**CME 501
Urban Transportation** 4 hrs.
Transportation technology, and its relation to travel and location phenomena in large urban areas, as a basis for planning, operating, and design of multimodal transportation systems. **Prerequisite(s):** Grade of C or better or concurrent registration in CME 302; and MATH 210 and ECON 120. Recommended background: For Transportation and Urban Planning majors.

**CME 502
Bridge Design II** 4 hrs.
Theory and design procedures related to the analysis and design of modern bridges, using AASHTO code. Includes concrete and steel structures, construction practices and procedures. **Prerequisite(s):** CME 406.

**CME 503
Advanced
Transportation
Demand Analysis 4 hrs.**
Advanced quantitative analysis and modeling of transportation demand for planning purposes. Disaggregate choice models, traveler behavior and values, activity-based and microsimulation approach to demand modeling. Extensive computer use required. **Prerequisite(s):** CME 508.

**CME 505
Advanced
Soil Mechanics 4 hrs.**
Soil structure, stresses in soil mass, fluid flow, consolidation, drained and undrained shear strength, stress-strain relations, laboratory determination of strength, and compressibility of soils. **Prerequisite(s):** CME 315.

**CME 506
Physical/Chemical
Principles in
Environmental
Systems 4 hrs.**
Physical and chemical principles in natural and engineered environmental systems. Environmental process equilibria and rates. Reactor design and mass transfer in environmental systems. Multiphase environmental processes. **Prerequisite(s):** CME 216.

**CME 507
Sustainable
Transportation
Systems 4 hrs.**
Transportation network analysis, mobile source emission modeling, and life-cycle-based transportation energy modeling. **Prerequisite(s):** Credit or concurrent registration in CME 501; and credit or concurrent registration in CME 508. Recommended background: Transportation engineering, urban planning, and environmental engineering.

**CME 508
Urban Travel
Forecasting 4 hrs.**
Theory and method of forecasting travelers' choices of route, mode, destination, departure time, trip frequency, and origin location in congested urban transportation networks. **Prerequisite(s):** CME 302 and MATH 210 and ECON 120.

**CME 509
Transportation
Networks 4 hrs.**
Application of constrained optimization methods to the analysis, planning, and design of urban transportation networks. **Prerequisite(s):** CME 501 and ECON 501 and MATH 484 and CME 508.

**CME 510
Advanced Design of
Prestressed Concrete
Structures 4 hrs.**
Analysis and design of indeterminate prestressed concrete members. Composite beams, torsion, deflections, and design and detailing of connections. Special topics such as anchorage zone design. **Prerequisite(s):** CME 410.

**CME 516
Design of Landfills
and Impoundments 4 hrs.**
Regulatory overview, site selection, waste characterization, design and construction of landfill and impoundment components, operations, performance monitoring, closure plans, long-term impacts, and monitoring economic analysis. **Prerequisite(s):** CME 315.

**CME 518
Pollution Prevention
Engineering 4 hrs.**
Pollution prevention concepts, planning and economics. Improved manufacturing operations and life cycle assessment. Design for the environment, resource conservation, and sustainable development. **Prerequisite(s):** CME 216.

**CME 520
Earthquake Engineering
of Concrete
Structures 4 hrs.**
Earthquake phenomena; response spectrum and design spectrum concepts; dynamic response of structures to earthquakes, methods of analysis; code approach to earthquake-resistant design; alternative approaches. **Prerequisite(s):** CME 310.

**CME 521
Environmental
Microbiology 4 hrs.**
Microbial cell structure and function, applications of molecular biology in microbial ecology, biogeochemical cycles. **Prerequisite(s):** Credit or concurrent registration in CME 422; or consent of the instructor. Recommended background: A basic understanding of biology.

**CME 523
Environmental
Organic Chemistry 4 hrs.**
Properties and behavior of environmental organic pollutants. Theory and estimation techniques. Concepts of environmental fate assessment. Applications of fate models. **Same as** EOHS 543. **Prerequisite(s):** EOHS 440 or CME 411.

**CME 524
Water Chemistry 4 hrs.**
Chemical equilibria and kinetic principles as applied to processes occurring in natural and engineered water systems. **Same as** EOHS 542. **Prerequisite(s):** EOHS 440 or CME 411.

**CME 525
Applied
Environmental
Biotechnology 4 hrs.**
Advanced biological treatment processes for environmental restoration. Stoichiometry of biological reactions, kinetics, bioremediation, biochemical pathways for pollutant biodegradation, biological nutrient removal. **Prerequisite(s):** Credit or concurrent registration in CME 521; or consent of the instructor.

**CME 526
Air Quality
Management II 2 hrs.**
Air quality management: Integration of diverse aspects. Data interpretation; standards setting; policy implementation; equipment design; hazardous spill modeling; indoor air pollution; case studies. **Same as** EOHS 532. **Prerequisite(s):** EOHS 431 or CME 419.

**CME 530
Theory of
Elasticity II 4 hrs.**
Review of complex variable theory. Complex variable formulation of plane problems. Singularities and crack problems. **Prerequisite(s):** CME 430.

**CME 531
Nonlinear
Continuum Mechanics 4 hrs.**
Matrices and general tensors, isotropic tensor functions, representation theorem, kinematics, polar decompositions, Cauchy-Green tensors, Cauchy stress, Piola-Kirchoff stresses, constitutive laws, frame indifference, hyperelastic materials, and universal solutions. **Prerequisite(s):** CME 430 or CME 431.

**CME 533
Fracture Mechanics
and Failure Analysis II 4 hrs.**
Thermodynamics of irreversible processes. Damage parameter. Eshelby tensor. Crack-damage interaction. Dynamic crack growth. Quasi-static crack propagation. Crack layer theory. Crack driving forces. Fractographic analysis. **Prerequisite(s):** CME 433.

**CME 534
Finite Element
Analysis II 4 hrs.**
Application of the finite element method to the analysis of complex continuum and structural linear systems. Introduction to error analysis and convergence of the finite element solutions. **Same as** ME 534. **Prerequisite(s):** CME 434.

**CME 535
Theory of
Vibrations II 4 hrs.**
Harmonic vibrations; vibrations of a string; vibrations of a beam; vibrations of a membrane; periodic systems; floquet waves; and nonlinear vibrations. **Same as** ME 535. **Prerequisite(s):** CME 435 or ME 408 or the equivalent.

**CME 536
Nondestructive
Testing of Concrete 4 hrs.**
Strength and durability of concrete structures by nondestructive evaluation of the material through acoustic, magnetic, thermal, electrical, and optical phenomena; nondestructive methodologies for evaluation of concrete structures. **Prerequisite(s):** CME 310.

**CME 537
Plasticity I 4 hrs.**
Basic postulates of plasticity. Yield condition and associated flow rules. Isotropic and kinematic hardening rules. Bounding problems. Finite element applications. Slip-line theory.

**CME 539
Elastic Stability 4 hrs.**
Elastic stability of columns, beams, and frames. Limitations of elastic theory, plastic buckling. Eigenproblems and their numerical solution. Elastic stability analysis by the finite element method. **Prerequisite(s):** CME 432.

**CME 540
Interdisciplinary
Approaches to the
Study of Integrated
Human/Natural
Landscapes 3 hrs.**
Examination of ecological, biogeochemical, and evolutionary principles; techniques and philosophies of ecological remediation, restoration, and conservation; environmental regulation and policy; sustainability in theory and practice. **Same as** EAES 540 and BIOS 540. **Prerequisite(s):** Consent of the instructor.

**CME 541
Mechanics of
Composite Materials 4 hrs.**
Anisotropic elastic materials; stress analysis for isotropic materials; Stroh formalism for anisotropic materials; singularities at free edges; stress analysis in composites; wave propagation in composites. **Prerequisite(s):** CME 430 or equivalent.

**CME 544
Structural Dynamics 4 hrs.**
Formulation and solution methods for time-dependent systems. Pertinent numerical techniques and their application to seismic analysis, blast loading, and heat transfer problems. **Prerequisite(s):** CME 434.

**CME 546
Research Methods for
Landscape Ecological
and Anthropogenic
Processes 4 hrs.**
Students will develop the skills to choose and utilize relevant methods and tools used in the study and management of altered natural landscapes to achieve research and management objectives through hands-on interdisciplinary laboratory modules. **Same as** BIOS 546 and EAES 546. **Prerequisite(s):** Consent of the instructor.

CME 547
Field Experiences in Landscape Ecological and Anthropogenic Processes 4 hrs.
Evaluation of the issues and needs of various landscape restorations and related urban-impacted sites in the Chicago metropolitan area based upon selected readings, site visits, and presentations and discussions with the site manager/coordinators. **Same as BIOS 547 and EAES 547. Prerequisite(s):** Consent of the instructor.

CME 549
Subsurface Flow and Contaminant Transport Modeling 4 hrs.
Definitions, basic principles, fluid flow in vadose zone, groundwater flow, contaminant transport in vadose zone, contaminant transport in groundwater, numerical models and field implementation, case studies. **Prerequisite(s):** CME 415 or consent of the instructor.

CME 550
Dynamics of Floating Offshore Structures 4 hrs.
Covers environmental loads and dynamics of floating structures in fluid. **Same as ME 550. Prerequisite(s):** ME 210 and CME 211 and ME 211 and MATH 220; or consent of the instructor.

CME 554
Nonlinear Finite Element Analysis 4 hrs.
Nonlinear elastostatics, consistent linearization, Newton and modified-Newton methods, line search techniques, arc-length methods. Hyperelasticity, B-bar-type methods. Finite deformation elastodynamics, semi-discretization, time-stepping algorithms. **Prerequisite(s):** CME 531 and CME 534; or consent of the instructor.

CME 568
Kinetics of Reactions and Phase Transformations in Metals 4 hrs.
Nucleation and growth kinetics, order of transformation, grain growth recovery, recrystallization, solidification, phase transformation in solids, precipitation hardening, spinodal decomposition, and martensitic transformations. **Prerequisite(s):** Consent of the instructor.

CME 570
Diffusion Phenomena in Materials 4 hrs.
Diffusion mechanisms in crystals; Kirkendall effect; diffusion in ionic solids; diffusion in gases and liquids; diffusion through porous media; kinetics of diffusion controlled processes.

CME 572
Advanced Thermodynamics of Materials 4 hrs.
Treatment of multicomponent system thermodynamics with emphasis on metallurgical process applications. Development of relation between structure of metallic solutions, molten salts, and quasi-chemical models.

CME 580
Infrastructure Management 4 hrs.
Integrated approach to the management of infrastructure systems: design, construction, operations, maintenance, and rehabilitation of facilities. Performance of facilities, approaches to management, and available tools and developing technologies. **Same as UPP 569. Prerequisite(s):** IE 201 or the equivalent or consent of instructor. Recommended background: Familiarity with computer spreadsheets.

CME 581
Vadose Zone Hydrology 4 hrs.
Soil physics and biochemical processes. Flow and contaminants transport in vadose zone. Theory of soil water movement. **Prerequisite(s):** CME 311; and graduate standing; or consent of the instructor.

CME 582
Lake and Watershed Management 4 hrs.
Lake and watershed processes influencing water quality, diffuse pollution, integrated management, and sustainable development of lotic and lentic water resources, watershed restoration. **Prerequisite(s):** CME 311; and graduate or professional standing; or consent of the instructor.

CME 594
Advanced Special Topics in Civil Engineering, Mechanics, and Materials 1 TO 4 hrs.

CME 596
Independent Study 1 TO 4 hrs.

CME 598
Master's Thesis Research 0 TO 16 hrs.
MS thesis work under the supervision of a faculty member. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term.

CME 599
PhD Thesis Research 0 TO 16 hrs.
PhD thesis work under the supervision of an advisor. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term.

Classics

CL 401
Topics in Greek History 3 OR 4 hrs.
Specific topics are announced each term. **Same as HIST 401.** 3 undergraduate hours. 4 graduate hours. May be repeated. **Prerequisite(s):** 3 hours of history or classics.

CL 402
Topics in Roman History 3 OR 4 hrs.
Specific topics are announced each term. **Same as HIST 402.** 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history or classics.

CL 404
Roman Law and the Civil Law Tradition 3 OR 4 hrs.
Roman law and its relationship to values and social structure; social analysis through law; continental law tradition. **Same as CLJ 404, and HIST 404.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CLJ 200 or CL 203 or HIST 203 or consent of the instructor.

CL 405
Herodotus and His World 3 OR 4 hrs.
Examines the Histories of Herodotus—both the text and the culture of Classical Greece compared to the Near East and Egypt. **Same as HIST 405.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Sophomore standing or above.

CL 498
Special Topics in Classical Civilization 3 OR 4 hrs.
Advanced study of topics in classical civilization. Sample topic: Augustus and his image. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. All readings are in English. **Prerequisite(s):** Two classics courses at the 200-level.

CL 499
Advanced Independent Study 3 OR 4 hrs.
Advanced independent study under faculty direction. Reading and papers on chosen topics for qualified students based on preparation and interest. Students must consult with faculty. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the faculty member and department.

Committee on Institutional Cooperation

CIC 500
Committee on Institutional Cooperation 0 TO 16 hrs.
Holding course for UIC doctoral students taking approved course work at other institutions through the CIC Traveling Scholar Program. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Admission to a doctoral program and approval of the Graduate College.

Communication

COMM 404
Discourse Analysis 3 OR 4 hrs.
Nonverbal aspects of communication; rules of communication; speech acts; conversational coherences; acts and sequences in communication; marital communication patterns. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** COMM 304 or COMM 315 or COMM 416 or approval of the department.

COMM 416
Conflict and Communication 3 OR 4 hrs.
Students learn to manage and resolve conflict in business, governmental, and community settings. Practical analysis of interpersonal and group conflict cases. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** COMM 312 and COMM 313 and COMM 315; or approval of the department.

COMM 423
Discourse and Rhetoric 3 OR 4 hrs.
Exploration of interconnections between language and social practices with attention to multiple components of discursive situations: senders, receivers, context, code, media, and content. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** COMM 101 and COMM 102 and COMM 201; or approval of the department.

COMM 430
Media, Information, and Society 3 OR 4 hrs.
News as a distinct form of mass communication, involving social functions and significant questions about facts, truth, knowledge, and values. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** COMM 103 and COMM 200; or COMM 300; or approval of the department.

**COMM 434
Global
Communication
Systems 3 OR 4 hrs.**
Structure and flow of international communication. Media organization systems. International impact of new media and information technology. Impact of U.S. media reporting on foreign affairs. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Approval of the department.

**COMM 454
Cognitive
Psychology of
Language 3 hrs.**
Provides students with a survey of methods, theory, and research in language and discourse processing. **Same as** LING 474 and PSCH 454. **Prerequisite(s):** Graduate standing or consent of the instructor.

**COMM 456
Topics in the
History of
Communications 3 OR 4 hrs.**
This course introduces students to major developments in the history of communications, with a focus on the political and cultural dimension of technologies. **Same as** HIST 456. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Consent of the instructor. Recommended background: At least one history course at the 100-level.

**COMM 458
Minorities and
Communication 3 OR 4 hrs.**
Description and analysis of the processes through which ethnic and racial perceptions shape public discourse. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Two communication courses at the 300-level; or approval of the department.

**COMM 460
Visual
Communication 3 OR 4 hrs.**
Exploration of processes through which meaning is derived from verbal and visual roles of media images in the cultural circuit. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Two communication courses at the 300-level; or approval of the department.

**COMM 467
Public Opinion
and Political
Communication 3 OR 4 hrs.**
Nature of public opinion and political communication systems. Patterns of opinion distribution and its measurement. Forces shaping public opinion and its impact on public policy. **Same as** POLS 467. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** POLS 200 or the equivalent or consent of the instructor.

**COMM 473
Organizations and
Their Publics 3 OR 4 hrs.**
History of relevant theories and models; problem solving: analyzing goals, identifying publics, setting objectives, designing messages, choosing channels, planning implementation (budgeting, staffing, timetables), evaluating effects. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** COMM 201 and COMM 306; or approval of the department.

**COMM 474
Internship 1 TO 8 hrs.**
Students work in an approved professional setting. Individual projects developed through conferences with a faculty member and a field supervisor. May be repeated. Students may register in more than one section per term. A maximum of three hours may be counted toward the undergraduate communication major requirements. May not be counted toward the minimum Master of Arts degree requirements. **Prerequisite(s):** 12 hours of upper-division courses in communication, with a 3.00 grade point average in those courses; recommendation of two faculty members and approval of the department obtained in the semester prior to internship.

**COMM 490
Seminar in Culture and
Communication 3 hrs.**
Analysis of contrastive cultural paradigms (interethnic, gender, class) to develop student's awareness of own socialization and cultural orientation. **Prerequisite(s):** COMM 301 plus any other 300-level communication course, or approval of department.

**COMM 491
Seminar in Media and
Communication 3 hrs.**
Analysis of contemporary or historical issues in mediated communication. **Prerequisite(s):** COMM 301 plus any other 300-level communication course, or approval of the department.

**COMM 494
Special Topics in
Communication 3 OR 4 hrs.**
Contemporary trends in the field of communication. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). **Prerequisite(s):** COMM 200 and COMM 201 and consent of the instructor; or approval of the department.

**COMM 498
Independent
Study 1 TO 4 hrs.**
Individual investigation of special problems (student-initiated or related to faculty research). May be used for special projects, such as interdisciplinary seminars. May be repeated to a maximum of 8 hours. Students may register in more than one section per term. A maximum of 3 hours of credit may be applied toward the major in Communication. Credit earned may not be applied toward the minimum Master of Arts in Communication degree requirements. **Prerequisite(s):** Senior standing and approval of the department.

**COMM 500
Introduction to
Communication
Research 4 hrs.**
History of the field, research traditions, communication viewed as social science; forming research questions, reviewing and critiquing literature, formulating hypotheses and rationale, conceptually defining variables. **Prerequisite(s):** Consent of the instructor or graduate standing in Communication.

**COMM 501
Operationalizing
Communication
Research 4 hrs.**
Levels of measurement; operational definitions; sampling qualitative and quantitative designs; coding and analysis of data; statistics; pilot testing and instrument/design revision; writing research reports. **Prerequisite(s):** COMM 500.

**COMM 502
Seminar in
Media Studies 4 hrs.**
In-depth, intensive examination of theories, perspectives, and approaches to media studies. **Prerequisite(s):** COMM 500; or consent of the instructor.

**COMM 503
Seminar in
Intercultural
Communication 4 hrs.**
Introduction to basic theoretical concepts and important issues in intercultural communication. **Prerequisite(s):** COMM 500; or consent of the instructor.

**COMM 504
Communication,
Technology, and
Society Proseminar 4 hrs.**
Introduction to philosophy and history of communication technologies. The social impact of communication technology.

**COMM 505
Organizational
Communication 4 hrs.**
Classic and current research. Models that examine organizational communication; assessment of organizational problems and conduct of problem-solving research. **Prerequisite(s):** COMM 306 and COMM 500; or consent of the instructor.

**COMM 506
Cross-Cultural
Communication 4 hrs.**
Analysis of different theoretical approaches to cross-cultural communication (sociolinguistic, attributional); contrastive analysis of Western and non-Western cultural systems (interactional etiquette, discourse rules). **Same as** LING 506.

**COMM 508
New Media of
Communication 4 hrs.**
Theories, history, and philosophy of the new media of communication. Social diffusion and consequences of new media technologies. Assessment and evaluation of the social impact of new media. **Prerequisite(s):** COMM 504.

**COMM 525
Approaches to
Rhetorical Criticism 4 hrs.**
Contemporary approaches to rhetorical criticism. Each offering focuses upon the distinctive contributions of specified rhetoricians to the theory and practice of rhetorical criticism. May be repeated to a maximum of 12 hours. **Prerequisite(s):** COMM 410.

**COMM 534
Mass Communication
Theory 4 hrs.**
Introduction to major theories of mass communication: their social history and substantive claims; distinction between mass-mediated and other forms of communication; implications of distinction.

**COMM 567
Topics in
Political
Communication 4 hrs.**
Intensive study of selected aspects; organizational communication in public institutions, urban political communication patterns, communication elites. Independent research using a variety of community research techniques. **Same as** PA 567 and POLS 567. **Prerequisite(s):** Consent of the instructor.

**COMM 570
Seminar in
Philosophy of
Technology 4 hrs.**
Conceptual approaches to technology, with special emphasis on communication technologies. Emphasis on the application of values, beliefs, and thoughts related to the interplay of technology and society. **Prerequisite(s):** COMM 504.

**COMM 580
Qualitative
Methods in
Communication 4 hrs.**
Qualitative methods course analyzing language and culture patterns. **Same as** LING 582. **Prerequisite(s):** COMM 501 or consent of the instructor.

COMM 591
Health Communication 4 hrs.
Focusing on interpersonal, organizational, and public contexts, seminar participants will review current literature in health communication, and apply selected communication concepts to health-related situations.
Prerequisite(s): Graduate standing in Communication, or enrollment in a health professions school or college, or consent of the instructor.

COMM 594
Advanced Special Topics in Communication 1 TO 4 hrs.
Student may register for more than one section per term. Advanced topics in communication theory and research. Subject matter varies. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

COMM 596
Independent Research 1 TO 4 hrs.
Department-approved research projects not included in thesis research. May be repeated to a maximum of 6 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the head of the department.

COMM 598
Thesis Research 0 TO 16 hrs.
Under guidance of an advisor and committee the student develops and conducts a research project addressing a communication problem of a basic or applied nature. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term.
Prerequisite(s): COMM 501.

COMM 599
Dissertation Research 0 TO 16 hrs.
Under guidance of an advisor and committee, the student conducts research on the topic of the doctoral dissertation. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register for more than one section per term. **Prerequisite(s):** Consent of the instructor.

Community Health Sciences

CHSC 400
Public Health Concepts and Practice 3 hrs.
Concepts, principles, discussions, exercises, and case studies that provide an overview of the philosophy, purpose, history, organization, functions, tools, activities, and results of public health practice. **Prerequisite(s):** Enrollment restricted to Public Health students; other graduate, professional, and advanced undergraduate students admitted by consent as space permits. To obtain consent, see the SPH registrar.

CHSC 401
Behavioral Sciences in Public Health 3 hrs.
Provides grounding in the social and behavioral sciences to analyze public health issues. Includes analysis of individual, community, institutional, and societal factors influencing health and illness.
Prerequisite(s): Enrollment restricted to Public Health students; other graduate, professional, and advanced undergraduate students admitted by consent as space permits. To obtain consent, see the SPH registrar.

CHSC 403
The Future of Public Health 2 hrs.
Examines the critical issues facing the public health system in the United States by considering concepts, issues, and recommendations of public health practice experts. Recommended background: Completion of CHSC 400.

CHSC 405
Leadership in Public Health Practice 3 hrs.
Utilizing public health core functions, this course explores leadership style and practice through case studies and techniques which enhance leadership development. **Same as** HPA 405. **Prerequisite(s):** CHSC 400 and consent of the instructor.

CHSC 411
Nutrition for Public Health Professionals 3 hrs.
Foundation course to introduce nutrition principles and their application to public health populations and problems.
Prerequisite(s): CHSC 400; and graduate or professional standing; or consent of the instructor.

CHSC 419
Public Health Aspects of Sexuality and Women's Health 3 hrs.
An overview of human sexuality from a public health view with special emphasis on family planning, sexuality, and behavior effects on women's health. **Same as** GWS 419. **Prerequisite(s):** Graduate standing; or junior standing or above with consent of the instructor.

CHSC 425
Public Health and Aging 3 hrs.
Gerontological public health issues are examined through the psychosocial and physical dimensions of the aging process and interactions between the elderly and the healthcare system.

CHSC 431
Community Assessment in Public Health 3 hrs.
An introduction to community assessment in health promotion. Concepts and models of community health and community social dynamics: community participation and capacity building; strategies for situated inquiry and use of existing indicators; ethical issues. Fieldwork required. **Prerequisite(s):** Credit or concurrent registration in BSTT 400 and credit or concurrent registration in EPID 400 and credit or concurrent registration in CHSC 400 and consent of the instructor.

CHSC 432
Analytic Methods in Public Health 3 hrs.
Provides analytic and computer skills needed for assessment and planning in public health and for maximizing the acquisition and use of public health data.
Prerequisite(s): BSTT 400 and EPID 400 and CHSC 400.

CHSC 433
Public Health Planning and Evaluation 3 hrs.
Planning and evaluation for community health programs, including proposal development and evaluation; considerations for community/consumer involvement in planning process.
Prerequisite(s): Credit or concurrent registration in CHSC 431 and credit or concurrent registration in CHSC 480; or consent of the instructor.

CHSC 434
Introduction to Qualitative Methods in Public Health 3 hrs.
Introduction to the major techniques used in qualitative research (observation, participant observation, in-depth interviews). Includes field and in-class exercises, and introduces computer-assisted qualitative data analysis.

CHSC 441
Introduction to Maternal and Child Health 3 hrs.
Title V maternal and child health programs; concepts of delivery risks by age; effective interventions and public sector organization for delivery of MCH services. **Same as** GWS 441. **Prerequisite(s):** Consent of the instructor. Recommended background: Some knowledge of maternal and child health issues.

CHSC 446
Research Methods in Community Health 3 hrs.
Introduction to principles and techniques for scientific investigation of problems in public health research and practice.
Prerequisite(s): BSTT 400 or the equivalent. Restricted to graduate or professional standing, or consent of the instructor.

CHSC 447
Survey Planning and Design 3 hrs.
Theory and applications of sample survey planning and design for conducting research in health sciences and related fields. Addresses three major topics: survey design and planning, sampling, and data collection procedures. **Same as** PA 447.
Prerequisite(s): Graduate or professional standing and BSTT 400 or the equivalent. Recommended background: Credit in CHSC 446 or the equivalent.

CHSC 450
Introduction to International Health 3 hrs.
Survey of health conditions focusing on Third World issues, including consequences of population trends, disease prevalence, prevention/control, and technology transfer in socioeconomic context.

CHSC 456
Women's Health: A Primary Healthcare Approach 3 hrs.
Health promotion and disease prevention in women's health. Includes community experience with community women. Primary healthcare approaches examined. **Same as** NUSC 455 and NUWH 455. **Prerequisite(s):** Consent of the instructor.

CHSC 464
Survey of Developmental Disabilities 3 hrs.
Survey of the developmental disabilities field, including basic definitions, history of DD services, relevant public policies and legislation, service delivery systems, and research. **Same as** DHD 464.
Prerequisite(s): Graduate standing or consent of the instructor.

CHSC 480
Health Education and Health Promotion 3 hrs.
Theories of health education and health promotion for public health professionals; approaches for individual, group, and community-level behavior change.
Prerequisite(s): Graduate or professional standing. Priority enrollment given to students in the division of Community Health Sciences within the School of Public Health. Recommended background: For CHSC students, CHSC 401 is recommended as a prerequisite.

CHSC 485
Communications, Mass Media, and Public Health 3 hrs.
Examines the development, theoretical bases, and assessments of mass media interventions, and the intended and unintended effects of the mass media in society.

**CHSC 494
Special Topics in
Community Health
Sciences** 1 TO 4 hrs.
Study of topics in maternal and child health, gerontology, behavioral science of health and illness, international health, community health, and public health practice. May be repeated. Students may register in more than one section per term. Topics vary by semester. **Prerequisite(s):** Consent of the instructor. Restricted to graduate or professional standing, or consent of the instructor.

**CHSC 500
Proseminar in
Community Health
Sciences** 3 hrs.
Analysis of current key literature from behavioral sciences, maternal and child health, gerontology, general and miscellaneous fields of community health sciences. **Prerequisite(s):** CHSC 400 and 8 semester hours in student's major field.

**CHSC 510
Women's, Children's,
and Family Health:
Outcomes and
Measurement** 3 hrs.
Introduces key theoretical frameworks, measurement tools, and relevant datasets needed to understand and describe the health status of women, children, and families at the individual and population/community level. **Prerequisite(s):** Consent of the instructor. Recommended background: Enrollment in the Master of Public Health or other graduate program.

**CHSC 511
MCH Delivery
Systems: Services,
Programs, and
Policies** 3 hrs.
Structure, funding, and evidence base for MCH service delivery systems at the federal, state, and local levels. **Prerequisite(s):** CHSC 400 and CHSC 510; or consent of the instructor. Recommended background: Enrollment in the Master of Public Health or other graduate program.

**CHSC 514
Nutritional
Epidemiology** 3 hrs.
Examination of nutritional epidemiological techniques to the design of population-based nutrition research. Students complete research proposal using nutritional assessment, epidemiology and research skills. **Prerequisite(s):** CHSC 411 or EPID 403 or consent of the instructor.

**CHSC 518
The Epidemiology
of Pediatric Diseases** 3 hrs.
Familiarizes the student with issues unique to research on children. Lecture topics include epidemiology of childhood diseases, important research studies, and methodologic problems specific to studying children. **Same as** EPID 518. **Prerequisite(s):** EPID 400 or EPID 403, EPID 404 and BSTT 400; or consent of the instructor.

**CHSC 526
Family Perspectives
on Disability** 3 hrs.
Examines trends, theories and research methods, policies, and family-centered intervention approaches for families of persons with disabilities. **Same as** DHD 526 and DIS 526. **Prerequisite(s):** Consent of the instructor.

**CHSC 527
Critical Issues
in Long-Term
Care Policy** 3 hrs.
Long-term care organization, financing, delivery utilization, and policy, emphasizing affordability, access, and quality in a managed-care environment. **Same as** HPA 527. **Prerequisite(s):** CHSC 400 and CHSC 425; or consent of the instructor.

**CHSC 528
Societal Analysis of
Aging, Health, and
Healthcare** 3 hrs.
Analysis of aging, health, and healthcare issues mainly from sociological and public health perspectives. Review and application of appropriate concepts, theories, and methods. **Same as** SOC 528. **Prerequisite(s):** CHSC 425 or consent of instructor.

**CHSC 529
Gerontological
Health/Illness
Behavior** 3 hrs.
Perceptions and behaviors of older adults are examined in reference to illness prevention, health promotion, and reactions to acute and chronic illness. Priority enrollment is given to students in the gerontology track of the division of Community Health Sciences within the School of Public Health; or consent of the instructor.

**CHSC 534
Management and
Analysis of
Qualitative Data** 3 hrs.
A hands-on course that teaches conceptual and technical skills for organizing and analyzing qualitative (textual) data from focus groups, in-depth interviews, and other sources, using specialized text-analysis computer software. Extensive computer use required. **Prerequisite(s):** CHSC 434 or consent of the instructor.

**CHSC 542
Advanced Maternal
and Child Health
Applied Programs** 3 hrs.
Interventions and services in healthcare programs for maternal and child populations. In-depth program analysis and problem solving with emphasis on public sector programs, population needs, and program evaluation. **Prerequisite(s):** CHSC 441.

**CHSC 543
MCH Policy
and Advocacy** 3 hrs.
Explores the social, economic, and political dynamics which influence the development and implementation of MCH policy and U.S. health policy in general. **Prerequisite(s):** CHSC 441 or consent of the instructor.

**CHSC 544
Public Health Aspects
of Adolescent Health** 3 hrs.
Overview of critical health/developmental issues in adolescence; youth participation in health initiatives. Cross-cutting perspectives of social identity, gender, culture, and social class will be essential to any topic discussion/assignment. **Same as** SOCW 546. **Prerequisite(s):** CHSC 446 or consent on the instructor. Recommended background: Research, policy, and/or practice and interest in adolescence and in community development and intervention studies; ethnic/minority studies; education; health and social/human service professions.

**CHSC 545
Reproductive and
Perinatal Health** 3 hrs.
Focuses on the epidemiology of key reproductive and perinatal health outcomes and relevant health services and health policies. **Same as** EPID 545. **Prerequisite(s):** BSTT 400; and EPID 400 or EPID 403; or consent of the instructor.

**CHSC 547
Public Health
Approaches to
Maternal and Child
Nutrition** 2 hrs.
Advanced seminar to integrate role and application of nutrition for maternal and child populations. **Prerequisite(s):** CHSC 411 or CHSC 441 or consent of the instructor.

**CHSC 548
Readings in
Reproductive and
Perinatal Epidemiology** 2 hrs.
Advanced seminar in reproductive/perinatal epidemiology with particular emphasis on methodologic issues. **Same as** EPID 548. **Prerequisite(s):** CHSC 441 and EPID 404 or consent of the instructor. Recommended background: Maternal and child health and epidemiology.

**CHSC 549
Advanced Applied
Methods in MCH
Epidemiology** 3 hrs.
Gives conceptual and technical understanding of statistical and epidemiological methods, builds skills/proficiency in applying these. Attention is given to data handling tasks and to statistical/epidemiologic strategies for analysis and presentation. **Same as** EPID 549. **Prerequisite(s):** EPID 402 or EPID 404; and BSTT 401 and EPID 406; or consent of the instructor. Recommended background: Credit or concurrent registration in EPID 501.

**CHSC 550
Advanced Concepts
in Community
Health Sciences** 3 hrs.
Critical review of landmark publications in community health, with analysis of current literature for developing community health science and practice. **Prerequisite(s):** CHSC 400 or the equivalent.

**CHSC 551
Foundations of Public
Health Inquiry** 3 hrs.
Examination of research paradigms, precepts of theory development, literature synthesis, and ethical principles; all enhance the scholarliness and meaningfulness of doctoral students' public health inquiry. **Prerequisite(s):** Open only to PhD degree students.

**CHSC 553
Family Planning:
Policies and Practices** 2 hrs.
Provides an understanding of family planning concepts, including contraceptive and abortion methods, and the policies that affect their implementation. **Prerequisite(s):** CHSC 400 and EPID 403 and BSTT 400; or consent of the instructor.

**CHSC 554
International Women's
Health: Current and
Emerging Issues** 3 hrs.
Enhance students' understanding of, and sensitivity to, current and emerging international women's health issues. The focus will include studying social and cultural factors affecting women's physical as well as psychosocial health. **Prerequisite(s):** CHSC 400; or consent of the instructor.

**CHSC 564
Community Integration
in Developmental
Disabilities** 3 hrs.
Historical and contemporary issues pertaining to the empowerment and integration of persons with developmental disabilities into community settings. **Same as** DHD 564

CHSC 577
Survey Questionnaire Design 3 hrs.
Concepts and strategies for developing survey questionnaires for various modes of survey data collection. Students develop and present questionnaires related to their individual interests. **Same as PA 577. Prerequisite(s):** CHSC 446 or CHSC 447; or consent of the instructor.

CHSC 584
Community Organizing for Health 3 hrs.
Focus on the bases of facilitating community-organizing processes in health promotion, including theories, fieldwork tools, feminist and international perspectives. Fieldwork required. **Prerequisite(s):** CHSC 480 or consent of the instructor.

CHSC 586
Health Behavior Interventions 3 hrs.
Addresses advanced concepts and strategies for the development, implementation, and evaluation of public health interventions to change health behaviors. **Prerequisite(s):** CHSC 446 and CHSC 480.

CHSC 594
Advanced Special Topics in Community Health Sciences 1 TO 4 hrs.
Advanced study of topics in maternal and child health, gerontology, behavioral science of health and illness, international health, community health, and public health practice. May be repeated. Students may register in more than one section per term. Topics vary by semester. **Prerequisite(s):** BSTT 400 and CHSC 400 and EPID 400 or equivalent and consent of the instructor. Recommended background: Advanced placement in graduate program.

CHSC 595
Seminar in Community Health Sciences 1 TO 3 hrs.
Analysis of current theory and research in community health sciences. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. Topics vary by seminar. **Prerequisite(s):** Consent of the instructor. Recommended background: Advanced placement in graduate program.

Computer Science

CS 401
Computer Algorithms I 3 OR 4 hrs.
Design and analysis of computer algorithms. Divide-and-conquer, dynamic programming, greedy method, backtracking. Algorithms for sorting, searching, graph computations, pattern matching, NP-complete problems. **Same as MCS 401.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MCS 360; or grade of C or better in CS 202.

CS 411
Artificial Intelligence I 3 OR 4 hrs.
Problem representation; rule-based problem-solving methods; heuristic search techniques. Application to expert systems, theorem proving, language understanding. Individual projects. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 484. **Prerequisite(s):** CS 202.

CS 415
Computer Vision I 3 OR 4 hrs.
Computer vision system design. Segmentation and representation of regions and boundaries; image filtering; object recognition; advanced topics (examples: texture, stereo, color); applications. Programming assignments. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 487. **Prerequisite(s):** CS 202 or MCS 360; or consent of the instructor.

CS 421
Natural Language Processing 3 OR 4 hrs.
Design of natural language processing systems; part-of-speech tagging, statistical and symbolic parsers; semantic interpretation; discourse and dialogue processing; natural language generation; applications. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CS 301 or MCS 441.

CS 422
User Interface Design and Programming 3 OR 4 hrs.
User interface design, implementation, and evaluation: user-centered design methodologies, windowing systems, I/O devices and techniques, event-loop programming, user studies. Programming projects. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 478. **Prerequisite(s):** CS 340.

CS 426
Video Game Design and Development 3 OR 4 hrs.
Theory and practice of video game design and programming. Students will form interdisciplinary teams, to design, build, and demonstrate video games or related interactive simulation environments. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CS 107 and CS 201 and CS 488; or consent of the instructor.

CS 440
Software Engineering I 3 OR 4 hrs.
Software life-cycle model, requirement specification techniques, large-scale software design techniques and tools, implementation issues, testing and debugging techniques, software maintenance. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 470. **Prerequisite(s):** CS 340.

CS 441
Distributed Object Programming Using Middleware 3 OR 4 hrs.
Design and implementation of distributed object programs using middleware software standards; interface definition languages and programming language mappings; static and dynamic object communication mechanisms. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** CS 340 and CS 385.

CS 442
Software Engineering II 3 OR 4 hrs.
Advanced concepts in software development: requirements engineering, cost estimation, risk analysis, extreme programming, regression test case selection, and design patterns. Software lab assignments required. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** CS 440.

CS 450
Introduction to Networking 3 OR 4 hrs.
Network protocols, algorithms, and software issues. Topics include the Open Systems Interconnect model, data link, network and transport layers, TCP/IP, ATM, and mobile networks. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 433. Credit is not given for CS 450 if the student has credit for ECE 433. **Prerequisite(s):** CS 202 and CS 385; and STAT 381 or STAT 401 or IE 342.

CS 455
Design and Implementation of Network Protocols 3 OR 4 hrs.
Network protocols and their software, examines OS network interface through network layers. Topics include routing, congestion control, fault tolerance, security, name servers, multicast, and performance. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CS 340 and CS 450.

CS 466
Advanced Computer Architecture 3 OR 4 hrs.
Design and analysis of high-performance uniprocessors. Topics include arithmetic: multiplication, division, shifting; processor: pipelining, multiple function units, instruction sets; memory: caches, modules; virtual machines. **Same as ECE 466.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ECE 366 or CS 366.

CS 469
Computer Systems Design 3 OR 4 hrs.
Analysis and modeling of digital systems; hardware description languages; CAD tools for simulation, synthesis, and verification of computer systems. Project: a simple processor design. 3 undergraduate hours. 4 graduate hours. **Same as ECE 469. Prerequisite(s):** CS 366; or ECE 366 and ECE 368.

CS 473
Compiler Design 3 OR 4 hrs.
Language translation: lexical analysis, parsing schemes, symbol table management, syntax and semantic error detection, and code generation. Development of fully functional compiler. **Same as MCS 411.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in CS 301 or grade of C or better in MCS 441; and grade of C or better in CS 202 or grade of C or better in MCS 360; and grade of C or better in CS 266.

CS 474
Object-Oriented Languages and Environments 3 OR 4 hrs.
Data abstraction, classes and objects, messages and methods, polymorphism and dynamic binding, inheritance. Object-oriented design. Pure and hybrid object-oriented languages. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 474. **Prerequisite(s):** CS 340.

CS 475
Object-Oriented Programming 3 OR 4 hrs.
OO paradigm: classes, messages, methods, variables, inheritance, polymorphism; the C++ and Java languages; programming labs required. 3 undergraduate hours. 4 graduate hours. Credit is not given for CS 475 if the student has credit for CS 340 or CS 474. Extensive computer use required. **Prerequisite(s):** CS 202; and consent of the instructor.

CS 476
Programming Language Design 3 OR 4 hrs.
Definition, design, and implementation of programming languages. Syntactic and semantic description; variable bindings, control and data structures, parsing, code generation, and optimization; exception handling; data abstraction. **Same as MCS 415.** 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 476. **Prerequisite(s):** MCS 360 or CS 340.

CS 480
Database Systems 3 OR 4 hrs.
Database design, logical design, physical design. Relational databases. Recovery, concurrency control. Normalization. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 480. **Prerequisite(s):** CS 202.

CS 485 Networked Operating Systems Programming 4 OR 5 hrs.
Concepts, design, and programming of multiprocess and distributed systems; interprocess communications; fault tolerance; distributed programming semantics. Programming assignments and project required. 4 undergraduate hours. 5 graduate hours. Previously listed as EECS 471. **Prerequisite(s):** CS 385.

CS 487 Building Secure Computer Systems 3 OR 4 hrs.
Building and programming secure systems; protecting systems from threats and reduction of vulnerabilities; Includes application, host, and network security. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** Grade of C or better in CS 385; and senior standing or above; or consent of the instructor.

CS 488 Computer Graphics I 0 TO 4 hrs.
Principles of interactive computer graphics. Raster and vector display techniques, and hardware considerations. Introduction to two-dimensional and three-dimensional rendering. Laboratory. **Same as** AD 488. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 488. **Prerequisite(s):** Credit or concurrent registration in CS 340.

CS 491 Seminar 1 TO 4 hrs.
Topics of mutual interest to a faculty member and a group of students. Offered as announced by department bulletin or the Schedule of Classes. May be repeated. Previously listed as EECS 491. **Prerequisite(s):** Consent of the instructor.

CS 493 Special Problems 2 TO 4 hrs.
Special problems or reading by special arrangement with the faculty. Previously listed as EECS 493. No graduate credit for computer science majors. **Prerequisite(s):** Consent of the instructor.

CS 501 Computer Algorithms II 4 hrs.
Continuation of MCS 401/CS 401). Advanced topics in algorithms. Lower bounds. Union-find problems. Fast Fourier transform. Complexity of arithmetic, polynomial, and matrix calculations. Approximation algorithms. Parallel algorithms. **Same as** MCS 501. **Prerequisite(s):** MCS 401 or CS 401.

CS 502 Design and Analysis of Efficient Algorithms in Computational Molecular Biology 4 hrs.
Design and analysis of efficient algorithms for computational problems in molecular biology; such as genome sequencing and construction of evolutionary trees. **Prerequisite(s):** Grade of B or better in CS 401; or consent of the instructor. Recommended background: CS 501 and some exposure to basic chemistry and biology.

CS 503 Applied Graph Theory 4 hrs.
Paths, circuits, trees, cutsets, planarity, duality, matrices, and vector space of graphs, directed graphs, coloring, covering, matching, and applications to switching networks and computer science. Previously listed as EECS 563. **Prerequisite(s):** Consent of the instructor.

CS 505 Computability and Complexity Theory 4 hrs.
Turing machines, undecidability, Rice's theorem, recursively enumerable sets, complexity theory, hierarchy theorems, alternation, parallel complexity classes, and complete problems. Previously listed as EECS 561. **Prerequisite(s):** CS 301.

CS 511 Artificial Intelligence II 4 hrs.
Predicate logic and resolution strategies, reasoning under uncertainty, incomplete information reasoning, state and change, planning, temporal reasoning knowledge representation, learning, advanced search techniques, and current topics. Previously listed as EECS 584. **Prerequisite(s):** CS 411.

CS 514 Expert Systems 4 hrs.
Anatomy of expert systems, types of expert systems, architecture of an expert system, expert system tools, building an expert system; expert systems in the marketplace. Previously listed as EECS 585. **Prerequisite(s):** CS 411.

CS 515 Advanced Computer Vision 4 hrs.
Analysis of 3-D scene images. Shape from shading, texture, line drawings, and surface orientation. Surface representation methods and reconstruction of 3-D scenes. Design of knowledge-based vision systems and 3-D applications. Previously listed as EECS 587. **Prerequisite(s):** CS 415.

CS 521 Statistical Natural Language Processing 4 hrs.
Statistical techniques for natural language processing, including maximum likelihood estimation, hidden Markov models, and probabilistic grammars; and their applications, including parsing, semantic inference, dialogue processing, and summarization. **Prerequisite(s):** CS 421; or consent of the instructor.

CS 522 Human-Computer Interaction 4 hrs.
The computer-user interface: media, languages, interaction techniques, user modeling. Human factors in software development. Theory, experimental methods, evaluation, tools. Project required. Previously listed as EECS 578. **Prerequisite(s):** CS 422.

CS 523 Multimedia Systems 4 hrs.
Principles of multimedia interface design for computer applications. Multidisciplinary approaches to integrating text, still images, animation, and sound into human-computer interfaces. Previously listed as EECS 579. **Prerequisite(s):** CS 422; or consent of the instructor.

CS 525 Advanced Graphics Processor Programming 4 hrs.
Graphics processing unit (GPU) programming languages, vertex shaders, fragment shaders, general purpose computing on GPUs. **Prerequisite(s):** CS 488; or graduate standing; and consent of the instructor.

CS 526 Computer Graphics II 4 hrs.
State of the art in computer graphics and interactive techniques: three-dimensional surface and volumetric models. A laboratory is required. **Same as** AD 588. Previously listed as EECS 588. **Prerequisite(s):** CS 488.

CS 527 Computer Animation 4 hrs.
Theoretical and practical aspects of computer animation and computer-assisted animation in two and three dimensions and in black and white or full color. Laboratory. Previously listed as EECS 589. **Prerequisite(s):** CS 488.

CS 528 Virtual Reality 4 hrs.
Principles of virtual reality and virtual environments. Hardware, software, and design issues in presenting images and sound in immersive environments. Input and control devices. Quantitative assessment of virtual reality systems. Previously listed as EECS 590. **Prerequisite(s):** CS 488.

CS 540 Advanced Topics in Software Engineering 4 hrs.
Formal methods; requirements and specification languages; program flow analysis; validation and verification; software metrics; program representations; software tools; software testing; software process. Previously listed as EECS 570. **Prerequisite(s):** CS 440; or consent of the instructor.

CS 541 Software Engineering Environments 4 hrs.
Software configuration management; software quality assurance; software engineering economics; software factory; software reuse; computer aided software engineering; software prototyping. Previously listed as EECS 571. **Prerequisite(s):** CS 540; or consent of the instructor.

CS 542 Distributed Software Engineering 4 hrs.
Fundamental concepts of distributed software. Task allocation algorithms, language concepts for concurrency and communication, analysis methods and tools, and formal models. Previously listed as EECS 572. **Prerequisite(s):** CS 440.

CS 545 Formal Methods in Concurrent and Distributed Systems 4 hrs.
Formal methods in concurrent and distributed systems, particularly temporal logic and automata for specifying and reasoning real-time properties. Automated and manual techniques for checking correctness. Previously listed as EECS 575. **Prerequisite(s):** Consent of the instructor.

CS 553 Distributed Computing Systems 4 hrs.
Distributed computing systems terminology and design issues. Data communications protocols; distributed operating systems, resource management, and synchronization; security; database systems. Previously listed as EECS 573. **Prerequisite(s):** CS 366 and CS 385.

CS 554 Advanced Topics in Concurrent Computing Systems 4 hrs.
Petri nets, methods, and their applications to concurrent, distributed, parallel, and data-flow systems; and logic programming and rule-based systems. Previously listed as EECS 564. **Prerequisite(s):** Consent of the instructor.

CS 559 Neural Networks 4 hrs.
Artificial neural networks, and perceptron, backpropagation, Kohonen nets, statistical methods, Hopfield nets, associative memories, large memory networks, and cognition. **Same as** ECE 559. Previously listed as EECS 559. **Prerequisite(s):** Consent of the instructor.

CS 560 Fuzzy Logic 4 hrs.
Crisp and fuzzy sets; membership functions; fuzzy operations; fuzzy relations and their solution; approximate reasoning; fuzzy modeling and programming; applications; project. Previously listed as EECS 560. **Prerequisite(s):** Consent of the instructor.

CS 565 Physical Design Automation 4 hrs.
Computer-aided physical design of integrated circuits; circuit partitioning and placement; floorplanning; global and detailed routing; timing optimization; general optimization tools: local search, constraint relaxation. **Same as** ECE 565. **Prerequisite(s):** CS 401; and CS 466 or ECE 465.

CS 566 Parallel Processing 4 hrs.
Parallel processing from the computer science perspective. Includes architecture (bus-based, lockstep, SIMD), programming languages (functional, traditional, and extensions), compilers, interconnection networks, and algorithms. **Same as** ECE 566. **Prerequisite(s):** CS 466 or ECE 466; and CS 401.

CS 569 High-Performance Processors and Systems 4 hrs.
Instruction-level parallelism, multiple-instruction issue, branch prediction, instruction and data prefetching, novel cache and DRAM organization, high-performance interconnect, compilation issues, and case studies. **Same as** ECE 569. **Prerequisite(s):** CS 466 or ECE 466; and graduate standing.

CS 577 Object Stores 4 hrs.
Use, design, and implementation of object stores. An object store enables object-oriented programming to be extended by storing objects on disk and communicating objects between processes. Previously listed as EECS 577. **Prerequisite(s):** CS 385 and CS 480; and knowledge of C++, or consent of the instructor.

CS 580 Query Processing in Database Systems 4 hrs.
Query processing in deductive databases and in distributed/parallel databases systems. **Same as** IDS 511. Previously listed as EECS 580. **Prerequisite(s):** CS 480.

CS 581 Database Management Systems 4 hrs.
Concurrency control; reliability, recovery; data integrity, database machines, and current topics. Previously listed as EECS 581. **Prerequisite(s):** CS 480.

CS 582 Information Retrieval 4 hrs.
Document retrieval, office automation. Optimal retrieval, relevance feedback, clustered search, construction of clusters, model of term weighting, thesaurus construction, multimedia data, and handling of audio and video. Previously listed as EECS 582. **Prerequisite(s):** CS 480.

CS 583 Data Mining and Text Mining 4 hrs.
Provide students with a sound knowledge in data and text mining tasks and techniques, as well as ensure students' ability to use this technology. **Prerequisite(s):** CS 401. Recommended background: Algorithm probability.

CS 586 Data and Web Semantics 4 hrs.
Data modeling and semantics; knowledge representation, querying, and reasoning for the semantic web; metadata; data integration and interoperability; Web services; applications. Extensive computer use required. **Prerequisite(s):** CS 480 or equivalent.

CS 587 Computer Systems Security 4 hrs.
Security policies; security properties; protection mechanisms for single systems, networked systems, and distributed computing; trust; attacks on computer systems. Extensive computer use required. **Prerequisite(s):** CS 485 or CS 450; or consent of the instructor.

CS 594 Special Topics 4 hrs.
Subject matter varies from term to term and section to section, depending on the specialties of the instructor. May be repeated. Students may register in more than one section per term. Previously listed as EECS 594. **Prerequisite(s):** Consent of the instructor.

CS 595 Departmental Seminar 0 hrs.
Seminar by faculty and invited speakers. Satisfactory/Unsatisfactory grading only. May be repeated. Previously listed as EECS 595.

CS 596 Individual Study 1 TO 4 hrs.
Individual study or research under close supervision of a faculty member. May be repeated. Students may register in more than one section per term. No graduation credit for students in the following: MS in Computer Science or PhD in Computer Science. Previously listed as EECS 596. **Prerequisite(s):** Consent of the instructor. For Computer Science majors only.

CS 597 Project Research 0 TO 9 hrs.
A research design or reading project approved by the committee appointed by the director of graduate studies. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. Previously listed as EECS 597. **Prerequisite(s):** Consent of the instructor. For CS majors only.

CS 598 MS Thesis Research 0 TO 16 hrs.
MS thesis work under the supervision of a graduate advisor. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. Previously listed as EECS 598. **Prerequisite(s):** Consent of the instructor. For CS majors only.

CS 599 PhD Thesis Research 0 TO 16 hrs.
PhD thesis work under supervision of a graduate advisor. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. Previously listed as EECS 599. **Prerequisite(s):** Consent of the instructor. For CS students only.

Criminology, Law, and Justice

CLJ 402 Trial Interaction 3 OR 4 hrs.
Language use, culture, and law in the trial process. Analysis of qualitative methods applied to legal processes and change. **Same as** LING 402. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CLJ 261 and CLJ 350; or consent of the instructor.

CLJ 404 Roman Law and the Civil Tradition 3 OR 4 hrs.
Roman law and its relationship to values and social structure; social analysis through law; continental law tradition. **Same as** CL 404 and HIST 404. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CLJ 200 or CL 203 or HIST 203 or consent of the instructor.

CLJ 405 The Problem of Justice 3 OR 4 hrs.
Premodern and modern views of justice and their practical utility in analyzing legislative, executive, and judicial programs for enhancing or restricting justice. **Same as** POLS 405. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CLJ 101, plus two 200-level courses in criminology, law, and justice or two 200-level courses in political science.

CLJ 421 Youth, Crime, Law, and Justice in Society 3 OR 4 hrs.
Theories of juvenile delinquency and rule-breaking; juvenile rights; organization and administration of the juvenile justice system in the U.S. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CLJ 210 and CLJ 220.

CLJ 422 Victimization 3 OR 4 hrs.
Survey of criminal victimization theory and research. Examination of causes, consequences, and prevention of violent crime and of victims' experiences in the criminal justice system. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CLJ 101 and two 200-level criminology, law, and justice courses.

CLJ 423 Violence 3 OR 4 hrs.
Explores how men and women have experienced violence historically and in modern times. Students examine how violence is perpetrated through words, pictures, physical harm, and silences. **Same as** ANTH 424. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CLJ 101 and CLJ 200.

CLJ 424 Gender, Crime, and Justice 3 OR 4 hrs.
An in-depth examination of the etiology of female crime and the involvement of females in the criminal justice system as offenders, victims, and workers/professionals. **Same as** GWS 424. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CLJ 101 and CLJ 220; or consent of the instructor.

CLJ 435 Organized and White-Collar Crime in the United States 3 OR 4 hrs.
Analysis and evaluation of organized crime, including its public perception; sociological, political, and economic impacts as well as past and present enforcement strategies. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Two 200-level criminology, law, and justice courses.

**CLJ 442
Comparative
Criminal Justice
Institutions 3 OR 4 hrs.**
Comparative study of law, jurisprudence, enforcement, and punishment in Western and non-Western societies, including civil law, common law, and Islamic systems. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Two 200-level criminology, Law, and Justice courses.

**CLJ 456
Community
Corrections 3 OR 4 hrs.**
History, processes, and functions of programs organized for sanctioning offenders in community settings, such as probation, parole, halfway houses, restitution, community service, and home confinement. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CLJ 350 or CLJ 355; plus one 200-level criminology, law, and justice course.

**CLJ 480
Application of
Science to the Law 4 hrs.**
Issues affecting the development, accessibility, and admissibility of forensic science services by the criminal justice system; problems which may compromise the quality, fairness, and effectiveness of scientific inquiries. **Same as** BPS 480. **Prerequisite(s):** CLJ 210 and CLJ 260; or graduate standing.

**CLJ 491
Topics in
Rule Breaking 3 OR 4 hrs.**
Content of course varies, addressing major issues. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). Students may register in more than one section per term. **Prerequisite(s):** Six 200- or 300-level criminology, law, and justice courses.

**CLJ 492
Topics in
Rule Application 3 OR 4 hrs.**
Content of course varies, addressing major issues. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). Students may register in more than one section per term. **Prerequisite(s):** Six 200- or 300-level criminology, law, and justice courses.

**CLJ 500
Law and Society 4 hrs.**
Emergence and growth of rule-governed social order; social organization of legal actors; functional aspects of law including social control, dispute resolution; rule interpretation; and the promotion of social and economic enterprises.

**CLJ 520
Criminological Theory 4 hrs.**
Critical examination of the major traditions in criminological theories; emphasis on critical, positivist, interpretivist, and postmodern.

**CLJ 539
Seminar in
Rule-Breaking 4 hrs.**
Study of a specific area of rule-breaking such as larceny, criminal violence, corporate crime, political crime, public order criminality, or occupational crime. Content varies. May be repeated to a maximum of 8 hours. **Prerequisite(s):** Consent of the instructor.

**CLJ 540
Criminal Justice:
Process and
Institutions 4 hrs.**
Critical examination of the criminal justice system. The dynamics and processes of contemporary police, judicial, and correctional institutions are evaluated in the context of key historical developments and relevant research.

**CLJ 541
The Dynamics
and Behavior
in Criminal Justice
Agencies 4 hrs.**
Leading theories of organizational behavior used to interpret organizational patterns, functions, and constraints in rule-applying institutions; emphasis on the application of these theories to the problems of planned change.

**CLJ 546
Violence
and Victimization 4 hrs.**
The field of victimology and victimization theories are introduced including characteristics of victims, crime and post-crime victimization effects, and victims' criminal justice system experiences.

**CLJ 547
Race, Class, and Gender
Dimensions of Crime
and Justice 4 hrs.**
Theories addressing the intersections of race, class, gender, crime, and justice. Students examine criminological theories, social construction of race, class, and gender, legal decision making, and implications for justice in our society. **Same as** GWS 547.

**CLJ 548
Legal Discourse and
Culture in Law and
Society 4 hrs.**
Discourse, power, and culture in legal settings and analysis of power and resistance in the construction of law as a social fact. **Prerequisite(s):** CLJ 500.

**CLJ 555
Corrections: Institutions
and Field Operations 4 hrs.**
Examines institutions and field services in public and private sectors. Addresses historical and empirical approaches to the analysis of policy and correctional effectiveness; the neo-classical challenge to rehabilitation, and corrections case law. **Prerequisite(s):** CLJ 540.

**CLJ 560
Quantitative Methods
and Design 4 hrs.**
Fundamentals of scientific inquiry, logic of causal inference, and quantitative methods. Development of perspective and identification of weaknesses in research design. Development of skills in proposal development and data collection unique to criminology, law, and justice. **Prerequisite(s):** CLJ 262 or consent of the instructor.

**CLJ 561
Qualitative Methods
and Design 4 hrs.**
Theories and techniques of qualitative research methods, particularly fieldwork and in-depth interviews. Criminology, law, and justice problems amenable to these techniques and methods and interrelationship between the researcher role and substantive findings. **Prerequisite(s):** CLJ 262 or consent of the instructor.

**CLJ 562
Statistical Applications
in Criminology, Law, and
Justice I 4 hrs.**
Basic descriptive and inferential statistics, their applications in data analysis, and assumptions underlying use of these procedures in criminology, law, and justice research. **Prerequisite(s):** CLJ 262 or the equivalent.

**CLJ 563
Evaluation Research in
Criminology, Law, and
Justice 4 hrs.**
Experimental, quasi-experimental, and nonexperimental approaches to evaluation research; indicators of effectiveness. Applications to crime prevention, police, courts, and correctional programs. Politics of researcher-agency interactions. **Prerequisite(s):** One graduate-level course in research methods and consent of the instructor.

**CLJ 564
Statistical Applications in
Criminology, Law, and
Justice II 4 hrs.**
Introduction to multivariate statistics with emphasis on multiple regression in criminology, law, and justice research, analysis and interpretation of regression output, coding of variables, and path analysis. **Prerequisite(s):** CLJ 562.

**CLJ 570
Advanced Methods in
Criminology, Law, and
Justice 4 hrs.**
Methodological problems in criminology, law, and justice measurement including the identification problem in estimating deterrence and the limitations of survival analysis in estimating recidivism. **Prerequisite(s):** CLJ 560 and CRJ 561 or the equivalent.

**CLJ 580
Forensic Science:
Survey and
Foundations 2 hrs.**
Survey course for forensic sciences with emphasis on criminalistics; unique characteristics, underlying philosophies; nature, analytical methods, significance of results with chemical, biological, trace, and pattern evidence. **Same as** BPS 580. **Prerequisite(s):** Approval of the department.

**CLJ 589
Special Topics in
Forensic Science 3 hrs.**
Content may vary but will revolve around the philosophic, moral, and managerial problems associated with criminalistics evidence collection, analysis, reporting, and testimony to non-criminalistics fields. **Same as** BPS 589. May be repeated if topics vary. **Prerequisite(s):** Consent of the instructor.

**CLJ 592
Internship in
Criminology, Law,
and Justice 2 TO 4 hrs.**
Placement in a criminal justice agency or setting under the supervision of a faculty member with an accepted research project and paper. May be repeated to a maximum of 4 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**CLJ 594
Selected Issues in
Criminology, Law,
and Justice 4 hrs.**
Current issues and advanced problem areas related to deviance, crime, etiology, labeling, criminal careers, organized crime, and victimology. May be repeated to a maximum of 12 hours. Students may register in more than one section per term.

**CLJ 596
Independent
Study or
Research 2 TO 8 hrs.**
Research undertaken for this course may not duplicate that being done for CLJ 598. Supervised projects, which may consist of extensive readings in criminology, law, and justice, research on special problems not included in the regular course offering. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of instructor and approval of the director of graduate studies.

**CLJ 597
Project Research 0 TO 8 hrs.**
Independent research project under the supervision of a faculty member. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 8 hours. **Prerequisite(s):** Graduate standing in the MA in Criminology, Law, and Justice program and consent of the instructor.

CLJ 598
Thesis Research 0 TO 16 hrs.
For students doing thesis research or writing. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 8 hours. **Prerequisite(s):** Consent of the student's advisor; and acceptance of the thesis topic and preliminary thesis outline by the thesis committee.

CLJ 599
Dissertation Research 0 TO 16 hrs.
Research on the topic of the doctoral dissertation. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 20 hours. **Prerequisite(s):** Consent of faculty advisor and director of graduate studies.

Curriculum and Instruction

CI 410
Literature, Social Studies, and the Arts in the Elementary School 4 hrs.
Theory and practice in curriculum development, planning instruction, and assessing learning in elementary classrooms. Literature, social studies, and the arts content foci.

CI 411
Creating Learning Environments in the Elementary School 3 hrs.
Examination of beliefs about teaching culture and learning in urban America in relation to the creation of learning environments with emphasis on application of state standards in classrooms and the development of a electronic teaching portfolio. 30 hours of fieldwork required. **Prerequisite(s):** Open only to master's degree students.

CI 412
Dynamics of Learning Environments 3 hrs.
Exploration of multiculturalism and bilingualism/biculturalism in schools and families. Continued development of electronic portfolio for meeting Illinois professional teaching and technology standards. **Prerequisite(s):** Graduate standing and satisfactory completion of fieldwork and grade of B or better in CI 411.

CI 413
Foundations of Literacy Instruction, K-8 4 hrs.
Introduction to teaching literacy K-8; examining cognitive, social, and developmental perspectives; relationships between language and literacy; connections to other school subjects; aligning instruction, assessment, standards. Extensive computer use required word processing on writing; search engines for examining literacy curriculum, professional organizations, e-mail networks. **Prerequisite(s):** CI 450; and consent of the instructor. Open to master's degree students and PhD degree students. Recommended background: Admission to MEd in Instructional Leadership: Literacy, Language, and Culture.

CI 414
Middle and High School Literacy 3 hrs.
Focuses on the teaching of reading and writing strategies appropriate for disciplinary learning and expression. Fieldwork required. **Prerequisite(s):** Junior standing or above; and consent of the instructor.

CI 416
Programs for Underserved Youth 3 hrs.
Survey and evaluation of physical activity-based and other models and programs designed to help underserved youth in school, extended day, and special programs. Includes development of new models. **Prerequisite(s):** Junior standing or above and consent of the instructor.

CI 428
Curriculum and Teaching in Secondary Education 4 hrs.
Introduction to the study of curriculum and teaching. Specifically designed for graduate students wanting to become middle and high school teachers, students who are newly admitted to the secondary education program. Fieldwork required. **Prerequisite(s):** Open only to Master's degree students in the Secondary Education program; and consent of the instructor.

CI 450
Literacy and Society 4 hrs.
Explores the significant role of literacy in cognition, law, economics, social, and personal life and its implications for teaching and learning. Extensive computer use required. **Prerequisite(s):** Graduate standing.

CI 464
Bilingualism and Literacy in a Second Language 4 hrs.
Theoretical foundations of second language acquisition and the teaching of English as second language. Methods and materials for teaching reading and writing in bilingual/ESL settings. **Prerequisite(s):** Junior standing and admission into the College of Education or consent of instructor.

CI 472
Language Proficiency Assessment and ESL Instruction 4 hrs.
English language proficiency assessment instruments and procedures; effective planning and ESL instructional practices; methods, materials, and technology resources for teaching ESL in K-12 school settings. **Prerequisite(s):** CI 481 and junior standing or above; or consent of the instructor.

CI 480
Technology and Multimedia: Learning Tools in the Classroom 3 OR 4 hrs.
New technologies to support teaching and learning in pre-college classrooms. **Same as** SPED 480. 3 undergraduate hours. 4 graduate hours.

CI 481
Foundations and Current Issues in Educating English Language Learners 4 hrs.
Philosophical, theoretical, sociocultural, and educational examination of learning and achievement issues that culturally and linguistically diverse students face in American schools. Fieldwork required. **Prerequisite(s):** Junior standing or above.

CI 482
Assessment and Instruction: A Multilingual/Multicultural Perspective 4 hrs.
Methods and materials for teaching English language learners (ELLs) in bilingual/ESL classrooms. Emphasis upon curricular and methodological practices, assessment for academic placement, and instruction. **Prerequisite(s):** CI 481 and junior standing or above; or consent of the instructor.

CI 483
Methodology of TESOL 3 OR 4 hrs.
Methods of teaching listening, speaking, reading, and writing to speakers of English as a second or foreign language. **Same as** LING 483. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing and consent of the instructor.

CI 484
Curriculum and Instruction in the Middle School 3 hrs.
Philosophy, curriculum, and instructional methods for teaching middle grade students (grades five through eight). Content area reading is included. **Prerequisite(s):** ED 200 and ED 210; or graduate standing and either ED 402 or ED 403, and either ED 421 or ED 422 or ED 445 and either ED 430 or ED 431 and approval of the College of Education.

CI 494
Special Topics in Curriculum and Instruction 1 TO 4 hrs.
Exploration of an area not covered in existing course offerings. Content varies. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

CI 500
Proseminar in Curriculum and Instruction 1 hour.
Research-oriented colloquia on issues in curriculum and instruction. Serves as introduction to faculty research interests. Provides opportunity to consider issues in research design. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Admission to the PhD in Education program or consent of instructor.

CI 502
Mathematics and Science in the Elementary School 4 hrs.
Integrating mathematics and science content with issues of teaching and learning, including adapting and developing curriculum, planning, classroom interactions, and assessment in elementary classrooms. **Prerequisite(s):** ED 402 or ED 403; and either ED 421 or ED 422 or ED 445; and ED 430; and CI 460; and a second reading methods course.

CI 503
Advanced Foundations of Literacy Instruction, K-8 4 hrs.
Introduction to teaching literacy K-8; examining cognitive, social, developmental perspectives; relationships between language and literacy; connections to other school subjects; aligning instruction, assessment, standards. Extensive computer use required: word processing on writing; search engines for examining literacy curriculum, professional organizations, e-mail networks. **Prerequisite(s):** CI 450; or consent of the instructor. Open to master's degree students and PhD degree students. Recommended background: Admission to MEd in Instructional Leadership: Literacy, Language, and Culture.

CI 504
Secondary Literacy 4 hrs.
Focuses on the foundations of literacy and on the literacy processes of middle and secondary students and how these processes apply to reading and writing in the disciplines. Fieldwork required.

CI 505
Integrated Reading and Writing Instruction 4 hrs.
Examination of the reading-writing relationship. Specific instructional strategies for teaching reading and writing together in the elementary grades. **Prerequisite(s):** CI 413; or consent of the instructor.

CI 507
Teaching and Learning Mathematics in the Elementary School 4 hrs.
Integrating mathematics content with teaching and learning issues, including adapting and developing curriculum, planning, classroom interactions, and assessment in K-9 classrooms. **Prerequisite(s):** CI 411 and CI 412.

CI 508
Teaching and Learning Science in the Elementary School 4 hrs.
To help prospective teachers develop multiple frameworks for facilitating the learning of science in students of various abilities, cultures, and backgrounds. **Prerequisite(s):** CI 411 and CI 412.

CI 509
Reading and Writing with Young Children 4 hrs.
The early writing and reading behaviors of children and how these develop during the primary grades. Observation, teaching, and assessing are emphasized. **Prerequisite(s):** ED 422; and consent of the instructor.

CI 511
Student Teaching in the Elementary Grades I 6 hrs.
Culminating course in graduate elementary teacher education. Meets Illinois State Board of Education requirements for certification. **Prerequisite(s):** Completion of all professional education courses and program requirements. Must enroll concurrently in CI 512.

CI 512
Student Teaching in the Elementary Grades II 6 hrs.
The culminating course in the graduate elementary teacher education sequence. Meets Illinois State Board of Education requirements for certification. **Prerequisite(s):** CI 501 and CI 502. Must enroll concurrently in CI 511.

CI 515
Urban Youth Program Evaluation 3 hrs.
Analysis of the impact of social trends and problems on urban youth. Evaluation of urban youth programs with emphasis on affective and moral dimensions.

CI 520
The K-12 Mathematics Curriculum: Theory, Politics, and Reform 4 hrs.
A look at the K-12 curriculum from three perspectives: theoretical (epistemological, learning, teaching), political (whose interests are served), and practical (implementation issues in schools). **Prerequisite(s):** Consent of the instructor.

CI 521
Learning and Teaching Mathematics with Technology 4 hrs.
Can technology support conceptually based learning of mathematics? Issues of learning, teaching, and equity related to technology in the K-12 mathematics classroom. **Prerequisite(s):** Consent of the instructor.

CI 522
Social Context of Mathematics Education 4 hrs.
Examination of contextual, social, and linguistic factors which influence the learning of mathematics; emphasis on sociohistorical and activity theories; and equity in schooling. **Prerequisite(s):** Graduate standing in the College of Education or consent of the instructor.

CI 525
Assessment and Instruction for Struggling Readers, K-12, Part 1 4 hrs.
Theoretical and practical issues concerning the etiology of reading problems and clinical diagnostic techniques. Children with reading problems are diagnosed and taught in the practicum component. **Prerequisite(s):** CI 450; and CI 503 or CI 504; and consent of the instructor.

CI 526
Assessment and Instruction for Struggling Readers, K-12, Part 2 4 hrs.
Continued study of theoretical and practical issues concerning the etiology of literacy problems and clinical diagnostic and instructional techniques. Practicum involves tutoring clients in the UIC Reading Clinic. **Prerequisite(s):** CI 525.

CI 527
Reading Specialists as Literacy Leaders 4 hrs.
Theories and practices related to the role of the reading specialist, including management and evaluation of support systems, programs, personnel, and professional development in literacy. **Prerequisite(s):** CI 450 and CI 503 and CI 504.

CI 528
Assessing Literacy in Classrooms 4 hrs.
Introduction to and practicum in K-12 classroom literacy assessment and its relation to literacy instruction. Addresses purposes of and techniques for conducting/interpreting specific literacy assessments. Extensive computer use required word processing on writing; search engines for examining literacy curriculum, professional organizations, e-mail networks, use of PowerPoint, Excel and SPSS. **Prerequisite(s):** CI 450 and CI 503 and CI 504 and consent of the instructor. Open only to master's degree students. Recommended background: admission to MEd in Instructional Leadership: Literacy, Language, and Culture.

CI 532
Staff Development and School Improvement 4 hrs.
Analysis of issues of school improvement and teacher professional development. Emphasis on processes of and alternative approaches to individual and organizational change. **Prerequisite(s):** CI 574 or ED 430 or ED 431 or ED 543; and consent of the instructor.

CI 535
Studies in Literacy Research and Teacher Inquiry 4 hrs.
Analysis of methodologies and topics of reading research; decision-making processes for effective literacy instruction based on research; skills and strategies in designing teacher inquiry. Extensive computer use required: word processing on writing; search engines for identifying research studies, including teacher researcher Web sites. **Prerequisite(s):** CI 450 or CI 503 or CI 504; and consent of the instructor. Admission to the MEd in Instructional Leadership: Language, Literacy, and Culture program or consent of the instructor.

CI 536
Colloquium on Literacy 1 hour.
Various areas of reading, writing, and literacy including research on learning, instruction, and use. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 12 hours. **Prerequisite(s):** Enrollment in a graduate specialization in reading, and consent of the instructor.

CI 539
Internship in Instructional Leadership 4 hrs.
Conceptualization, development, implementation, analysis, and interpretation of a curriculum and/or instructional improvement in an educational setting (supervised by university faculty and leadership from the setting). May be repeated to a maximum of 8 hours. **Prerequisite(s):** CI 532.

CI 540
Linguistics for Teachers 4 hrs.
Introduction to linguistic concepts as they apply to teaching in monolingual and bilingual classrooms. Relation of linguistic theory to theories of language and cognition.

CI 541
Oral Language: Its Development and Role in the Classroom 4 hrs.
Analysis of oral language development and children's varying patterns of language use; analysis of talk in classroom settings and instructional decision-making processes to assess and optimize student learning. Extensive computer use required. Fieldwork required. **Prerequisite(s):** CI 450 and either CI 503 or CI 504. Restricted to graduate students in Education, Psychology, or English.

CI 542
Improving School/District Literacy Achievement 4 hrs.
Review of research on school/factors implicated in improvement of literacy achievement. Role of empirical evidence (best practices, scientifically based research, research synthesis, beat-the-odds studies) in school decision making and policy. **Prerequisite(s):** CI 450 and CI 503 and CI 504.

CI 543
Using Multimedia Environments to Support Literacy and Learning 4 hrs.
Introduction to ways changes in technologies of communication transform environments for teaching and learning. Analyzing technologies, linear, and nonlinear reading environments and designing instructional strategies to enhance multiple literacies. Extensive computer use required. **Prerequisite(s):** One social science course or one computing course focused on the human use of computing.

CI 544
Foundations of Writing 4 hrs.
Introduction to K-8 writing research, theory, and practice, including writing development, processes, text pedagogy, and assessment. Combination of academic study of writing with guided inquiry. Computer use required: word processing on writing; search engines for examining literacy curriculum, professional organizations, e-mail networks, use of PowerPoint and Web page composers. **Prerequisite(s):** CI 450. Recommended background: Admission to the MEd in Instructional Leadership: Literacy, Language, and Culture.

CI 545 Educational Evaluation 4 hrs.
Examination of theoretical and operational assumptions of alternative evaluation models; analysis and critique of evaluation case studies. **Prerequisite(s):** Admission to PhD in Education program.

CI 546 Children's and Adolescent Literature 4 hrs.
Overview of trade books written for children from preschool through adolescence. Emphasizes critically reading, selecting, and evaluating books appropriate for developmental stages, curricular connections, and students in our multicultural society. **Prerequisite(s):** CI 450 and CI 503 and CI 504; and consent of the instructor.

CI 547 Integrating Literacy Instruction 4 hrs.
Engaging in professional experiences (e.g., teacher inquiry, teacher book clubs) that support the design and adaptation of frameworks and units that emphasize meaningful instructional connections among reading, writing, and talk in the classroom. Extensive computer use required. **Prerequisite(s):** CI 450 and either CI 503 or CI 504. Restricted to graduate students in Education, Psychology, or English.

CI 548 Leadership for Literacy Instruction 4 hrs.
School and system leadership practices for promoting effective literacy instruction in urban elementary and secondary schools. Assessment and improvement of literacy curriculum, pedagogy, and evaluation. **Same as** EDPS 548. **Prerequisite(s):** Consent of the instructor; admission to a degree program in the College of Education. Students admitted to the EdD in Urban Education Leadership, prerequisites also include EDPS 550 and EDPS 552.

CI 549 Teaching for Social Justice 4 hrs.
Examine theory and practice of social justice teaching in schools, including: history liberatory pedagogies, culturally relevant and critical pedagogies, funds of knowledge, critical multiculturalism and anti-racist pedagogy, and critical race theory. **Same as** EDPS 549. **Prerequisite(s):** Consent of the instructor.

CI 550 Conflicts in Curriculum 4 hrs.
Analysis of theoretical models for curriculum development, special attention to alternative and often-conflicting viewpoints about the particulars of the development process. **Prerequisite(s):** Admission to a graduate program in education.

CI 552 Curricular and Cultural Context 4 hrs.
Influence of cultural, political, sociological, and economic factors on curriculum, at the instructional, institutional, societal, and ideological levels. **Prerequisite(s):** CI 574 or consent of instructor.

CI 553 History of Curriculum Thought 4 hrs.
Analysis of selected documents on curriculum theory and policy from antiquity to present; secondary treatments and primary sources; interaction of theory and practice. **Prerequisite(s):** CI 574 or consent of the instructor.

CI 556 Proseminar in Literacy, Language, and Culture 4 hrs.
Socialization of students into the field through intensive introduction to literacy, its relationship to language and culture, using the collective knowledge and research experience of faculty. Emphases on developing student inquiry in urban contexts. Restricted to first-year doctoral students with a specialization in Literacy, Language, and Culture.

CI 557 Proseminar in Literacy, Language, and Culture 4 hrs.
Socialization of students into field through intensive introduction to literacy, its relationship to language and culture, using the collective knowledge and research experience of faculty. Emphases on developing student inquiry in urban contexts. Restricted to first-year doctoral students with a specialization in Literacy, Language, and Culture.

CI 558 The Historical and Philosophical Bases of Literacy and Literacy Instruction 4 hrs.
Critical examination of historical and philosophical bases of current literacy and literacy instruction from social, cultural, and psychological perspectives. Emphases on historical patterns of reading and writing instruction in the U.S. **Prerequisite(s):** Consent of the instructor.

CI 559 The Social and Cultural Contexts of Literacy and Literacy Instruction 4 hrs.
Critical examination of theoretical and methodological orientations that inform the study of sociocultural influences on the definition and practices of literacy in classrooms, at school level, and in out-of-school contexts. **Prerequisite(s):** Consent of the instructor.

CI 561 Genre Theory and Practice 4 hrs.
Analysis of perspectives and methodologies employed in genre theory and practice; exploration and evaluation of discourse-analysis approaches used in genre research; critical examination of sociocultural bases of genre. **Prerequisite(s):** Consent of the instructor.

CI 562 Design and Conduct of Literacy Research 4 hrs.
Design principles for the study of literacy development and education. Emphasis is on examining lines of literacy research from multiple design perspectives; relationship between research design, theory, and epistemology. Fieldwork required. **Prerequisite(s):** Consent of the instructor.

CI 563 Analysis of Research in Literacy 4 hrs.
Critical analyses of literacy-related research methods, their implications for interpreting research, the forms in which research is published; manuscript review process, and ethical considerations that inform all of the above. **Prerequisite(s):** CI 581 or CI 586; and consent of the instructor.

CI 564 Design and Conduct of Literacy Research 4 hrs.
Introduction to design principles informing the study of literacy development and education. Emphasis on conducting literacy research from multiple design perspectives; and the relationship between epistemology, theory, and research design. **Prerequisite(s):** ED 502 and ED 503 and CI 563. Priority in enrollment will be given to students admitted into Literacy, Language, and Culture doctoral program.

CI 568 Research in Children's and Adolescent Literature 4 hrs.
Topical seminar that examines research on a specific area of children's or adolescent literature such as multicultural literature, picture books, nonfiction texts, or the development of literacy understanding in children/adolescents. May be repeated to a maximum of 8 hours. **Prerequisite(s):** Consent of the instructor and an undergraduate or master's level survey course on children's/adolescent literature.

CI 570 Critical Issues in Science Education 4 hrs.
Explores the nature of scientific activity and educational issues, such as constructivism, discourse, gender and multicultural issues, assessment, the role of technology, and teacher research. **Prerequisite(s):** Admission to a graduate program in the College of Education or consent of the instructor.

CI 571 Integrating Mathematics, Science, and ESL 4 hrs.
Curriculum and instructional issues and practice related to the integration of mathematics, science, and English as a second language development. **Prerequisite(s):** CI 481 or consent of the instructor.

CI 572 Assessment in Science and Math Education 4 hrs.
Explores different purposes of assessment, generates principles to guide assessment, studies "new" assessment practices, and explores ways to implement them in science and mathematics classes. **Prerequisite(s):** Admission to graduate study in education or consent of the instructor.

CI 574 Foundations of Curriculum Studies 4 hrs.
Curriculum as area of inquiry; historical, philosophical, cultural, and related foundations; variations on curriculum theory and practice; alternative paradigms of curriculum inquiry. **Prerequisite(s):** ED 430 or admission to the PhD in Education program or the PhD in Public Policy Analysis program.

CI 575 Seminar in Research Issues with English Language Learners 4 hrs.
Selected topics on research in the education of language minority students for advanced MEd and PhD students. Topics vary each semester. May be repeated to a maximum of 12 hours. **Prerequisite(s):** CI 481.

CI 576 Possibilities for Teaching and Schooling 4 hrs.
Philosophical and conceptual analysis of teaching and schooling and the impact of those conceptions on the conduct of educational practice. **Prerequisite(s):** CI 574 or consent of the instructor.

CI 577 Literacy In and Out of School 4 hrs.
Analysis of literacy practices in formal and informal contexts. Focus on community and family contributions to literacy learning; emphasis on consequences of cultural congruity and discontinuity between in- and out-of-school literacy practices. **Prerequisite(s):** Consent of the instructor.

CI 578 Advanced Studies in Qualitative Research Methods 4 hrs.
The dynamics of data collection and analysis, the use of theory and interdisciplinary frameworks, and writing up and presenting original research. **Prerequisite(s):** ED 502.

CI 579
Bi-Literacy: Theory, Research, and Practice 4 hrs.
Theoretical foundations, research paradigms, and issues focusing on bilingual and bi-literacy practices in and between home, school, and community contexts.
Prerequisite(s): Consent of the instructor.

CI 581
Perspectives on Reading: Theory, Research, and Practice 4 hrs.
Introduction of doctoral students to perspectives underlying theory, research, and practices related to understanding reading and reading instruction. Study of how research and practice is framed, shaped, and constrained by theoretical perspectives. **Prerequisite(s):** Priority will be given to students admitted into the Literacy, Language, and Culture doctoral program.

CI 582
Research Perspectives on Literacy in the Disciplines 4 hrs.
Literacy is an integral part of expertise in the major fields of study. This course reviews the research in literacy and its related constructs in the disciplines of mathematics, science, history, and English. **Prerequisite(s):** Consent of the instructor.

CI 583
Early Literacy: Theory Research, and Practice 4 hrs.
Analysis of theories and research focusing on the initial phases of young children's acquisition of reading and writing, with emphasis on issues related to instruction. **Prerequisite(s):** CI 503 and consent of the instructor.

CI 584
Semiotics, Literacy, and Learning 4 hrs.
Theory and research focusing on language and literacy as they relate to other embodied forms of meaning-making; how these varied meanings are socially and culturally mediated; the ways in which they enable and constrain processes of learning. **Prerequisite(s):** Consent of the instructor.

CI 585
Seminar in Literacy Studies 4 hrs.
Selected topics in literacy theory, research and practice for advanced PhD students. Topics vary each semester. May be repeated to a maximum of 12 hours. **Prerequisite(s):** CI 563 or the equivalent or consent of instructor.

CI 586
Perspectives on Writing Instruction: Theory, Research, and Practice 4 hrs.
An examination of research and theoretical perspectives on writing and multimodal text construction, including critical reflection on perspectives that have contributed to changes in the ways we view texts, writing, writers, and instruction. **Prerequisite(s):** CI 544; and consent of the instructor. Priority in enrollment will be given to students admitted into Literacy, Language, and Culture doctoral program.

CI 587
Literacy Assessment: Theory, Research, and Practice 4 hrs.
Theory and practice in literacy assessment. Measurement issues unique to literacy assessment, including word recognition, vocabulary, comprehension and writing. Critical consideration of how assessment both enables and constrains instruction. **Prerequisite(s):** CI 503 and consent of the instructor.

CI 588
Design Research in the Study of Literacy 4 hrs.
Emphasis on understanding the conceptual frameworks that inform design research, integrating literacy theory into the design of teaching and learning environments; the use of design research in the study of literacy in various instructional settings. Individual and group participation (including participation on course listserv). **Prerequisite(s):** Consent of the instructor.

CI 589
Literacy and Learning Technologies: Theory, Research, and Practice 4 hrs.
Critical analyses of how technologically based multimedia transform instruction with a focus on the design of strategies to enhance written, visual, and oral literacies using linear and nonlinear software and online environments. **Prerequisite(s):** Consent of the instructor.

CI 590
Alternative Paradigms of Qualitative Research in Education 4 hrs.
Methodology, cases, and rationale for action research, educational criticism, critical ethnography, historiography, and phenomenological hermeneutics as alternatives in qualitative research in education. **Prerequisite(s):** CI 578 or consent of instructor; and admission to PhD in Education program or PhD in Public Policy Analysis program.

CI 592
Apprenticeship in Teacher Education 1 TO 4 hrs.
Faculty guidance and supervision of doctoral students' teaching experience related to curriculum and instruction. Variable credit (1-4 hours) given based upon scope of students' teaching responsibilities, and proposed reflection on them. **Prerequisite(s):** Consent of the instructor and program coordinator.

CI 593
PhD Research Project 1 TO 8 hrs.
Students design, implement, and analyze results of a research problem in this area of specialization. Completed study is reviewed by faculty. May be repeated to a maximum of 8 hours. **Prerequisite(s):** Admission to the PhD in Education program.

CI 594
Special Topics in Curriculum and Instruction 2 TO 4 hrs.
Seminar on a preannounced topic focusing on methodology, research, and educational implications of recent models of learning, problem solving, and thinking. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of instructor.

CI 596
Independent Study 1 TO 4 hrs.
Students design, implement, and analyze the results of a research problem in this area of specialization. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of study advisor.

CI 599
Thesis Research 0 TO 16 hrs.
Research on the topic of the student's dissertation. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the dissertation advisor.

Disability and Human Development

DHD 401
Foundations of Disability and Human Development 3 hrs.
A critical review of key concepts and issues in disability. Students will develop a framework for understanding disability as a multilevel entity, including the impact of disability at personal, social, and societal levels. **Prerequisite(s):** Enrollment in the MS in Disability and Human Development program or consent of the instructor.

DHD 430
Introduction to Disability Policy and Organization 3 hrs.
Legislative, legal, and administrative foundations for the provision of services to persons with disabilities in the U.S. Roles of residential institutions, the independent living movement, class-action litigation, and advocacy. **Prerequisite(s):** DHD 401 or consent of the instructor.

DHD 440
Introduction to Assistive Technology: Principles and Practice 3 hrs.
Principles and exemplary practice of assistive technology used by individuals with disabilities, including augmentative communication, seating, mobility, computer access, environmental control, home modifications, and worksite modifications. **Prerequisite(s):** Graduate standing or consent of the instructor. Recommended background: Undergraduate enrolled in Health Sciences, Education, or Engineering and working professionals seeking to develop assistive technology as an area of concentration.

DHD 441
Adaptive Equipment Design and Fabrication 3 hrs.
Examination of the interaction between design and disability, through comparison of appropriate design theories, materials, and work on consumer-based issues. **Prerequisite(s):** Graduate standing; or DHD 440 and consent of the instructor. Recommended background: Undergraduates enrolled in Health Sciences, Education, or Engineering, or working professionals seeking to develop assistive technology as an area of concentration.

DHD 444
Assistive Technology for Literacy, Learning, and Participation in Pre-K through High School 3 hrs.
Use of communication systems, computers, adapted equipment and strategies to foster participation and inclusion of students in grades preschool through high school. **Same as SPED 444.**

DHD 445
Topics in Disability Studies 3 OR 4 hrs.
This course will focus on topics structured around particular aspects of disability studies and its practical, cultural, and theoretical implications. **Same as ENGL 445.** 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 361 or ENGL 362 or ENGL 363 or ENGL 364; and senior standing or above; or consent of the instructor.

**DHD 460
Fundamentals of
Behavior Analysis 3 hrs.**

Introduction to the principles, concepts, and applications of behavioral principles. Content includes philosophic origins, historic and current practices of experimental and applied behavior analysis. **Prerequisite(s):** Credit or concurrent registration in DHD 401 or the equivalent.

**DHD 464
Survey of
Developmental
Disabilities 3 hrs.**

Survey of the developmental disabilities field, including basic definitions, history of DD services, relevant public policies and legislation, service delivery systems, and research. **Same as** CHSC 464. **Prerequisite(s):** Graduate standing or consent of the instructor.

**DHD 494
Special Topics in
Disability and
Human
Development 1 TO 4 hrs.**

Systematic study of selected topics in disability and human development. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Graduate standing or consent of the instructor.

**DHD 501
Disability Studies I 4 hrs.**

Provides analysis of contemporary classification and diagnosis systems for disability as well as the conceptual foundations for disability studies as a content area. Previously listed as DIS 501.

**DHD 502
Disability Studies II 4 hrs.**

Current approaches and practices in disability studies, critically considered from a variety of perspectives. Service delivery systems and the influence that civil rights and self-determination have had. Previously listed as DIS 502. **Prerequisite(s):** DHD 501.

**DHD 510
Concepts in
Interdisciplinary
Research on
Disability 3 hrs.**

Core concepts and methodologies of the major research traditions used in disability research.

**DHD 514
Ethical Issues in
Disability 3 hrs.**

Examines contemporary ethical issues affecting the lives of persons with disabilities and disability professionals. Critiques the application of ethical principles to problems of genetics, treatment decisions, and competency.

**DHD 515
Statistical Methods in
Disability Studies 3 hrs.**

Examination of parametric and nonparametric statistical methods commonly used in disability research with microcomputer applications to supplement text and lecture materials. **Prerequisite(s):** An introductory course in statistics.

**DHD 517
Ethics and
Disability:
Contemporary
Problems 3 hrs.**

Ethical theories and ethical decision-making are examined from an interdisciplinary disability studies perspective in relation to people with disabilities. Topics include assisted suicide, de-institutionalization, and genetic discrimination. **Prerequisite(s):** DHD 514 or consent of the instructor.

**DHD 520
Disability and
Physical Activity 3 hrs.**

Examination of the foundations of physical activity for persons with disabilities. Emphasis on strategies for promoting physical activity among persons with disabilities in community settings. **Same as** MVSC 520.

**DHD 525
Technology to
Promote Physical Activity
Among Persons with
Disabilities 3 hrs.**

Applications of new and emerging technologies to promote participation in and adherence to healthful physical activity by people with disabilities. Considers ways of redesigning physical, social, and attitudinal environments to achieve these outcomes. **Same as** IE 525. Recommended background: DHD 515 or an equivalent course on interpreting research findings.

**DHD 526
Family Perspectives on
Disability 3 hrs.**

Examines trends, theories, research methods, policies, and family-centered intervention approaches for families of persons with disabilities. **Same as** CHSC 526. **Prerequisite(s):** Consent of the instructor.

**DHD 532
Community
Intervention 3 hrs.**

Theory, research, and practice of community interventions in public, nonprofit, and voluntary settings, such as disability organizations; intervention types and effectiveness; role of community intervener. **Same as** PSCH 532. **Prerequisite(s):** Consent of the instructor.

**DHD 535
Advocacy and
Empowerment in
Disability 3 hrs.**

In-depth review of academic literature on advocacy and empowerment. Relevant theories, research, and interventions in the context of individuals with disabilities will be reviewed.

**DHD 537
Disability and Health
Promotion 3 hrs.**

Examines health issues in disability with emphasis on health promotion and preventing secondary disease. Relationship of emerging theories of health promotion to disability are discussed.

**DHD 541
Advanced Concepts in
Disability Research 3 hrs.**

Seminar-based applications of advanced scholarship skills. Topics covered include problem formulation, manuscript development, and critical reviews.

**DHD 545
Leadership in the
Nonprofit Disability
Organization 3 hrs.**

Applications in management and leadership in the nonprofit disability agency. Focus on employee motivation, recruitment, retention, fiscal management, long-range planning, board development, and succession planning.

**DHD 546
Qualitative Methods in
Disability Research 4 hrs.**

Examines qualitative research methods, design, data collection, analysis, and report writing. Issues of ethical conduct, power relationships, and collaborative approaches.

**DHD 547
Organizational Theory in
the Nonprofit Disability
Sector 3 hrs.**

Organizational theory applied to nonprofit disability agencies. Review and evaluation of theoretical models of organizations, authority, management, and budgeting.

**DHD 551
Computers,
Communication, and Controls
in Rehabilitation
Technology 3 hrs.**

Provides information on operation and use of alternative controls for computers, augmentative communication devices, and powered mobility. Emphasis on matching consumer's need and assistive technology. **Same as** OT 551. Recommended background: Speech-Language Pathology, Occupational Therapy, Special Education.

**DHD 552
Seating and Wheeled
Mobility 3 hrs.**

Focuses on issues of wheelchair seating, positioning, and mobility for children and adults with physical disabilities. Assessment procedures, technology selection, current research, and analysis of funding sources. **Prerequisite(s):** DHD 440 or consent of the instructor. Recommended background: Physical Therapy, Occupational Therapy, Speech-Language Pathology, Special Education, Engineering.

**DHD 554
Augmentative
Communication
Assessment 3 hrs.**

Augmentative communication assessment strategies and evaluation of materials development. Utilizes case examples for discussion of specific approaches for different ages, disabilities, and settings. **Prerequisite(s):** DHD 440. Recommended background: Speech-Language Pathology, Occupational Therapy, Special Education.

**DHD 560
Behavioral Assessment
and Functional
Analysis 3 hrs.**

Concepts and principles for use of behavioral assessment and functional analysis. **Prerequisite(s):** DHD 460; or consent of the instructor.

**DHD 563
Exploring the
Promise of the Americans
with Disabilities
Act of 1990 3 hrs.**

Examination of the history and implementation of the American with Disabilities Act. Analyzes and evaluates the effectiveness of the legislation in promoting and protecting the civil rights of people with disabilities.

**DHD 564
Community Integration
in Developmental
Disabilities 3 hrs.**

Historical and contemporary issues pertaining to the empowerment and integration of persons with developmental disabilities into community settings. **Same as** CHSC 564. Provides an analysis of the historical and current approaches to the treatment of persons with disabilities within institutions and the natural community. It provides an important perspective for the understanding of current research issues, services systems, public policies, legislation, and litigation pertaining to disability. It is relevant to all specializations in the Disability and Human Development and Disability Studies programs.

**DHD 565
Research Methodology
and Outcomes Measures
in Rehabilitation
Technology 3 hrs.**

Analyzes the research process in rehabilitation technology and assistive technology and how such analysis leads to the development of a research proposal. Outcome measures related to assistive technology will be evaluated for their applicability. **Same as** OT 565. Recommended background: Engineering, Occupational Therapy, Physical Therapy, Special Education, and Speech and Language Pathology.

DHD 570
Disability and Culture 3 hrs.
Development of a cultural comparative approach in disability studies; American and cross-cultural aspects of disability; imagery of disability; disability and the body; gender and life-course issues, cultures of disability.
Prerequisite(s): DHD 401 or consent of the instructor.

DHD 571
Eugenics in America, 1848-1945 4 hrs.
Critical examination of the philosophy and practice of eugenics toward people with disabilities during the period from mid-nineteenth to mid-twentieth centuries.

DHD 572
A Representational History of Disability 4 hrs.
Examines historical and contemporary representations of "the body" to demonstrate how cultural concepts such as normalcy, health, and morality are created in reference to "aberrant bodies."
Prerequisite(s): Graduate or professional standing.

DHD 575
History of Human Differences: Disability Minorities in America 3 hrs.
Historical experiences of disability minorities during the modern era. Focus on American experiences and comparing them to premodern and contemporaneous experiences in Western European societies.
Prerequisite(s): DHD 401 or consent of the instructor.

DHD 576
Visualizing the Body 4 hrs.
Survey of key moments in the representational life of disability in film. Film portrayals of disability will be analyzed from the perspective of narrative theory, film grammar, and social history.
Prerequisite(s): Graduate or professional standing.

DHD 589
Current Research in Disability Studies 1 hour.
A review of the current primary-source literature in the area of disability research. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 10 hours. Previously listed as DIS 589. **Prerequisite(s):** Consent of the instructor.

DHD 590
Field Experience in Disability and Human Development 0 TO 12 hrs.
Opportunities for guided experience working with agencies, families, and persons with disabilities providing concrete, practical applications of concepts and principles of disability and human development. May be repeated to a maximum of 12 hours. **Prerequisite(s):** DHD 401 and DHD 415; or consent of the instructor.

DHD 592
Interdisciplinary Seminar in Disability Studies 1 hour.
Students, faculty, and guest speakers present topics addressing current issues in research in the area of disability studies. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 4 hours. Students may register in more than one section per term. Previously listed as DIS 595. **Prerequisite(s):** Consent of the faculty advisor.

DHD 593
Independent Research 1 TO 8 hrs.
Advanced study and analysis of a topic selected by a student under the supervision of a faculty member. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

DHD 594
Advanced Special Topics in Disability and Human Development 1 TO 4 hrs.
Systematic study of advanced selected topics in disability and human development. May be repeated. Students may register in more than one section per term.

DHD 595
Seminar in Disability and Human Development 1 TO 4 hrs.
Identifies and analyzes a broad range of issues related to disability and human development. Topics vary according to student interests and instructor availability. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

DHD 596
Independent Study 1 TO 4 hrs.
Advanced study and analysis of a topic under guidance of a faculty member. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

DHD 597
Project Research 0 TO 16 hrs.
Independent research project under the supervision of a faculty member. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Graduate standing in the MS in Disability and Human Development program and consent of the instructor.

DHD 598
Master's Thesis Research 0 TO 16 hrs.
Thesis research to fulfill master's degree requirements. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Graduate standing in the MS in Disability and Human Development program and consent of the instructor.

DHD 599
PhD Thesis Research 0 TO 16 hrs.
Independent research in one area of disability studies. Satisfactory/Unsatisfactory grading only. May be repeated. Previously listed as DIS 599. **Prerequisite(s):** Graduate standing in the PhD in Disability Studies program and consent of the instructor.

Earth and Environmental Sciences

EAES 400
Field Experience in Earth Sciences 6 hrs.
Application of geologic mapping and other field techniques to a summer field camp in the Black Hills of South Dakota for a period of six weeks. **Prerequisite(s):** EAES 330 and EAES 440, or consent of the instructor.

EAES 410
Geochemistry 4 hrs.
Origin of elements. Principles of the distribution of elements in the earth's crust. Element partitioning between coexisting minerals. Thermodynamic considerations of mineral equilibria. Geochemistry of continental waters. Ocean geochemistry. **Prerequisite(s):** CHEM 114 or consent of the instructor.

EAES 415
Environmental Geochemistry 4 hrs.
Chemical reactions in natural environments; surface chemistry of metals and organic compounds. Clay minerals in soils and sediments. Chemistry of contaminant remediation. **Prerequisite(s):** EAES 310 or consent of the instructor.

EAES 416
Organic Geochemistry 4 hrs.
Global carbon cycle, chemical composition of biogenic matter, sedimentology and diagenesis of organic matter, molecular fossils, geopolymers, fossil fuels, anthropogenic organic compounds, and carbon isotope geochemistry. **Prerequisite(s):** CHEM 114 or CHEM 130, and EAES 350; or consent of the instructor.

EAES 422
Crystal Chemistry of Rock-Forming Minerals 4 hrs.
The crystal chemistry, chemistry, phase equilibria, and properties of materials and minerals. **Prerequisite(s):** EAES 220 or consent of the instructor.

EAES 424
X-Ray Crystallography 4 hrs.
Introduction to the use of diffraction techniques for the identification and characterization of materials. **Prerequisite(s):** Consent of the instructor.

EAES 430
Igneous Petrology 4 hrs.
Discussion of petrogenesis, application of thermodynamic principles to the crystallization of rocks. **Prerequisite(s):** CHEM 114 and EAES 330.

EAES 440
Structural Geology and Tectonics 4 hrs.
Elementary stress and strain relations; folds, fabrics, and faults; deformation mechanisms; basic plate tectonic concepts with regional geological examples. Required weekend field trip at a nominal fee. **Prerequisite(s):** EAES 102.

EAES 444
Geophysics 4 hrs.
Introduction to basic principles of geophysics applicable for environmental problems and the solid earth, including magnetics, electric, seismic, gravity, geophysical well logging, radioactivity, and heat flow. **Prerequisite(s):** EAES 102. Recommended background: Completion of introductory courses in physics and calculus.

EAES 448
Plate Tectonics 4 hrs.
Basic concepts and recent developments, including plate kinematics, marine magnetics and paleomagnetism, evolution of oceanic lithosphere, subduction zones, and passive margins. **Prerequisite(s):** MATH 180; and PHYS 102 or PHYS 142; or consent of the instructor.

EAES 455
Clastic Sedimentology and Sequence Stratigraphy 4 hrs.
Processes, facies, and sedimentary architecture in fluvial, deltaic, coastal, and offshore marine clastic depositional environments. Relative sea-level change and its controls on the stratigraphic record. Basin and reservoir modeling. Field trips required at nominal fee. **Prerequisite(s):** EAES 350 or consent of the instructor.

EAES 466
Principles of Paleontology 4 hrs.
Theory and methods of evolutionary paleobiology; includes paleoecology, functional morphology, and major features of organic evolution. **Same as** BIOS 466. **Prerequisite(s):** EAES 360 or BIOS 360 or consent of the instructor.

EAES 470
Surficial Processes 4 hrs.
Quantitative analysis of the mechanics, rates, and distribution of physical processes that modify Earth's and other planets' surfaces. Introduction to field, theoretical, and modelling approaches. **Prerequisite(s):** EAES 101 and MATH 181.

**EAES 475
Hydrology/
Hydrogeology 4 hrs.**
The occurrence, storage, movement, and quality of water above, on, and below the Earth's surface. Topics progress through atmospheric water vapor processes, Earth surface hydrology, and groundwater hydrology. Field trip required at nominal fee.
Prerequisite(s): EAES 101 or EAES 107; and MATH 181; or consent of the instructor.

**EAES 480
Statistical Methods in
Earth and Environmental
Sciences 4 hrs.**
Techniques of probability and data analysis as applied to problems in environmental sciences. Sampling, statistical inference, descriptive statistics, multivariate methods, and time series analysis.
Prerequisite(s): Consent of the instructor.

**EAES 488
Instrumental Analysis 3 hrs.**
Scanning electron microscopy with energy-dispersive system. DC plasma analysis. **Prerequisite(s):** CHEM 114 and EAES 220; or consent of the instructor.

**EAES 492
Internship in the Earth
and Environmental
Sciences 1 hour.**
Off-campus participation in governmental or private-sector training program. Credit is contingent on submission of a final report. Satisfactory/Unsatisfactory grading only. May be repeated with approval. A combined maximum of 6 hours of credit in EAES 492 and EAES 396 may be applied toward the degree. **Prerequisite(s):** Approval of the department.

**EAES 494
Current Topics in Earth
and Environmental
Sciences 4 hrs.**
Discussion of current research topics in earth and environmental sciences. **Prerequisite(s):** Consent of the instructor. Recommended background: Senior standing and 12 hours of advanced courses in Earth and Environmental Sciences.

**EAES 510
Advanced
Geochemistry 3 TO 4 hrs.**
Advanced topics in one of the following categories: isotope geochemistry and geochronology, distribution of elements in the earth's crust, mineral systems with and without volatile components, low-temperature mineral systems. Lectures and seminars. May be repeated if topics vary.
Prerequisite(s): Consent of the instructor. Recommended background: Credit in EAES 410.

**EAES 511
Principles of Aqueous
Geochemistry 4 hrs.**
Theory and application of thermodynamics and kinetics to processes controlling the compositions of natural waters, including solid and gas solubility, dissolution and precipitation, sorption, oxidation-reduction, and acid-base equilibria.
Prerequisite(s): Consent of the instructor.

**EAES 512
Solid-Water Interface
Chemistry 4 hrs.**
Description, theory, and characterization of molecular-scale chemical processes at the solid-water interface. Major emphasis on oxide minerals with minor emphasis on metals, salts, and organics. **Prerequisite(s):** Consent of the instructor.

**EAES 513
Stable Isotopes
Geochemistry and
Biogeochemistry 4 hrs.**
Lectures and readings will cover nucleosynthesis, physical basis of isotopic fractionation, isotopic distributions in nature, and applications of stable isotope ratio measurements in studies of geologic, hydrologic, and biogeochemical cycles.
Prerequisite(s): Consent of the instructor.

**EAES 514
Environmental
Radioactivity 4 hrs.**
Covers the origins and distribution of radioactivity in the natural environment, along with applications of radioactivity measurements to studies of geologic, hydrologic, atmospheric, and biological processes.
Prerequisite(s): Consent of the instructor.

**EAES 516
Advanced Organic
Geochemistry/
Biochemistry 4 hrs.**
Carbon biogeochemical cycle, carbon fixation and carbon isotope fractionation, compound specific isotope analysis, biomarker geochemistry, and paleoenvironment. **Prerequisite(s):** EAES 416 or consent of the instructor.

**EAES 520
Advanced Mineralogy 4 hrs.**
Various types in one of the following categories: structural determination, advanced diffraction techniques, crystal chemistry, and structural mineralogy. Lectures, seminars, and laboratory. May be repeated if topics vary. **Prerequisite(s):** Consent of the instructor.

**EAES 530
Advanced
Petrology 3 TO 4 hrs.**
Selected topics: generation and properties of magmas, formation of metamorphic rocks, and reaction rates in metamorphic rocks. May be repeated if topics vary. **Prerequisite(s):** Consent of the instructor. Recommended background: Credit in EAES 430.

**EAES 540
Interdisciplinary
Approaches to the Study of
Integrated Human/
Natural Landscapes 3 hrs.**
Examination of ecological, biogeochemical, and evolutionary principles; techniques and philosophies of ecological remediation, restoration, and conservation; environmental regulation and policy; sustainability in theory and practice. **Same as** BIOS 540 and CME 540. **Prerequisite(s):** Consent of the instructor.

**EAES 541
Seismology 4 hrs.**
Elastic wave propagation theory, instrumentation, seismic source mechanisms, body and surface waves, free oscillations, Earth's interior, focal mechanisms, and earthquakes and plate tectonics. **Prerequisite(s):** EAES 444 or consent of the instructor.

**EAES 543
Advanced Geophysics
and Plate Tectonics 4 hrs.**
Advanced topics in geophysics and plate tectonics, including subjects such as mantle convection, driving forces of plate tectonics, and evolution of rifted continental margins. May be repeated if topics vary. Students may register in more than one section per term. **Prerequisite(s):** EAES 444 or EAES 448.

**EAES 545
Spatial and Temporal
Analysis and Modeling 4 hrs.**
Methods for the analysis and modeling of spatial and temporal patterns in the earth and environmental sciences. Data acquisition. **Prerequisite(s):** Graduate standing; and consent of the instructor.

**EAES 546
Research Methods for
Landscape Ecological
and Anthropogenic
Processes 4 hrs.**
Students will develop the skills to choose and utilize relevant methods and tools used in the study and management of altered natural landscapes to achieve research and management objectives through hands-on interdisciplinary laboratory modules. **Same as** BIOS 546 and CME 546. **Prerequisite(s):** Consent of the instructor.

**EAES 547
Field Experiences in
Landscape Ecological
and Anthropogenic
Processes 4 hrs.**
Evaluation of the issues and needs of various landscape restorations and related urban-impacted sites in the Chicago metropolitan area based upon selected readings, site visits, and presentations and discussions with the site manager/coordinators. **Same as** BIOS 547 and CME 547. **Prerequisite(s):** Consent of the instructor.

**EAES 555
Advanced
Sedimentary Geology 3 hrs.**
Advanced topics in modern sedimentology and stratigraphy. May be repeated if topics vary. Field trips required at nominal fee. **Prerequisite(s):** EAES 455 or consent of the instructor.

**EAES 560
Topics in
Paleontology 3 TO 4 hrs.**
In-depth analysis of current problems and issues in paleontology, involving reading primary literature, student presentations, and critical discussions. **Same as** BIOS 560. May be repeated if topics vary. **Prerequisite(s):** Consent of the instructor.

**EAES 570
Advanced
Surficial Processes 4 hrs.**
Advanced topics in theoretical, empirical, and applied aspects of hillslope processes, sediment transport mechanics, river mechanics, weathering and soil development, or drainage basin development. May be repeated if topics vary. **Prerequisite(s):** EAES 470.

**EAES 572
Quaternary
Environmental Systems 3 hrs.**
Interrelations between eolian, lacustrine, marine, eolian, and glacial environments for the past 1.8 million years; geochronologic and isotopic methods; stratigraphic and geomorphic approaches. **Prerequisite(s):** EAES 470.

**EAES 575
Advanced
Hydrology 3 hrs.**
Selective topics: mechanics of near-surface groundwater, flow in fractured rocks, groundwater contamination, unsaturated-saturated flow, surface-groundwater interactions. May be repeated if topics vary. **Prerequisite(s):** EAES 475.

**EAES 576
Paleoclimatology 3 hrs.**
Principles of climatology and paleoclimatology; mechanisms and causes of climate change for the past 63 million years; geologic records of climate and modelling. **Prerequisite(s):** EAES 470.

**EAES 580
Aquatic Science 3 hrs.**
Addresses environmental issues related to lakes, rivers, estuaries, and coastal zones. Topics will cover sampling techniques, impact of humans, and global change. Field trip required at nominal fee. **Prerequisite(s):** EAES 475; or consent of the instructor.

**EAES 595
Departmental
Seminar 1 hour.**
Special one-hour seminar, every Thursday, by invited speakers from other earth and environmental sciences departments, governmental agencies, and industry. Satisfactory/Unsatisfactory grading only.

EAES 596
Advanced Studies
in Earth and
Environmental
Sciences 1 TO 6 hrs.
Independent study or research with faculty supervision, leading to a written report. May be repeated. A maximum of 4 hours of credit may be applied toward the requirements for the MS degree. **Prerequisite(s):** Consent of the head of the department and the faculty member who will supervise the study.

EAES 598
Master's Thesis
Research 0 TO 16 hrs.
Individual work under the supervision of faculty members in their respective fields. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the thesis supervisor.

EAES 599
PhD Thesis
Research 0 TO 16 hrs.
Individual work under the supervision of faculty members in their respective fields. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the thesis supervisor.

Economics

ECON 436
Mathematical
Economics 3 OR 4 hrs.
Application of mathematics to theories of consumer and producer behavior, determination of prices in markets, growth and stability features of macroeconomic models. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ECON 218 or ECON 220; and either ECON 345 or MATH 165 or MATH 180.

ECON 441
Teaching
Methods in
Economics 3 OR 4 hrs.
Develops skills in preparing and giving lectures and examinations, computer usage, and other aspects of teaching economics and consumer economics at secondary/higher education levels. 3 undergraduate hours. 4 graduate hours. Credit earned in ECON 441 may not be used to satisfy Economics credit requirements for the BA, BS, MA, or PhD degrees awarded by the Department of Economics. Credit earned in ECON 441 may be applied toward the degree as an elective. **Prerequisite(s):** For undergraduate students, two 300- or 400-level electives in economics; for graduate students in Economics, one course in graduate-level microeconomics or macroeconomics.

ECON 442
Topics in Economic
Education 1 TO 4 hrs.
Topics vary. Course content is announced prior to each term in which it is given. May be repeated for credit. Students may register for more than one section per term. Credit for this course may not be used to satisfy the minimum number of Economics credit hours needed for the BA, BS, MA, or PhD in Economics. It may be used as general elective credit for these degree programs or as the Economic Education course requirement for the Certificate in the Teaching of Economics. **Prerequisite(s):** Consent of the instructor. Prerequisites may vary according to topic.

ECON 450
Business Forecasting
Using Time Series
Methods 3 OR 4 hrs.
Autoregressive, moving average, and seasonal models for time series analysis and business forecasting. Forecasting using multivariable transfer function models. **Same as** IDS 476. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IDS 371 or ECON 346 or consent of the instructor.

ECON 472
Real Estate
Finance 3 OR 4 hrs.
Finance principles applied to real estate; financing of residential and income-producing real estate; real estate development finance; secondary mortgage market; taxation and real estate finance. **Same as** FIN 472. 3 undergraduate hours. 4 graduate hours. May not be used to satisfy the Economics credit requirement for the MA in Economics and PhD in Economics. Elective credit only will be applied toward these degrees. **Prerequisite(s):** ECON 218 or ECON 220.

ECON 475
Real Estate
Markets and
Valuation 3 OR 4 hrs.
Real estate market analysis. Sales comparison, cost, and income approaches to estimating residential and commercial property values. Statistical procedures for real estate analysis. 3 undergraduate hours. 4 graduate hours. Course may not be applied toward the minimum required courses in Economics for the MA or PhD in Economics. **Prerequisite(s):** ECON 218 or ECON 220; and ECON 270 or IDS 270; or consent of the instructor.

ECON 495
Competitive Strategy 4 hrs.
Multidisciplinary analysis of organizational strategy and policy, using case method and/or business simulation. Assignments involve extensive library research and oral and written reports. **Prerequisite(s):** Senior standing in the College of Business Administration and completion of all other CBA core courses, or consent of the instructor.

ECON 499
Independent
Study in
Economics 1 TO 3 hrs.
Independent study of a topic not covered in a graduate-level course. **Prerequisite(s):** Graduate standing and consent of the director of graduate studies and the instructor.

ECON 500
Managerial
Economics 4 hrs.
Economic analysis applied to business operations; demand theory; production cost analysis; capital theory; pricing policies; capital budgeting. **Prerequisite(s):** ECON 501 or ECON 520.

ECON 501
Microeconomics I 4 hrs.
Theories of consumer and producer behavior and determination of market price. Systematic treatment of the core of microeconomic theory. **Prerequisite(s):** ECON 220 and MATH 165.

ECON 502
Microeconomics II 4 hrs.
Advanced microeconomic theory. Theories of consumer behavior, uncertainty, general equilibrium, and welfare economics. **Prerequisite(s):** ECON 501.

ECON 504
The Economics of
Organization of
Business Enterprises 4 hrs.
The economic reasons for the existence of firms, the determinants of firm size, and the theory of organizational structure. **Prerequisite(s):** ECON 501 or ECON 520.

ECON 511
Macroeconomics I 4 hrs.
Static and dynamic theories of income, employment, and the price level; advanced treatment of consumption, investment, money demand, and aggregate production functions; stabilization theory and policy. **Prerequisite(s):** ECON 221.

ECON 512
Macroeconomics II 4 hrs.
Neoclassical and modern market-clearing models of real and monetary influences on economic growth, inflation, and business cycles. **Prerequisite(s):** ECON 511.

ECON 513
Special Topics in
Macroeconomics
and International
Economics 4 hrs.
Intense study of selected research topics in macroeconomics and international economics. Topics may vary. **Prerequisite(s):** ECON 512.

ECON 514
International
Trade Policy 4 hrs.
Theoretical models on the causes and consequences of international trade and their empirical validation. Effects of tariff and nontariff trade policies and preferential trade agreements. **Prerequisite(s):** ECON 501; or ECON 520 and ECON 521.

ECON 515
International
Monetary Policy 4 hrs.
Capital mobility and stabilization policy under fixed and flexible exchange rates; optimum currency areas; reform of international monetary system; problems of liquidity adjustment and confidence. **Prerequisite(s):** ECON 511 or ECON 521.

ECON 516
Economic Development
in an Interdependent
World 4 hrs.
Theoretical and empirical studies of economic development with intersectoral and international perspectives; structural change and resource reallocation; factor proportions, substitutability, and movement; export-led growth. **Prerequisite(s):** ECON 501 or ECON 520 or consent of the instructor.

ECON 519
International
Economics for
Business 4 hrs.
Comparative advantage. Trade policy. Custom unions and free-trade areas. Balance of payments and foreign-exchange markets. Capital mobility and other globalization issues. Stabilization policy. Monetary integration. Credit for ECON 519 may not be used to satisfy Economics credit requirements for the MA or PhD in Economics or for the PhD in Business Administration (Concentration in Economics). Credit is not given for ECON 519 if the student has credit for ECON 333, ECON 415, or ECON 515. **Prerequisite(s):** ECON 520.

ECON 520
Microeconomics
for Business
Decisions 4 hrs.
Efficient allocation of resources by consumers, profit and nonprofit firms, and government, regulation of industry, monopoly and imperfect competition, business ethics and the market place, efficiency versus equity, and social welfare. Credit is not given for ECON 520 if the student has credit in ECON 501 or ECON 540. **Prerequisite(s):** MATH 165 or MATH 181 or the equivalent.

ECON 521
Macro and
International
Economics for
Business 4 hrs.
Impact of the macroeconomy and international economics on business decisions. Determination of economic activity, inflation, interest rates and exchange rates. Role of monetary and fiscal policy. Credit is not given for ECON 521 if the student has credit in ECON 511.

**ECON 531
Labor Economics I 4 hrs.**
Determinants of wage differentials; analysis of determinants and consequences of investments in human capital (schooling, on-the-job training, health); labor mobility, supply, and allocation of time. **Prerequisite(s):** ECON 501 or ECON 520.

**ECON 532
Labor Economics II 4 hrs.**
Impact of training, legislation, institutional constraints, and discrimination on the labor market. Focus on demographic groups (race, nativity, ethnicity, gender). **Prerequisite(s):** ECON 501 or ECON 520.

**ECON 533
Economic
Development and
Human Resources 4 hrs.**
Economic theory applied to less developed countries, focusing on human aspects of development. Household economy, employment, earnings, labor productivity, unemployment, migration, population growth, income distribution. **Prerequisite(s):** ECON 501 or ECON 520.

**ECON 534
Econometrics I 4 hrs.**
Detailed treatment of the multivariate linear regression model using matrix algebra. Emphasis on formulating and testing static and dynamic econometric models. **Prerequisite(s):** ECON 346; or consent of the instructor.

**ECON 535
Econometrics II 4 hrs.**
Detailed treatment of simultaneous equations estimation; evaluation of alternative estimators; problems of estimation including probit, logit, tobit, and error component models. **Prerequisite(s):** ECON 534.

**ECON 536
Advanced
Mathematical
Economics 4 hrs.**
Mathematics theory and applications, including calculus and linear algebra, to theories of consumer and producer behavior, general equilibrium, welfare economics, externalities, and social choice. **Prerequisite(s):** MATH 181.

**ECON 537
Business
Research and
Forecasting I 4 hrs.**
The role of research in business; forecasting methods and techniques, including models and their applications. **Same as** IDS 582. **Prerequisite(s):** ECON 534 and at least one statistics course with regression analysis at the 300-level or above.

**ECON 538
Business Research and
Forecasting II 4 hrs.**
The role of research in business; forecasting methods and techniques, including multivariate time series models and their applications. **Same as** IDS 583. **Prerequisite(s):** IDS 476 or IDS 582 or ECON 537.

**ECON 539
Microeconometrics 4 hrs.**
Application of econometric techniques to empirical problems in microeconomics with emphasis on issues of identification and causality; and the selection, implementation, and testing of statistical models. **Prerequisite(s):** ECON 501 and ECON 535.

**ECON 540
Economics for the
Non-Economists 4 hrs.**
Basic introduction to economics for graduate and professional school students. Supply/demand, opportunity cost, economic behavior of consumers/business firms, macroeconomy, inflation, and business cycles. Credit is not given for ECON 540 if the student has credit in ECON 501 or ECON 520. No graduation credit given to students enrolled in MBA, MA, or PhD in Economics, or PhD in Business Administration.

**ECON 551
Economics
of Education 4 hrs.**
Basic concepts and tools of economics applied to education. Economic implications of educational outcomes for the economy, and for socioeconomic structure (e.g., income distribution, fertility patterns, ethnic group differences). **Prerequisite(s):** ECON 501 or ECON 520.

**ECON 552
Economic
Demography 4 hrs.**
Economic analysis of fertility (number and timing of children), mortality, marriage and divorce, population age structure, and the relationship between population growth and economic development. **Prerequisite(s):** ECON 501 or ECON 520.

**ECON 553
Economics
of Religion 4 hrs.**
The economic determinants of participation in religious activities; the effects of religion on economic and demographic behavior, health, and well-being. **Prerequisite(s):** ECON 501 or ECON 520.

**ECON 555
Health
Economics I 4 hrs.**
Topics in the supply and demand for health services; the role of insurance in the medical care industry; public policy issues of cost and quality regulation. **Prerequisite(s):** ECON 501 or ECON 520; or consent of the instructor.

**ECON 556
Health Economics II 4 hrs.**
Economics of health-related behaviors, prevention and health promotion, health disparities, health and development, evaluation of health-related interests. **Prerequisite(s):** ECON 501 or ECON 520; or consent of the instructor.

**ECON 560
Industrial
Organization 4 hrs.**
Analysis of industry structure, behavior and performance; firms in imperfect competition; concentration measurement; oligopoly; theory; cartels; price discrimination; vertical and horizontal integration. **Prerequisite(s):** ECON 501 or ECON 520 or consent of the instructor.

**ECON 570
Environmental
and Natural
Resource Economics 4 hrs.**
Analytical methods for evaluating the impacts and control costs of pollution externalities and natural resource changes. Consequent implications for public and business policy. **Prerequisite(s):** ECON 501 or ECON 520.

**ECON 571
Urban Real
Estate and Land
Economics 4 hrs.**
Economic analysis of urban real estate and land. Real estate appraisal. Demand for urban land; supply of land and improvements. **Prerequisite(s):** ECON 501 or ECON 520.

**ECON 572
Urban Economics 4 hrs.**
Urban economic models and economic analysis of urban problems. Firm location, housing, transportation, local public finance. **Prerequisite(s):** ECON 501 or ECON 520.

**ECON 575
Economic Analysis
of Public
Expenditures 4 hrs.**
Microeconomic theory as applied to public expenditure decisions; externalities, shadow prices, and investment criteria in cost-benefit analysis; uncertainty and the value of life; extensive illustrative case studies. **Prerequisite(s):** ECON 501 or ECON 520.

**ECON 576
Economics of
Taxation 4 hrs.**
Analysis of the effects of taxation on economic behavior; taxation and public choice; the effects of taxation on the distribution of income; theory and empirical analysis of welfare effects of taxes; optimal tax theory; issues in tax policy and tax reform. **Prerequisite(s):** ECON 501 or ECON 520.

**ECON 592
Workshop in
Economics 4 hrs.**
Bridges the transition from course work to dissertation research. The nature of a PhD dissertation, topic selection, career design, research support networks. Students define a potential dissertation topic, survey the literature, and present it in class. **Prerequisite(s):** Comprehensive exams in micro and macro.

**ECON 593
Internship
Program 0 TO 8 hrs.**
Under the direction of a faculty supervisor, students work in government or a private firm on problems related to their major field of interest. Specific credit allotted is determined by the Graduate Curriculum Committee after receiving the supervisor's recommendation. **Prerequisite(s):** Completion of the core courses in the degree program in which the student is enrolled and approval of the internship program by the graduate advisor and the Graduate Curriculum Committee.

**ECON 596
Independent
Study 1 TO 4 hrs.**
Independent study under faculty supervision. **Prerequisite(s):** Consent of the instructor.

**ECON 598
Master's Thesis
Research 0 TO 16 hrs.**
Research on MA thesis. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the chair of the thesis committee.

**ECON 599
PhD Thesis
Research 0 TO 16 hrs.**
Research on a PhD thesis. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the chair of the thesis committee.

Education

**ED 402
Philosophy of
Education and Urban
School Policy 3 hrs.**
Selected social and education philosophies and their impact on urban school curriculum design, school organization, and control.

**ED 403
Policy Issues
in the History of
American Education 3 hrs.**
Political, economic, and cultural influences shaping the development of American education policy; emphasis on issues of education theory and practice in their historical settings.

ED 421
Advanced
Educational Psychology 3 hrs.
Examines current theory and research on the teaching-learning process with particular attention to general learning and curriculum-relevant problem-solving skills.
Prerequisite(s): ED 210 or graduate standing.

ED 422
Advanced
Developmental
Psychology and
Educational
Processes 3 hrs.
Focuses on cognitive and social development from birth to adolescence. Examines relations between development, learning, and educational processes. **Same as PSCH 422.** **Prerequisite(s):** PSCH 100 and any one from ED 210, PSCH 259, PSCH 320; or graduate standing and consent of the instructor.

ED 429
Practicum in
Middle and High
School Classrooms 2 hrs.
Students will observe secondary classrooms, tutor individuals, and teach small groups. Discussions explore curriculum, instruction, and assessment practices within content areas and cultural contexts.
Prerequisite(s): Admission into a secondary teacher education program and graduate standing. Must enroll concurrently in ED 430.

ED 430
Curriculum and
Teaching 3 hrs.
Introduction to curriculum and teaching as areas of inquiry; implications of these areas of inquiry for educational practice; related contemporary problems and issues. **Prerequisite(s):** Admission to graduate study in Education, or consent of the instructor.

ED 431
Improving Learning
Environments 3 hrs.
Analysis of structural, normative, and social dimensions of learning environments and their relationships to student learning. Exploration of change processes to improve those environments.
Prerequisite(s): Graduate standing or consent of the instructor.

ED 432
Instruction and
Evaluation in
Secondary Education 5 hrs.
Instructional planning and curriculum design; strategies for instruction and classroom management; forms of formative and summative evaluation; and professional development issues. Fieldwork required.
Prerequisite(s): Completion of education core courses in undergraduate teacher certification program: ED 200 and ED 210 or, in graduate teacher certification program: ED 402 or ED 403 or PS 401; and ED 421 or ED 422 or ED 445.

ED 445
Adolescence and
the Schools 3 hrs.
Physiological, intellectual, and social development of adolescence. Relations between aspects of adolescent development and the academic and social demands of secondary schools. **Prerequisite(s):** ED 210 or the equivalent, or graduate standing.

ED 450
Composing a
Teaching Life I 15 hrs.
Begins the capstone experience of the program, full-time student teaching in an elementary classroom. It is accompanied with a weekly seminar to discuss experiences, reason about learning, and reflect on students' own learning. **Prerequisite(s):** Senior standing or above and admission to the Bachelor of Arts in Elementary Education program.

ED 451
Composing a
Teaching Life II/Senior
Reflective Seminar 5 hrs.
Provides the capstone experience for students, with a weekly senior reflective seminar in which students reflect upon their teaching through the lenses of the five program curricular strands. Fieldwork required.
Prerequisite(s): Admission to the Bachelor of Arts in Elementary Education program. Senior standing and successful completion of ED 450.

ED 461
Political and Sociocultural
Perspectives on Special
Education 3 hrs.
Students will examine issues of access and equity through legislation, litigation, and sociocultural perspectives and be introduced to major theoretical frameworks that influence special education programs. **Same as SPED 461.** Fieldwork required.

ED 470
Educational Practice
with Seminar I 6 hrs.
The first half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the college.
Prerequisite(s): Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, and approval of the college or department of specialization.

ED 471
Educational Practice
with Seminar II 6 hrs.
The second half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the college.
Prerequisite(s): Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, credit or concurrent registration in ED 470, and approval of the college or department of specialization.

ED 472
Promoting
Academic
and Prosocial
Behavior I 3 hrs.
The importance of school-wide and classroom structure and climate in the educational process. Strategies to promote academic success and desired social behavior. **Same as SPED 472.** Fieldwork required. **Prerequisite(s):** SPED 461 or ED 461 or the equivalent or consent of the instructor.

ED 473
Teaching Math
and Science with
Adaptations 3 hrs.
Provides prospective teachers with assessment strategies and a range of adaptations, modifications, and interventions in math and science for students with disabilities. **Same as SPED 473.** Fieldwork required. **Prerequisite(s):** SPED 461 or ED 461 or the equivalent or consent of the instructor.

ED 500
Philosophical
Foundations of
Educational Inquiry 4 hrs.
Philosophical foundations of various forms of educational inquiry. Epistemological and ethical dimensions of different research approaches.
Prerequisite(s): Admission to the PhD in Education program or consent of the instructor.

ED 501
Data and Interpretation
in Educational Inquiry 4 hrs.
Data, interpretation, reliability, validity, accuracy, stability, and generalizability from different methodological perspectives; how research design, data collection, and interpretation vary with different philosophical approaches. **Prerequisite(s):** Admission to the PhD in Education program or consent of the instructor.

ED 502
Essentials of
Qualitative Inquiry in
Education 4 hrs.
Hands-on introduction to qualitative research methods, including foundations, practices, and ethics in qualitative research. **Prerequisite(s):** Admission to the PhD in Education program or consent of the instructor.

ED 503
Essentials of
Quantitative Inquiry
in Education 4 hrs.
Introduces theory and assumptions behind parametric statistics. Also provides hands-on experience in conducting basic quantitative research (t-test, correlation, regression, analysis of variance). **Same as EPSY 503.**
Prerequisite(s): Admission to the PhD in Education program or consent of the instructor.

ED 543
Research
on Teaching 4 hrs.
Review and analysis of history, paradigms, methods, and findings of research on teaching. Focus on the development of research questions and strategy.
Prerequisite(s): ED 490 or ED 503 or CIE 578; and consent of the instructor.

ED 580
Colloquium on
Diversity in Secondary
Education 2 hrs.
Designed to provide candidates with opportunities to interact with experts who deal with various issues of diversity in education, to discuss those issues with their cohorts, and to explore ways of meeting students' diverse needs. Satisfactory/Unsatisfactory grading only.

ED 594
Special Topics in
Education 1 TO 4 hrs.
Exploration of a topic not covered in existing course offerings. May be repeated if topics vary. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

ED 596
Independent
Study 1 TO 4 hrs.
Students independently study related topics not covered by course, under faculty supervision. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the advisor.

Educational Policy Studies

EDPS 412
Politics of
Urban Education 3 OR 4 hrs.
Relations between school governance and politics. The role of educational interest groups, school boards, professional educators, and citizens in formulation and execution of educational policy. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Consent of the instructor.

EDPS 449
Early Childhood /Early Childhood Special Ed: Perspectives, Policies, and History 3 hrs.
Perspectives, policies, history, and foundations of early childhood education and early childhood special education. Emphasis on the effects of changing economic, political, legal, and social views of human development. **Same as** EPSY 449 and SPED 449.

EDPS 453
Topics in Educational Policy Studies 3 OR 4 hrs.
Topics are announced at the time the class is scheduled. 3 undergraduate hours. 4 graduate hours. May be repeated to a maximum of 12 hours.

EDPS 500
City Schools: Education in the Urban Environment 4 hrs.
Cross-disciplinary, critical analysis of relationships between public schools and school districts and their urban environments, with attention to implications for school improvement. **Prerequisite(s):** Consent of the instructor.

EDPS 501
Education Finance and Budgeting 4 hrs.
Role of government, school boards, and community in funding education. Principles of school and district financial planning, management, and analysis. Equity issues in school finance. **Prerequisite(s):** Consent of the instructor.

EDPS 510
Introduction to Doctoral Education in Policy Studies 4 hrs.
This required doctoral seminar will be taken in the first year of doctoral study. It introduces theoretical perspectives and research problems in both concentrations of the PhD program as well as relation between educational and social change. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Admission to the PhD in Policy Studies in Urban Education program or consent of the instructor.

EDPS 512
Data and Interpretation in Educational Policy Studies 4 hrs.
Methodology course providing students with basic understanding and skills in assessing, interpreting and representing quantitative and qualitative evidence in educational policy studies research. Students learn research design and critique. **Prerequisite(s):** ED 500 and enrollment in the PhD in Policy Studies in Urban Education program or consent of the instructor.

EDPS 544
Research Design in Educational Policy Studies 4 hrs.
Alternative research design models and evaluation methodologies; quantitative and qualitative approaches; ethnography; historiography; experimentation and quasi-experimentation; institutional and practitioner research designs and methods. May be repeated. **Prerequisite(s):** Admission to the PhD in Policy Studies in Urban Education (Educational Organization and Leadership Concentration) or the EdD in Urban School Leadership program and consent of the instructor.

EDPS 548
Leadership for Literacy Instruction 4 hrs.
School and system leadership practices for promoting effective literacy instruction in urban elementary and secondary schools. Assessment and improvement of literacy curriculum, pedagogy, and evaluation. **Same as** CI 548. **Prerequisite(s):** Consent of the instructor; admission to a degree program in the College of Education. Students admitted to the EdD in Urban Education Leadership, prerequisites also include EDPS 550 and EDPS 552.

EDPS 549
Teaching for Social Justice 4 hrs.
Examine theory and practice of social justice teaching in schools, including: history liberatory pedagogies, culturally relevant and critical pedagogies, funds of knowledge, critical multiculturalism and antiracist pedagogy, critical race theory. **Same as** CI 549. **Prerequisite(s):** Consent of the instructor.

EDPS 550
Organizational Change in Education 4 hrs.
Introduction to models and theories of organizational change in education. Overview of mechanisms, resources, and contexts of effective school improvement. **Prerequisite(s):** Consent of the instructor.

EDPS 552
The Urban School Principal 4 hrs.
Leadership and management responsibilities of principals in urban schools. Theory and research on principal leadership, case study analysis, and field experience with working principals. **Prerequisite(s):** Admission to the Doctor of Education in Urban School Leadership program or consent of the instructor.

EDPS 553
System Leadership in Urban Schools 4 hrs.
Leadership and management responsibilities of system-level administrators in urban school districts. Theory and research on system level leadership using case study analysis and fieldwork with system administrators. **Prerequisite(s):** Consent of the instructor.

EDPS 555
Political Economy of Urban Education 4 hrs.
Politics of urban school policy and practice. Interest groups, school boards, educators, citizens, and governments as political actors. Educational leadership in political context. **Prerequisite(s):** Consent of the instructor.

EDPS 556
Instructional Leadership 4 hrs.
Instructional improvement role of educational leaders of urban schools. Human resource development, parent/community support, supportive organizational contexts. Strategic planning, implementation, and evaluation. **Prerequisite(s):** Consent of the instructor.

EDPS 559
Internship in Educational Leadership 4 hrs.
Field experience in approved educational leadership positions and sites to perform authentic leadership tasks. Supervision by site-based mentor and university instructor. Different sections will focus on school-level and system-level administration. May be repeated. 4 hours required for the Illinois Type 75 certificate. Additional hours may be needed for students to satisfy local school system administrator certification requirements (such as Chicago Public Schools' 1019 requirement). **Prerequisite(s):** Admission to the EdD in Urban School Leadership program and to the Type 75 General Administrative Certificate program, and consent of the instructor. Requires concurrent registration in EDPS 573.

EDPS 566
Cultural Studies in Education 4 hrs.
Examines origins, evolution, and current frameworks of cultural studies, with a focus on educational policy and practice. **Prerequisite(s):** Consent of the instructor.

EDPS 567
Economics of Education 4 hrs.
Introduction to the economics of education. Relates education and income, studies, and conditions for efficient production of education, and teacher markets and school finance. **Prerequisite(s):** Consent of the instructor.

EDPS 568
Education and the Law 4 hrs.
Legal rights, responsibilities, and authority of students, parents, teachers, administrators, boards, and government units in relation to schools. Legal issues in education policy and practice. **Prerequisite(s):** Consent of the instructor.

EDPS 570
Historical and Philosophical Analysis of Education Policy 4 hrs.
Historical and philosophical research methodology in the study of educational policy. **Prerequisite(s):** Consent of the instructor.

EDPS 571
The Education Policy Process 4 hrs.
Examination of forces that influence the processes of educational policy making, adoption, and implementation, with a focus on the roles of legislatures, courts, government agencies, and interest groups. **Prerequisite(s):** Admission to the PhD in Policy Studies in Urban Education or the EdD in Urban School Leadership or consent of the instructor.

EDPS 572
Sociology of Education 4 hrs.
Education as a social institution in interaction with other institutions, such as the economy. Topics include the emergence of national systems of education, purposes of education, inequality, and educational reform. **Same as** SOC 572. **Prerequisite(s):** Consent of the instructor.

EDPS 573
Seminar in Education Leadership Practice 4 hrs.
Budget and finance, strategic planning and decision making, communication, use of data and technology, parent/community relations, student support services. Different sections will focus on school-level and system-level administration. May be repeated. 4 hours is required for the Illinois Type 75 certificate. Additional hours may be needed for students to satisfy local school system administrator certification requirements (such as Chicago Public Schools' 1019 requirement). **Prerequisite(s):** Admission to the EdD in Urban Educational Leadership program and consent of the instructor. Requires concurrent registration in EDPS 559.

EDPS 574
Impact of College on Students 4 hrs.
Introduction to research on the impact of college on students. Emphasis is placed on methods of assessing impact and research on college effects. **Prerequisite(s):** Consent of the instructor.

EDPS 575
Higher Education Organization and Administration 4 hrs.
Perspectives on organization, leadership, and administration of higher education. Understandings from organization theory and research on postsecondary institutions applied to issues in higher education administration. **Prerequisite(s):** Admission to PhD in Public Policy Analysis program or consent of the instructor.

EDPS 576
History of Higher Education 4 hrs.
Focus on key historical events that have had enduring implications for colleges and universities. Emphasis on social, political, economic, intellectual, and legal forces shaping American higher education. **Prerequisite(s):** Consent of the instructor.

EDPS 577
American Academic Profession 4 hrs.
Foundations of the academic profession. Emphasis on institutional and disciplinary variation in the performance, evaluation, and reward of faculty activities. **Prerequisite(s):** Consent of the instructor.

EDPS 578
Political Theory and Education Policy 4 hrs.
Theoretical perspectives on the role of politics in the development of educational policy at the federal, state, and local levels. **Prerequisite(s):** Consent of the instructor.

EDPS 579
Organization Theory in Education 4 hrs.
Theories of decision making, organizational effectiveness, and organizational improvement in education. Multidisciplinary and historical perspectives and their application to understanding the nature and function of educational organizations. **Prerequisite(s):** Admission to the PhD in Policy Studies in Urban Education program or the EdD in Urban School Leadership program or consent of the instructor.

EDPS 581
Collective Bargaining in Education 4 hrs.
Role of collective bargaining in governance, function, and improvement of school systems. Models and processes of negotiation, engagement, and conflict resolution. **Prerequisite(s):** Consent of the instructor.

EDPS 582
Cultural Pluralism and Education Policy 4 hrs.
Social philosophical analysis of the theory of cultural pluralism, its relation to the liberal-experimentalist tradition in educational thought; selected equal educational opportunity policies; recent federal and state legislation on multicultural education. **Prerequisite(s):** Consent of the instructor.

EDPS 583
Women in Education 4 hrs.
An overview of girls' and women's educational experiences and placement within the academic structure (as students, professionals, and intellectuals). The impact of gender on the realization of educational, economic, and social opportunities. **Same as** GWS 583. **Prerequisite(s):** Consent of the instructor or enrollment in the PhD in Policy Studies in Urban Education program.

EDPS 586
Methods of Institutional and Practitioner Research 4 hrs.
Methods of institutional and practitioner research for practicing educators in school and school system settings. Relationship of this form of inquiry to educational leadership and improvement. **Prerequisite(s):** Consent of the instructor.

EDPS 587
Methods of Case Study Research 4 hrs.
Study and practice in documentary and field research methods of collecting, organizing, and integrating educational data for case study. Includes attention to interviewing, observation, ethnography, and historiography. May be repeated to a maximum of 8 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

EDPS 588
Critical Race Theory: Race and Racism in Education 4 hrs.
Examines theories of race and racism in education within the interdisciplinary construct of critical race theory. **Prerequisite(s):** Consent of the instructor.

EDPS 589
Administrative and Leadership Theory in Education 4 hrs.
Overview of administrative theory, including theory-practice interface; administrative theory history; and relationships of administrative theory to educational administration and organizations. **Prerequisite(s):** Admission to the PhD in Policy Studies in Urban Education program or the EdD in Urban School Leadership program or consent of the instructor.

EDPS 592
Professional Career Training in Education Policy Studies 4 hrs.
Faculty-supervised training through university teaching, research, or internship. Presentation relating experience to theory. May be repeated to a maximum of 16 hours. **Prerequisite(s):** Approval of the department chairperson.

EDPS 593
Doctoral Research Project 1 TO 8 hrs.
Students design, implement, and analyze results of a research problem in this area of specialization. Completed study is reviewed by faculty. May be repeated to a maximum of 8 hours. **Prerequisite(s):** Consent of the instructor.

EDPS 594
Special Topics in Educational Policy 4 hrs.
Exploration of an area not covered in existing course offerings. Topics vary. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

EDPS 596
Independent Study in Educational Policy Studies 1 TO 4 hrs.
Students carry out independent study in educational policy studies under the direction of a faculty member. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the advisor and the department chairperson.

EDPS 599
Dissertation and Thesis Research in Educational Policy Studies 0 TO 16 hrs.
Research on the topic of the student's dissertation. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the dissertation advisor.

Educational Psychology
EPsy 415
Urban Youth Fieldwork 3 hrs.
Experience in planning, teaching in, and evaluating innovative physical activity-based urban youth programs. Accompanying seminar to examine related literature and explore the interface between theory and practice. May be repeated to a maximum of 6 hours. Previously listed as CIE 415. Fieldwork required. **Prerequisite(s):** Junior standing or above; and consent of the instructor. Requires interview and placement.

EPsy 420
Social Development of Urban Children 3 OR 4 hrs.
General principles of social development and socialization during childhood and the factors common to urban children that illustrate and modify these principles. **Same as** PSCH 420. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Admission to a graduate program in Education or Psychology, or consent of the instructor.

EPsy 429
Constructivist Approaches to Development: Piaget and Vygotsky 3 OR 4 hrs.
Piaget's and Vygotsky's theories of development of knowledge. Empirical and logico-mathematical forms of knowledge. Thought and action. Thought and language. **Same as** PSCH 429. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ED 422 or PSCH 422 or the equivalent and graduate standing in Education or graduate standing in Psychology or consent of the instructor.

EPsy 446
Characteristics of Early Adolescence 3 hrs.
Physiological, social, emotional, and cognitive development of early adolescence. The relationship between these developmental characteristics and success in the middle grades. **Same as** PSCH 423. **Prerequisite(s):** ED 210 or ED 421 or ED 422 or PSCH 422 or the equivalent, and approval of the College of Education; or admission to the PhD in Psychology program; or consent of the instructor.

EPsy 447
Adolescence in Urban Contexts 3 hrs.
Overview of physiological, social, and cognitive development and how the urban context shapes development. The course utilizes an assets-based approach that challenges stereotypes and normative assumptions regarding the adolescents in urban contexts. **Prerequisite(s):** Introductory course work in psychology, child development, and social development; or admission to the MEd or doctoral program in Educational Psychology.

EPsy 449
Early Childhood/ Early Childhood Special Education: Perspectives, Policies, and History 3 hrs.
Perspectives, policies, history, and foundations of early childhood education and early childhood special education. Emphasis on the effects of changing economic, political, legal, and social views of human development. **Same as** SPED 449 and EDPS 449.

EPsy 465
Cognitive Development and Disabilities 3 hrs.
Theory and research on cognitive development in children with disabilities from infancy through adolescence, in the context of typical development. Models for cognitive assessment and intervention. **Same as** SPED 465. Fieldwork required. **Prerequisite(s):** SPED 461 or ED 461 or the equivalent or consent of the instructor.

EPSY 466
Language Development, Diversity, and Disabilities 3 hrs.
Theory and research on language development in children with disabilities, in the context of typical development. Models for language assessment and intervention. **Same as** SPED 466. Fieldwork required. **Prerequisite(s):** SPED 461 or ED 461 or the equivalent or consent of the instructor.

EPSY 467
Social and Emotional Development and Disabilities 3 hrs.
Exploration of the risk factors and different theoretical approaches associated with the social and emotional development of youth ages 5-21 with and without disabilities. **Same as** SPED 467. Fieldwork required. **Prerequisite(s):** SPED 461 or ED 461 or the equivalent or consent of the instructor.

EPSY 494
Topics in Educational Psychology 1 TO 4 hrs.
Seminar on a pre-announced topic focusing on methodology, research, and educational implications of recent models of learning, problem solving, and thinking. May be repeated to a maximum of 12 hours. **Prerequisite(s):** Consent of the instructor.

EPSY 496
Independent Study 1 TO 4 hrs.
Students carry out independent study under the direction of an Educational Psychology faculty member. **Prerequisite(s):** Junior standing or above; and consent of the instructor.

EPSY 500
Proseminar in Educational Psychology 2 hrs.
Interdisciplinary colloquia on selected topics in educational psychology. Serves as introduction to faculty research foci. **Same as** PSCH 550. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Admission to the PhD in Education program or the PhD in Psychology program, or consent of the instructor.

EPSY 501
Cognition and Instruction 4 hrs.
Current research on relations among cognitive processes, learning, and instruction. **Same as** PSCH 551. **Prerequisite(s):** Admission to the PhD in Education program or the PhD in Psychology program, or consent of the instructor.

EPSY 502
Social Psychology of Education 4 hrs.
Social psychological factors influencing academic and social outcomes in schools. Achievement motivation, peer relations, and social values in relation to student characteristics and school practice. **Same as** PSCH 517. **Prerequisite(s):** Admission to the PhD in Education program or the PhD in Psychology program; or consent of the instructor.

EPSY 503
Essentials of Quantitative Inquiry in Education 4 hrs.
Introduces theory and assumptions behind parametric statistics. Also provides hands-on experience in conducting basic quantitative research (t-test, correlation, regression, analysis of variance). **Same as** ED 503. **Prerequisite(s):** Admission to the PhD in Education program or consent of the instructor.

EPSY 504
Rating Scale and Questionnaire Design and Analysis 4 hrs.
Development and administration of rating scales and questionnaires, analysis of data, and reporting of results. The focus is on rating scales. **Same as** PSCH 504. Previously listed as EPSY 550. **Prerequisite(s):** ED 501, and ED 503 or EPSY 503 or the equivalents or consent of the instructor.

EPSY 505
Advanced Analysis of Variance and Multiple Regression 4 hrs.
Detailed coverage of the principles of ANOVA models, multiple correlation, and multiple regression techniques as tools for the analysis and interpretations of educational and behavioral science data. Extensive computer use required. **Prerequisite(s):** EPSY 503; or consent of the instructor.

EPSY 506
Item Response Theory/Rasch Measurement 4 hrs.
Statistical inference with item-response theory models, useful to measure an individual's performance on a test or questionnaire. Models include parametric, nonparametric, unidimensional, multidimensional, and cognitive. **Same as** PSCH 506. May be repeated to a maximum of 8 hours. Extensive computer use required. **Prerequisite(s):** ED 501 and EPSY 503 and EPSY 546 or the equivalent. Appropriate score on the department placement test. Graduate or professional standing required or consent of the instructor.

EPSY 509
Research Design in Education 4 hrs.
Emphasis is placed on discriminating theoretical and program evaluation research, distinguishing the parts of the study, and designing a research proposal. **Prerequisite(s):** Admission to a graduate program.

EPSY 510
Theory of Statistics 4 hrs.
The foundations of statistical analysis and probability modeling, including probability theory, parameter estimation, axioms and principles of rational decision making, and large-sample theory. **Prerequisite(s):** EPSY 546 or EPSY 547 or EPSY 563; and graduate or professional standing; or consent of the instructor or equivalent.

EPSY 512
Hierarchical Linear Models 4 hrs.
Parametric and semiparametric approaches to hierarchical linear modeling, for the analysis of continuous and categorical multivariate data. These approaches extend on classical linear regression analysis. Extensive computer use required. **Prerequisite(s):** EPSY 546 or EPSY 547 or EPSY 563; and graduate or professional standing; or consent of the instructor or equivalent.

EPSY 514
Nonparametric Modeling 4 hrs.
Contemporary nonparametric and semiparametric models that make minimal assumptions about the data-generating process, in order to permit more accurate conclusions in data analysis. **Prerequisite(s):** ED 501 and EPSY 503 or the equivalent; and appropriate score on the department placement test.

EPSY 517
Seminar in Urban Youth Development 4 hrs.
In-depth analysis of topics and issues in the field of youth development and its relation to youth program development, with special attention to the urban context. Previously listed as CIE 517. **Prerequisite(s):** Consent of the instructor.

EPSY 519
Curriculum, Instruction, and Assessment in Early Primary Grades 5 hrs.
Language arts, mathematics, science, social studies, and fine arts curriculum development and instruction in the primary grades. **Prerequisite(s):** EPSY 429 and EPSY 520; and consent of the instructor.

EPSY 520
Curriculum and Practice in Early Childhood Education I 5 hrs.
Examines curriculum models and methods for fostering learning and development in early childhood. Provides extensive clinical experience in early childhood classrooms. **Prerequisite(s):** EPSY 429 and ED 422; and consent of the instructor.

EPSY 521
Early Childhood Education Student Teaching 10 hrs.
Instructional methods and curricula in the early childhood classrooms. Discussion of program and child evaluation. Includes full-time supervised student teaching. Meets Illinois state requirement for Type 04 Certification by providing supervised student teaching experience. **Prerequisite(s):** EPSY 519 and EPSY 520; and consent of the instructor.

EPSY 522
Internship in Early Childhood 6 hrs.
Instructional methods in curricula in early childhood education. Meets Illinois State Board of Education requirement for Type 04 Certification. May be repeated. Full-time fieldwork required in early childhood education classroom. **Prerequisite(s):** Consent of the instructor.

EPSY 524
Parent and Staff Relations in Early Education 4 hrs.
Methods for involving parents in early childhood programs. The role of the director in program administration and in hiring, training, and supervising teachers and staff. **Prerequisite(s):** Consent of the instructor.

EPSY 525
Advanced Adolescent Development 3 hrs.
Examines current theory and research on physiological, intellectual, emotional, and social development during the adolescent years. Examines relationship among individual, interpersonal, and contextual factors related to adolescent development. **Prerequisite(s):** EPSY 446 or EPSY 502 or ED 421 or ED 422 or ED 445; or consent of the instructor. Recommended background: Course work in educational psychology or psychology.

EPSY 526
Development in Infancy and Early Childhood 4 hrs.
Consideration of development in the preschool years. Stress on theory, research, individual child study, and educational implications. **Same as** PSCH 520. **Prerequisite(s):** ED 422 or PSCH 422 or the equivalent.

EPSY 527 Seminar in Moral Development, Character Formation, and Education 4 hrs.
Philosophical assumptions, psychology research, and theory underlying current approaches to moral and character education. Cultural and developmental factors in value formation. **Same as PSCH 527. Prerequisite(s):** ED 422 or PSCH 422 or the equivalent, or admission to the PhD in Education program, PhD in Psychology program, or PhD in Social Work program, or consent of the instructor.

EPSY 529 Cognition and Instruction: Advanced Constructivist Approaches 4 hrs.
Piaget's and Vygotsky's theories of knowledge development. Emphasis on competing approaches concerning the relation of thought to action, to language, and to social relations. **Same as PSCH 552. Prerequisite(s):** EPSY 429 or PSCH 429 or the equivalent, and admission into a PhD program in the College of Education or Psychology or consent of instructor.

EPSY 530 Achievement Motivation 4 hrs.
The psychology of achievement motivation will be explored from the perspectives of personality, social, and educational psychology. **Same as PSCH 525. Prerequisite(s):** Graduate standing in education or psychology or consent of the instructor.

EPSY 546 Educational Measurement 4 hrs.
Contemporary models for the analysis of data arising from multiple-choice tests, rating-scale questionnaires, or experts' judgments of examinee performance. Test equating is also covered. **Prerequisite(s):** ED 501, and ED 503 or EPSY 503 or the equivalent or consent of the instructor.

EPSY 547 Multiple Regression in Educational Research 4 hrs.
Introduction to multiple correlation and regression techniques as tools for the analysis and interpretation of educational and behavioral science data. **Prerequisite(s):** EPSY 503.

EPSY 553 Assessment for Teachers 4 hrs.
Plan, construct, administer, score, and report on classroom assessments that measure a wide variety of learning outcomes, from simple to complex; select and use standardized achievement tests; developing defensible grading procedures. **Prerequisite(s):** EPSY 421 and EPSY 422; or consent of the instructor.

EPSY 560 Educational Program Evaluation 4 hrs.
An introduction to concepts, approaches, techniques, and practices of educational program evaluation. Students work toward acquiring knowledge and skills to plan and conduct evaluations of programs, projects, curriculum, and institutions. **Prerequisite(s):** ED 501 and EPSY 503; or consent of the instructor.

EPSY 561 Assessment for Measurement Professionals 4 hrs.
Plan, construct, administer, score, and report on classroom assessment; select and use standardized achievement tests; develop defensible grade procedures; measure issues in classroom assessment; validity and reliability of classroom assessments. **Prerequisite(s):** ED 421 and ED 422; or consent of the instructor.

EPSY 563 Advanced Analysis of Variance in Educational Research 4 hrs.
Detailed coverage of the principles of analysis of variance and the analysis of data collected from research employing experimental designs. **Prerequisite(s):** EPSY 503.

EPSY 582 Forging Collaborations with Family and Community 3 hrs.
Develops skills necessary to work in partnership with the families of children with disabilities, and community members. **Same as SPED 582. Prerequisite(s):** ED 461 or SPED 461 or the equivalent or consent of the instructor.

EPSY 583 Multivariate Analysis of Educational Data 4 hrs.
Introduction to multivariate statistical methods in education, including data screening, canonical correlation, MANOVA/MANCOVA, DFA, profile analysis, component/factor analysis, confirmatory factor analysis, and structural equation modeling. **Prerequisite(s):** EPSY 547 or EPSY 563.

EPSY 588 Current and Specialized Topics in Psychometrics 2 hrs.
Seminar on current and specialized topics in psychometrics. Satisfactory/Unsatisfactory grading only. May be repeated. Extensive computer use required. **Prerequisite(s):** Credit or concurrent registration in EPSY 546 or credit or concurrent registration in EPSY 550; and credit or concurrent registration in EPSY 503; or consent of the instructor.

EPSY 589 Topics in Educational Statistics 4 hrs.
Seminar on a preannounced topic on educational statistical methodology for the analysis of educational data. May be repeated. **Prerequisite(s):** EPSY 547.

EPSY 593 PhD Research Project 1 TO 8 hrs.
Students design, implement, and analyze results of a research problem in this area of specialization. Completed study is reviewed by faculty. May be repeated to a maximum of 8 hours. **Prerequisite(s):** Admission to the PhD in Education program.

EPSY 594 Special Topics in Educational Psychology 1 TO 4 hrs.
Seminar on a preannounced topic focusing on methodology, research, and educational implications of recent models of learning, problem solving, and thinking. May be repeated to a maximum of 12 hours. **Prerequisite(s):** ED 421 and ED 422, or consent of the instructor.

EPSY 596 Independent Study 1 TO 4 hrs.
Students carry out independent study in educational psychology under the direction of a faculty member. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** ED 490 or the equivalent, and consent of the advisor and instructor.

EPSY 598 Masters Research 0 TO 16 hrs.
Research on the topic of the student's master's thesis. May be repeated to a maximum of 8 hours. **Prerequisite(s):** Consent of the thesis instructor.

EPSY 599 Thesis Research 0 TO 16 hrs.
Research on the topic of the student's dissertation. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the dissertation advisor.

Electrical and Computer Engineering

ECE 400 Introduction to Microelectromechanical Systems 3 OR 4 hrs.
Definition, classification, and case studies of transducers, sensors, and actuators. Microfabrication methods for microelectromechanical systems (MEMS). Design, simulation, and modeling of MEMS. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 400. **Prerequisite(s):** ECE 346.

ECE 401 Quasi-Static Electric and Magnetic Fields 3 OR 4 hrs.
Static electric and magnetic fields. Material description, boundary value problems. Field energy, its conversion and scaling laws. Quasi-static fields, field diffusion, eddy currents, energy losses. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 401. **Prerequisite(s):** ECE 322.

ECE 407 Pattern Recognition I 3 OR 4 hrs.
The design of automated systems for detection, recognition, classification, and diagnosis. Parametric and nonparametric decision-making techniques. Applications in computerized medical and industrial image and waveform analysis. **Same as BIOE 407.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** MATH 220.

ECE 410 Network Analysis 3 OR 4 hrs.
Matrix algebra for network analysis, network parameters, macromodeling, high-frequency measurements, network functions and theorems. Topics in computer-aided analysis. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 410. **Prerequisite(s):** Grade of C or better in ECE 310.

ECE 412 Introduction to Filter Synthesis 3 OR 4 hrs.
Fundamentals of network synthesis, filter approximations, and frequency transformations. Active filter synthesis using bi-linear and bi-quad circuits. Topics in computer-aided design. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 412. **Prerequisite(s):** Grade of C or better in ECE 310.

ECE 415 Image Analysis and Computer Vision I 3 OR 4 hrs.
Image formation, geometry, and stereo. Two-dimensional image analysis by Fourier and other 2-D transforms. Image enhancement, color, image segmentation, compression, feature extraction, object recognition. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 415. **Prerequisite(s):** MATH 310 or a grade of C or better in ECE 310.

ECE 417 Digital Signal Processing II 0 TO 5 hrs.
Computer-aided design of digital filters; quantization and round-off effects; FFT algorithms; number-theoretic algorithms; multirate signal processing; DSP architectures and programming. 4 undergraduate hours. 5 graduate hours. **Prerequisite(s):** ECE 317.

**ECE 418
Statistical
Digital Signal
Processing** 3 OR 4 hrs.
Stochastic signal models, LMS identification, identification of signals from noise, Wiener filtering, blind separation of mixed signal, discrete wavelet transforms, compression and denoising, cepstral analysis. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 418. **Prerequisite(s):** ECE 317 and ECE 341.

**ECE 421
Introduction to
Antennas and
Wireless
Propagation** 3 OR 4 hrs.
Potential, antenna parameters, radiation from linear wires and loops, impedance, arrays, communication links and path loss, tropospheric propagation, fading and diversity. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 421. **Prerequisite(s):** ECE 225 and ECE 322.

**ECE 423
Electromagnetic
Compatibility** 3 OR 4 hrs.
EMC requirements for electronic systems. Nonideal behavior of components. Radiated and conducted emissions. Susceptibility. Coupling and shielding. Electrostatic discharge. System design for EMS. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 423. **Prerequisite(s):** ECE 320 and ECE 322.

**ECE 424
RF and
Microwave
Guided
Propagation** 0 TO 5 hrs.
Maxwell's equations, transmission lines, Smith chart, strip lines, rectangular and circular waveguides, TE and TM waves, wave impedance, resonators, two-port parameters, power and energy considerations. 4 undergraduate hours. 5 graduate hours. **Prerequisite(s):** ECE 225 and ECE 322.

**ECE 427
Modern
Linear Optics** 3 OR 4 hrs.
Geometrical optics, wave optics, two-dimensional Fourier analysis, scalar diffraction theory, Fourier transforming properties of lenses, coherent and incoherent images, holography, electromagnetic optics, polarization and crystal optics, resonators. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 427. **Prerequisite(s):** ECE 310 and ECE 322.

**ECE 431
Analog
Communication
Circuits** 0 TO 5 hrs.
Introduction to radio frequency circuit design: narrowband transistor amplifiers, impedance matching networks, oscillators, mixers, amplitude and frequency modulation/demodulation, phase-lock loop circuits, amplifier noise, and stability analysis. Laboratory. 4 undergraduate hours. 5 graduate hours. Previously listed as EECS 431. **Prerequisite(s):** ECE 311 and ECE 340.

**ECE 432
Digital
Communications** 3 OR 4 hrs.
Source coding, quantization, signal representation, channel noise, optimum signal reception, digital modulation: ASK, PSK, FSK, MSK, M-ary modulation. Probability of error. Intersymbol interference. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 432. **Prerequisite(s):** ECE 311 and ECE 341.

**ECE 434
Multimedia
Systems** 3 OR 4 hrs.
Multimedia systems; compression standards; asynchronous transfer mode; Internet; wireless networks; television; videoconferencing; telephony; applications. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** ECE 333.

**ECE 435
Wireless
Communication
Networks** 3 OR 4 hrs.
Radio technology fundamentals; channel and propagation models; channel multiple access technologies; wireless mobile communication fundamentals; generic wireless mobile network; cellular/PCS wireless mobile network standards. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 435. **Prerequisite(s):** ECE 432 and ECE 333.

**ECE 436
Computer
Communication
Networks II** 3 OR 4 hrs.
Explores integrated network architecture of service, control signaling and management, examples of high-speed LAN/WAN, next-generation Internet, and mobile wireless network. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** ECE 333.

**ECE 437
Wireless
Communications** 3 OR 4 hrs.
Cellular concept, frequency reuse, mobile radio propagation, channel fading, noise in analog communications, mobile radio channel equalization, multiple access techniques (FDMA, TDMA, CDMA), wireless networking. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ECE 311 and ECE 341.

**ECE 442
Power
Semiconductor
Devices and
Integrated
Circuits** 0 TO 5 hrs.
Covers the physics of devices encountered in the power-electronic and switching converter systems. 4 undergraduate hours. 5 graduate hours. Credit is not given for ECE 442 if the student has credit for EECS 442. Previously listed as EECS 442. ECE 442 is a supplement for ECE 445 and ECE 545. **Prerequisite(s):** ECE 342 and ECE 346.

**ECE 445
Analysis and
Design of Power
Electronic Circuits** 0 TO 5 hrs.
Analysis of different isolated and nonisolated power-converter topologies; understanding of power-converter components, switching schemes. 4 undergraduate hours. 5 graduate hours. Previously listed as EECS 445. **Prerequisite(s):** ECE 342 and a grade of C or better in ECE 310.

**ECE 448
Transistors** 3 OR 4 hrs.
Bipolar junction transistors, electronic processes in surface-controlled semiconductor and dielectric devices. Metal oxide semiconductor field effect transistors, surface and interface effects, diode lasers, integrated optoelectronic devices. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 448. **Prerequisite(s):** ECE 346.

**ECE 449
Microdevices and
Micromachining
Technology** 0 TO 5 hrs.
Microfabrication techniques for microsensors, microstructures, and microdevices. Selected examples of physical/chemical sensors and actuators. Simulation experiments. Laboratory. **Same as** ME 449. 4 undergraduate hours. 5 graduate hours. Previously listed as EECS 449. **Prerequisite(s):** ECE 347.

**ECE 451
Control
Engineering** 3 OR 4 hrs.
State-space representation of systems; realization theory; stability; performance; modern control design techniques, including: fuzzy, learning, adaptive and nonlinear control. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 451. **Prerequisite(s):** ECE 350.

**ECE 452
Robotics:
Algorithms
and Control** 3 OR 4 hrs.
Kinematic and dynamic modeling of robots; configuration space; motion planning algorithms; control of robots; sensors and perception; reasoning; mobile robots. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CS 201; and a grade of C or better in ECE 210 or a grade of C or better in ECE 225.

**ECE 458
Electromechanical
Energy
Conversion** 0 TO 4 hrs.
Electromagnetic forces and torque; magnetic circuits and transformers; DC machines; three-phase AC synchronous and induction machines; laboratory-demonstrations. Projects are required. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 458. **Prerequisite(s):** Grade of C or better in ECE 225.

**ECE 465
Digital Systems
Design** 3 OR 4 hrs.
Switching algebra, combinational circuits, Mux, ROM, DCD, PLA-based designs, advanced combinational circuit minimization techniques, synchronous and asynchronous sequential circuit synthesis (minimization, hazards, races, state assignment) testing. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 465. **Prerequisite(s):** Grade of C or better in PHYS 142; and a grade of C or better in ECE 265 and a grade of C or better in CS 366.

**ECE 466
Advanced
Computer
Architecture** 3 OR 4 hrs.
Design and analysis of high-performance uniprocessors. Topics include, arithmetic: multiplication, division, shifting; processor: pipelining, multiple function units, instruction sets; memory: caches, modules; virtual machines. **Same as** CS 466. 3 undergraduate hours. 4 graduate hours. Previously listed as EECS 466. **Prerequisite(s):** ECE 366 or CS 366.

**ECE 467
Introduction
to VLSI Design** 0 TO 5 hrs.
MOS, CMOS circuits VLSI technology, CMOS circuit characterization and evaluation. Static and dynamic MOS circuits, system design, faults, testing, and symbolic layout. Laboratory. 4 undergraduate hours. 5 graduate hours. Previously listed as EECS 467. **Prerequisite(s):** ECE 340.

**ECE 468
Analog and
Mixed-Signal
VLSI Design 0 TO 5 hrs.**

Elementary transistor stages and analog components; low-power design; comparison of bipolar, CMOS, and BiCMOS; s-parameters and high-frequency ASIC design and modeling; RF wireless communication system components; behavioral modeling. 4 undergraduate hours. 5 graduate hours. Previously listed as EECS 468. **Prerequisite(s):** ECE 467.

**ECE 469
Computer
Systems Design 3 OR 4 hrs.**

Analysis and modeling of digital systems; hardware description languages; CAD tools for simulation, synthesis, and verification of computer systems. Project: a simple processor design. 3 undergraduate hours. 4 graduate hours. **Same as** CS 469. Previously listed as EECS 469. **Prerequisite(s):** CS 366; or ECE 366 and ECE 368.

**ECE 491
Seminar 1 TO 4 hrs.**

Topics of mutual interest to a faculty member and a group of students. Offered as announced by department bulletin or the Schedule of Classes. May be repeated. Previously listed as EECS 491. **Prerequisite(s):** Consent of the instructor.

**ECE 493
Special
Problems 2 TO 4 hrs.**

Special problems or reading by special arrangement with the faculty. No graduation credit for students in the following: MS in Electrical and Computer Engineering or PhD in Electrical and Computer Engineering. Previously listed as EECS 493. **Prerequisite(s):** Consent of the instructor.

**ECE 510
Advanced
Network Analysis 4 hrs.**

Characterizations of networks. The indefinite-admittance matrix. Active two-port networks. Theory of feedback amplifiers. Stability of feedback amplifiers. Multiple-loop feedback amplifiers. Previously listed as EECS 510. **Prerequisite(s):** ECE 410.

**ECE 513
Advanced Analog
Filter Synthesis 4 hrs.**

The active biquad, sensitivity analysis, realization of active two-port networks, design of broadband matching networks, and the theory of passive cascade synthesis. Previously listed as EECS 513. **Prerequisite(s):** ECE 412.

**ECE 515
Image Analysis
and Computer
Vision II 4 hrs.**

Image analysis techniques, 2-D and 3-D shape representation, segmentation, camera and stereo modeling, motion, generic object and face recognition, parallel and neural architectures for image, and visual processing. Previously listed as EECS 515. **Prerequisite(s):** ECE 415; or consent of the instructor.

**ECE 516
Adaptive
Digital Filters 4 hrs.**

Properties of signals; optimal filters, Wiener and Kalman filters; signal modeling, adaptive filters channel equalizing, echo canceling, noise canceling, and linear prediction; filter properties. Previously listed as EECS 516. **Prerequisite(s):** ECE 317 and ECE 341.

**ECE 517
Digital Image
Processing 4 hrs.**

Operations on 2-D digital images such as transforms, enhancement, restoration, warping, segmentation, registration, compression, and reconstruction from projection. Previously listed as EECS 517. **Prerequisite(s):** ECE 317 and ECE 341.

**ECE 520
Electromagnetic
Field Theory 4 hrs.**

Maxwell's equations. Potentials. Constitutive relations. Special relativity. Boundary conditions. Green's functions. Polarization. Radiation from antennas and charged particles. Waveguides and resonators. Exterior boundary-value problems. Previously listed as EECS 520. **Prerequisite(s):** ECE 420 and ECE 421.

**ECE 521
Computational
Electromagnetics 4 hrs.**

Finite-element, finite-difference solution. Computer-aided solutions: integral equations, method of moments, transform and iterative solutions. FD-TD, singularity expansion method. Practical problems in radiation and scattering. Previously listed as EECS 521. **Prerequisite(s):** ECE 520.

**ECE 522
Advanced
Microwave Theory 4 hrs.**

Microwave integrated circuits: analysis, design. Microwave devices: filters, cavities, and phase shifters. Millimeter waves: components and circuits, millimeter wave applications. Previously listed as EECS 522. **Prerequisite(s):** ECE 420 and ECE 520.

**ECE 523
Advanced
Antenna Engineering 4 hrs.**

Radiation from helix and spiral; aperture antennas; linear and planar array synthesis; Hallen's and other methods for impedance; design of array feeds; reflector and lens antennas. Previously listed as EECS 523. **Prerequisite(s):** ECE 421 and ECE 520.

**ECE 526
Electromagnetic
Scattering 4 hrs.**

Exact solutions of exterior boundary-value problems. Low-frequency expansions. High-frequency methods, including geometrical and physical theories of diffraction. Hybrid techniques. Radar cross sections. Previously listed as EECS 526. **Prerequisite(s):** ECE 520.

**ECE 527
Optical Electronics 4 hrs.**

Optical resonators. Radiation and atomic systems. Laser oscillation. Laser systems. Parametric amplification and oscillation. Electrooptics and acoustooptics. Phase conjugate optics. Modulation, detection, and noise. Previously listed as EECS 527. **Prerequisite(s):** ECE 520.

**ECE 528
Fiber and
Integrated Optics 4 hrs.**

Propagation in thin films and fibers. Mode launching, coupling, and losses. Sources, detectors, modulators, interferometers. Fabrication and measurement techniques. Fiber optics systems. Previously listed as EECS 528. **Prerequisite(s):** ECE 520 or the equivalent.

**ECE 530
Random
Signal Analysis 4 hrs.**

Probability for communications, properties, and series representations of random processes, random processes through linear and nonlinear systems, minimum MSE and maximum SNR systems. Previously listed as EECS 530. **Prerequisite(s):** ECE 341 or consent of the instructor.

**ECE 531
Detection and
Estimation Theory 4 hrs.**

Bayes, Neyman-Pearson, and minimax detection for discrete and continuous-time random processes. Estimation of random and nonrandom signal parameters. Estimation of signals. Previously listed as EECS 531. **Prerequisite(s):** ECE 418 or consent of the instructor.

**ECE 532
Advanced Digital
Communications 4 hrs.**

Characteristics of digitally modulated signals; digital signals in additive noise; communication over fading channels and with intersymbol interference; source and channel coding; synchronization; spread spectrum techniques. Previously listed as EECS 532. **Prerequisite(s):** ECE 432 or consent of the instructor.

**ECE 533
Advanced
Computer
Communication
Networks 4 hrs.**

Computer and telecommunication networks; integrated (data, voice, and video) services; network performance; quality of service provisioning. **Prerequisite(s):** ECE 333 and ECE 341; or consent of the instructor.

**ECE 534
Elements of
Information Theory 4 hrs.**

Entropy and mutual information, fundamentals of coding theory, data compression, complexity of sources, channel mutual information and capacity, rate distortion theory, information theory applications. Previously listed as EECS 534. **Prerequisite(s):** ECE 341 or consent of the instructor.

**ECE 535
Advanced Wireless
Communication
Networks 4 hrs.**

2nd generation: IS-95-based wireless mobile network; 2nd generation: GSM-based wireless mobile network; 2.5 generation: wireless mobile data/voice network; 3rd generation: broadband wireless mobile multimedia network. Previously listed as EECS 535. **Prerequisite(s):** ECE 435.

**ECE 537
Wireless Data
Communications
and Networking 4 hrs.**

The course discusses data services evolution in 2G wireless systems to achieve specified data rates of 3G. The course focuses on wireless data services in the wide and local area networks. **Prerequisite(s):** ECE 432 and ECE 435; and senior standing or above; or consent of the instructor.

**ECE 540
Physics of
Semiconductor
Devices 4 hrs.**

Electrons in periodic lattice; equilibrium carrier distribution; energy band diagrams in junctions, in homogeneous semiconductors; recombination and generation; nonequilibrium processes, radiation and electric fields; diodes. **Same as** PHYS 540. Previously listed as EECS 540. **Prerequisite(s):** ECE 346 or the equivalent.

**ECE 541
Microelectronic
Fabrication
Techniques 4 hrs.**

Current fabrication techniques of microelectronic technology; plasma and CVD processes; etching techniques; ion implantation; surface analytical methods. **Same as** ME 541. Previously listed as EECS 541. **Prerequisite(s):** ECE 347 or ECE 449.

ECE 542
Advanced Semiconductor Devices 4 hrs.
Bipolar transistor and related devices, MOSFET transistor and related devices, MESFET and related devices, quantum-effect devices, photonic devices. previously listed as EECS 542. **Prerequisite(s):** ECE 540.

ECE 545
Advanced Power-Electronics Design 4 hrs.
High-frequency-magnetics design and measurement, parasitics, modeling, estimation, and measurement, soft switching for DC-DC converters, distributed DC-DC converters, and design layout. Previously listed as EECS 545. **Prerequisite(s):** ECE 445.

ECE 550
Linear Systems Theory and Design 4 hrs.
State variable description, linear operators, impulse response matrix, controllability, observability, reducible and irreducible realizations, state feedback, state observers, and stability. Previously listed as EECS 550. **Prerequisite(s):** ECE 350.

ECE 551
Optimal Control 4 hrs.
Optimal control of dynamic systems in continuous and discrete time, maximum principle, dynamic programming and constraints, learning systems. Previously listed as EECS 551. **Prerequisite(s):** ECE 550 or consent of the instructor.

ECE 552
Nonlinear Control 4 hrs.
Nonlinear phenomena, linear and piecewise linear approximations, describing functions, servomechanisms, phase plane, limit cycles, Lyapunov's stability theory, bifurcation, bilinear control, vibrational control, learning systems. Previously listed as EECS 552. **Prerequisite(s):** ECE 550 or consent of the instructor.

ECE 553
System Identification 4 hrs.
Online and off-line identification of control systems in frequency and time domain, considering noise effects, nonlinearities, nonstationarities, and distributed parameters. Previously listed as EECS 553. **Prerequisite(s):** ECE 550.

ECE 559
Neural Networks 4 hrs.
Artificial neural networks, perceptron, backpropagation, Kohonen nets, statistical methods, Hopfield nets, associative memories, large memory networks, and cognition. **Same as** CS 559. Previously listed as EECS 559. **Prerequisite(s):** Consent of the instructor.

ECE 560
Fuzzy Logic 4 hrs.
Crisp and fuzzy sets; membership functions; fuzzy operations; fuzzy relations and their solution; approximate reasoning; fuzzy modeling and programming; applications; project. Previously listed as EECS 560. **Prerequisite(s):** Consent of the instructor.

ECE 565
Physical Design Automation 4 hrs.
Computer-aided physical design of integrated circuits; circuit partitioning and placement; floorplanning; global and detailed routing; timing optimization; general optimization tools: local search, constraint relaxation. **Same as** CS 565. Previously listed as EECS 565. **Prerequisite(s):** CS 401; and CS 466 or ECE 465.

ECE 566
Parallel Processing 4 hrs.
Parallel processing from the computer science perspective. Includes architecture (bus-based, lockstep, SIMD), programming languages (functional, traditional, and extensions), compilers, interconnection networks, and algorithms. **Same as** CS 566. Previously listed as EECS 566. **Prerequisite(s):** CS 466 or ECE 466; and CS 401.

ECE 567
Advanced VLSI Design 4 hrs.
VLSI subsystem and system design: synthesis, design styles, design process, testing. Case studies: switching networks, graphics engine, CPU. Projects use computer-aided design tools. Previously listed as EECS 567. **Prerequisite(s):** ECE 467.

ECE 568
Advanced Microprocessor Architecture and Design 4 hrs.
Microprocessors; embedded control; processor core; system-on-chip; power-aware design; SMT design; Java processors; media processors; network processors; crypto processors; trusted processor architectures; architecture simulation. Extensive computer use required. **Prerequisite(s):** ECE 466 and consent of the instructor.

ECE 569
High-Performance Processors and Systems 4 hrs.
Instruction-level parallelism, multiple-instruction issue, branch prediction, instruction and data prefetching, novel cache and DRAM organization, high-performance interconnect, compilation issues, case studies. **Same as** CS 569. Previously listed as EECS 569. **Prerequisite(s):** CS 466 or ECE 466; and graduate standing.

ECE 572
Nanoscale Semiconductor Structures: Electronic and Optical Properties 4 hrs.
Electronic and optical properties of nanoscale semiconductors and devices, carrier interactions in dimensionally confined nanostructures, deformation potential, piezoelectric potential, polar-optical-phonon interaction potential. **Prerequisite(s):** PHYS 244 and ECE 346. Recommended background: Background in semiconductor device fundamentals such as covered in ECE 346 as well as the underlying physical principles as covered in PHYS 244.

ECE 594
Special Topics 4 hrs.
Subject matter varies from term to term and section to section, depending on the specialties of the instructor. May be repeated. Students may register in more than one section per term. Previously listed as EECS 594. **Prerequisite(s):** Consent of the instructor.

ECE 595
Departmental Seminar 0 hrs.
Seminar by faculty and invited speakers. Satisfactory/Unsatisfactory grading only. May be repeated. Previously listed as EECS 595.

ECE 596
Individual Study 1 TO 4 hrs.
Individual study or research under close supervision of a faculty member. May be repeated. Students may register in more than one section per term. No graduation credit for students in the following: MS in Electrical and Computer Engineering and PhD in Electrical and Computer Engineering. Previously listed as EECS 596. **Prerequisite(s):** Consent of the instructor.

ECE 597
Project Research 0 TO 9 hrs.
A research design or reading project approved by the committee appointed by the director of graduate studies. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. Previously listed as EECS 597. **Prerequisite(s):** Consent of the instructor. For ECE majors only.

ECE 598
MS Thesis Research 0 TO 16 hrs.
MS thesis work under the supervision of a graduate advisor. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. Previously listed as EECS 598. **Prerequisite(s):** Consent of the instructor. For ECE majors only.

ECE 599
PhD Thesis Research 0 TO 16 hrs.
PhD thesis work under supervision of a graduate advisor. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. Previously listed as EECS 599. **Prerequisite(s):** Consent of the instructor. For ECE majors only.

Energy Engineering

ENER 420
Combined Heat and Power, Design, and Management 4 hrs.
CHP systems construction, operation, economics, and includes a student design project. Also, builds on previous courses in power plants, engines, HVAC, a stress on economic and software analysis, utility rates, and regulations. Credit is not given in ENER 420 if the student has credit in ME 420. **Prerequisite(s):** Open only to Master of Energy Engineering students.

ENER 422
Building Heating, Ventilating, and Air-Conditioning 4 hrs.
Establishes the basic knowledge needed to understand heating and cooling systems, mass transfer in humidification, solar heat transfer in buildings, and psychrometrics. A computer design project will be completed. Credit is not given for ENER 422 if the student has credit in ME 422. **Prerequisite(s):** Open only to Master of Energy Engineering students.

ENER 424
Industrial Energy Management and Conservation 4 hrs.
Beginning course in energy analysis and auditing, and builds upon the critical background established in the HVAC course. An overview of the energy industry, billing, economic analysis, deregulated markets, and energy purchasing. Credit is not given for ENER 424 if the student has credit in ME 424. **Prerequisite(s):** Open only to Master of Energy Engineering students.

ENER 429
Internal Combustion Engines 4 hrs.
Introduction to engine types, characteristics, and performance. Combustion processes in spark and compression ignition engines; combustion abnormalities. Credit is not given for ENER 429 if the student has credit in ME 429. **Prerequisite(s):** Open only to Master of Energy Engineering students.

ENER 451
Electric Power Generation 4 hrs.
Thermodynamics and practical aspects of central fossil fuel fired electric generating plants. Focus on large steam cycle generating plants, with discussion of geothermal and hydroelectric plants. **Prerequisite(s):** Open only to Master of Energy Engineering students.

ENER 501
Engineering Project Coordination and Management 4 hrs.
Theory, strategy, and tactics of the use of project management, including project planning, matrix management concept, and team meetings. **Prerequisite(s):** Open only to Master of Energy Engineering students.

ENER 552
Design of Energy Efficient Buildings 4 hrs.
Emerging technologies in designing energy efficient buildings, including new code issues. **Prerequisite(s):** Open only to Master of Energy Engineering students.

ENER 553
Sustainable Energy Engineering and Renewable Energy 4 hrs.
A view of the energy industry's future from the perspective of emerging and alternative technologies. Examples include fuel cells, distributed energy, micro-grids, hydrogen energy systems, and renewables. **Prerequisite(s):** Open only to Master of Energy Engineering students.

Engineering

ENGR 400
Engineering Law 3 OR 4 hrs.
Overview of the legal system. Legal principles affecting the engineering profession. Professional ethics in engineering. Intellectual property law. Basic contract and tort principles. Environmental law. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Senior standing or above.

ENGR 401
Engineering Management 3 OR 4 hrs.
Theory, strategy, and tactics of the use of project management, including project planning, matrix management concept, and team meetings. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. This is an online, Web-based course. **Prerequisite(s):** Senior standing or above.

ENGR 402
Intellectual Property Law 3 OR 4 hrs.
Patent, copyright, trade secret, mask work, and cyber-squatting legal and procedural principles; protection for novel software, biotech inventions, and business methods; and trademark protection for domain names. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. This is an online, Web-based course. **Prerequisite(s):** Senior standing or above.

ENGR 403
Reliability Engineering 3 OR 4 hrs.
Probability overview; statistics overview; system reliability modeling and prediction-static methods; system reliability modeling and prediction-dynamic methods; maintainability and availability; reliability optimization; and risk analysis. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. This is an online, Web-based course. **Prerequisite(s):** Senior standing or above.

ENGR 404
Entrepreneurship 3 hrs.
Identify new business opportunities in technology, market value assessment, competition, business plan, funding acquisition, intellectual property protection, and case studies. **Prerequisite(s):** Open only to seniors; and consent of the instructor.

ENGR 410
Wireless Data 3 OR 4 hrs.
Data communications, existing wireless data networks, planning, topology, performance, and operation. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. This is an online, Web-based course. **Prerequisite(s):** A course in digital communications and an introductory course in wireless communications. Graduate or professional standing.

ENGR 420
Engineering for Success 1 hour.
Interactive seminars will be given by persons with engineering degrees having shown high achievement in either engineering or nonengineering endeavors. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Junior standing or above.

ENGR 494
Special Topics in Engineering 3 OR 4 hrs.
Course on multidisciplinary engineering topics that vary from term to term depending on current student and instructor interests. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Junior standing or above; and consent of the instructor.

English

ENGL 400
History of the English Language 3 OR 4 hrs.
Development of English from its proto-Indo-European origin to the present; detailed examination of the external and internal history of Old, Middle, and Modern English. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Senior standing or above; or consent of the instructor. Recommended background: ENGL 200.

ENGL 401
Modern English 3 OR 4 hrs.
This is a course on the sound system, the lexicon, and syntax-semantics of modern American English taught from the linguistic perspective. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Senior standing or 9 hours of English or consent of the instructor. Recommended background: ENGL 200.

ENGL 402
Rhetoric 3 OR 4 hrs.
Intensive study of central topics in rhetorical theory in their historical depth. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ENGL 342 or ENGL 361 or ENGL 370 or ENGL 372 or ENGL 374 or ENGL 375; and senior standing or above; or consent of the instructor.

ENGL 403
Introduction to Old English 3 OR 4 hrs.
The elements of Old English grammar and readings from the literature of England before the Norman Conquest. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ENGL 240; and ENGL 241 or ENGL 242 or ENGL 243; or consent of the instructor.

ENGL 405
Topics in Old English Literature 3 OR 4 hrs.
Studies in the language and literature of pre-Conquest England. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 403; or consent of the instructor.

ENGL 408
Topics in Medieval Literature 3 OR 4 hrs.
Topics in English literature from the period 450-1500. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 311 or ENGL 312 or ENGL 313 or ENGL 314; and senior standing or above; or consent of the instructor.

ENGL 413
Topics in Shakespeare 3 OR 4 hrs.
Study of a genre, topic, or period in Shakespeare's work. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 312 or ENGL 313 or ENGL 314; and senior standing or above; or consent of the instructor.

ENGL 416
Topics in Renaissance Literature and Culture 3 OR 4 hrs.
Study of a topic in English literature written between 1500 and 1700. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 311 or ENGL 312 or ENGL 313 or ENGL 314; and senior standing or above; or consent of the instructor.

ENGL 417
Topics in Restoration and Eighteenth-Century Literature and Culture 3 OR 4 hrs.
Focus on a particular topic or theme in British literature 1660-1780. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 313 or ENGL 314 or ENGL 315 or ENGL 316; and senior standing or above; or consent of the instructor.

ENGL 419
Topics in Romantic Literature and Culture 3 OR 4 hrs.
Concentrates on a particular aspect of British Romantic writing in order to provide a greater depth of study in the period. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 313 or ENGL 314 or ENGL 315 or ENGL 316 or ENGL 317; and senior standing or above; or consent of the instructor.

ENGL 421
Topics in Victorian Literature 3 OR 4 hrs.
Study of a major author, genre, or theme in the Victorian period. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 315 or ENGL 316 or ENGL 317 or ENGL 318; and senior standing or above; or consent of the instructor.

ENGL 422
Topics in Postcolonial and World Literature in English 3 OR 4 hrs.
Study of a major author, topic, movement, or genre within postcolonial and world literatures in English. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 318 or ENGL 319 or ENGL 320 or ENGL 333; and senior standing or above; or consent of the instructor.

ENGL 426
Topics in American Literature and Culture to 1900 3 OR 4 hrs.
This course analyzes selected topics in American literature and culture to 1900. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 323 or ENGL 324 or ENGL 325; and senior standing or above; or consent of the instructor.

ENGL 427
Topics in American Literature and Culture, 1900-Present 3 OR 4 hrs.

Study of a specific topic relating American literature to society, culture, history, race, gender, ethnicity. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 324 or ENGL 325 or ENGL 326 or ENGL 327; and senior standing or above; or consent of the instructor.

ENGL 428
Topics in Literature and Culture, 1900-Present 3 OR 4 hrs.

Study of a specific topic relating twentieth-century literature to society, culture, history, race, gender, ethnicity. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 318 or ENGL 319 or ENGL 320 or ENGL 325 or ENGL 326 or ENGL 327; and senior standing or above; or consent of the instructor.

ENGL 429
Topics in Literature and Culture 3 OR 4 hrs.

Study of a specific topic relating literature to society, culture, history, race, gender, ethnicity. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** Six hours of English at the 300-level and senior standing or above; or consent of the instructor.

ENGL 437
Topics in Poetry and Poetic Theory 3 OR 4 hrs.

Investigations into the nature of poetry. Discussions of issues such as technical, theoretical, formal, and historical developments. Topics and readings vary. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 303 or ENGL 316 or ENGL 355; and senior standing or above; or consent of the instructor.

ENGL 438
Topics in Performance Studies 3 OR 4 hrs.

In-depth study of a topic, movement, artist, or author in the field of drama and performance studies, broadly defined. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 304 or ENGL 313 or ENGL 341 or ENGL 342 or ENGL 370 or ENGL 375; and senior standing or above; or consent of the instructor.

ENGL 439
Topics in Fiction and Theories of Fiction 3 OR 4 hrs.

Study of fiction related to a particular theory of fiction (realism, romance, literary naturalism, narrative theory, fictional poetics). Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 305; and senior standing or above; or consent of the instructor.

ENGL 440
Topics in Cultural and Media Studies 3 OR 4 hrs.

Study of a medium, genre, theme, period, influence, or problem in culture and cultural theory. Topics vary. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 302 or ENGL 341 or ENGL 342; and senior standing or above; or consent of the instructor.

ENGL 441
Topics in Asian American Literature and Culture 3 OR 4 hrs.

An advanced seminar that examines various forms of cultural production by Asian American artists of diverse ethnic backgrounds. Topics vary. **Same as ASAM 441.** 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 327 or ENGL 328 or ENGL 359; and senior standing or above; or consent of the instructor.

ENGL 443
Topics in Gender, Sexuality, and Literature 3 OR 4 hrs.

Specific study of topics in gender and literature. Content varies. **Same as GWS 443.** 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 361 or ENGL 362 or ENGL 363 or GWS 101 or GWS 102; and senior standing or above; or consent of the instructor.

ENGL 444
Topics in Theories of Gender and Sexuality 3 OR 4 hrs.

Advanced study of topics related to theories of gender and sexuality. **Same as GWS 444.** 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 361 or ENGL 362 or ENGL 363 or GWS 101 or GWS 102; and senior standing or above; or consent of the instructor.

ENGL 445
Topics in Disability Studies 3 OR 4 hrs.

This course will focus on topics structured around particular aspects of disability studies and its practical, cultural, and theoretical implications. **Same as DHD 445.** 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 361 or ENGL 362 or ENGL 363 or ENGL 364; and senior standing or above; or consent of the instructor.

ENGL 446
Topics in Criticism and Theory 3 OR 4 hrs.

Focus on a particular critical or theoretical topic, movement, tradition, or figure. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 361 or ENGL 362 or ENGL 370 or ENGL 372; and senior standing or above; or consent of the instructor.

ENGL 448
Topics in Rhetorical Studies 3 OR 4 hrs.

Study of theoretical intersections between rhetoric and cultural studies to describe and explain the ways in which discourse constructs identity, knowledge, and values. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 374 or ENGL 375 or ENGL 342 or ENGL 402; and senior standing or above; or consent of the instructor.

ENGL 459
Introduction to the Teaching of English in Middle and Secondary Schools 3 OR 4 hrs.

Intended as a general initiation to the field of secondary English teaching, the course focuses on many of the crucial issues facing teachers in contemporary language arts classrooms. 3 undergraduate hours. 4 graduate hours. Fieldwork required. **Prerequisite(s):** Completion of the University Writing requirement; and sophomore standing or above.

ENGL 462
Topics in American Literary Nonfiction Prose 3 OR 4 hrs.

Study of a specific topic in the literary nonfiction of the United States, which may include its history, development, and classification. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** Grade of C or better in ENGL 240 and grade of C or better in ENGL 243, and junior standing or above; or consent of the instructor.

ENGL 469
Women's Literary Traditions 3 OR 4 hrs.

An exploration of issues such as the female aesthetic; women's popular literature; factors that enable creativity; differences of race and class. **Same as GWS 469.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ENGL 361 or ENGL 362 or ENGL 363; and senior standing or above; or consent of instructor.

ENGL 470
Topics in Multiethnic Literatures in the United States 3 OR 4 hrs.

Topics in the literatures of American racial and ethnic groups. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 328 or ENGL 333 or ENGL 350 or ENGL 351 or ENGL 355 or 357; or ENGL 359; and senior standing or above; or consent of the instructor.

ENGL 471
Topics in Native American Literatures 3 OR 4 hrs.

The history and development of literature by and about American Indians. Content varies. **Same as NAST 471.** 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** Senior standing or above and 6 hours of English, African American studies, or Latin American studies, or consent of the instructor.

ENGL 472
Women and Film 3 OR 4 hrs.

Roles and representations of women in classical Hollywood, European art, and independent feminist cinemas. **Same as AH 434,** and GWS 472. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ENGL 302 or ENGL 342 or ENGL 361 or ENGL 362 or ENGL 363; and senior standing or above; or consent of instructor.

ENGL 473
Topics in African American Literature 3 OR 4 hrs.

African American literature and culture for students with significant background in the field. Topics vary. **Same as AAST 490.** 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** AAST 357 or AAST 360 or ENGL 357; and senior standing or above; or consent of the instructor.

ENGL 474
Topics in Popular Culture and Literature 3 OR 4 hrs.
Study of a specific topic relating literature to popular culture, such as sport, television, and best sellers. Critical analysis of the cultural mythology encasing these subjects. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 302 or ENGL 341 or ENGL 342; and senior standing or above; or consent of the instructor.

ENGL 478
The Bible as Literature 3 OR 4 hrs.
Literary analysis of the English Bible (including the Apocrypha) in its historical and religious contexts; study of the King James Version and successive revisions of it. **Same as** JST 478 and RELS 478. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in ENGL 240; and grade of C or better in ENGL 241 or grade of C or better in ENGL 242 or grade of C or better in ENGL 243; or consent of the instructor.

ENGL 481
Methods of Teaching English in Middle and Secondary Schools 3 OR 4 hrs.
Theory and practice; emphasis on current approaches to language and literature in multicultural settings. 3 undergraduate hours. 4 graduate hours. All students in the teacher education program must take this course in the term preceding their student teaching. **Prerequisite(s):** Senior standing or 9 hours of English or consent of the instructor.

ENGL 482
Campus Writing Consultants 4 hrs.
Tutoring in the Writing Center. Students are required to consult with others on their writing. Emphasis on practice and theories of writing. Appropriate for prospective teachers. **Prerequisite(s):** Senior standing or 9 hours of English and consent of the instructor. Students must obtain override from the Writing Center.

ENGL 483
Studies in Language and Rhetoric 3 OR 4 hrs.
Study of a particular topic or movement in language or rhetoric. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** Senior standing or above; or consent of the instructor.

ENGL 484
Studies in Language and Cognition 3 OR 4 hrs.
Examination of relationships among theories of language structure, cognition, and discourse, with applications of such theories to the writing process. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ENGL 401; or consent of the instructor.

ENGL 485
Studies in the English Language and Linguistics 3 OR 4 hrs.
Study of a topic such as language diversity and literacy, theories of grammar, literacy in society, and ethnicity and language. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** Senior standing or 9 hours of English or consent of the instructor.

ENGL 486
The Teaching of Writing in Middle and Secondary Schools 3 OR 4 hrs.
Rhetoric and composition pedagogy. Study of a topic. Content varies. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Senior standing or 9 hours of English or consent of the instructor.

ENGL 489
The Teaching of Reading and Literature in Middle and Secondary Schools 3 OR 4 hrs.
Intended as a part of the English education methods sequence, with particular emphasis on helping prospective teachers assist struggling readers in the study of literature. 3 undergraduate hours. 4 graduate hours. Fieldwork required. **Prerequisite(s):** ENGL 459 and completion of the University Writing requirement; or consent of the instructor.

ENGL 490
Advanced Writing of Poetry 3 OR 4 hrs.
Advanced work on poetic techniques and practices; emphasis on analysis of student work, using published examples; particular attention to individual student development. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s) by undergraduates. **Prerequisite(s):** Undergraduates: Grade of B or better in ENGL 210. Registration restrictions: Graduate students must obtain approval of the Department of English.

ENGL 491
Advanced Writing of Fiction 3 OR 4 hrs.
Advanced practice; emphasis on analysis of student work and published examples. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s) by undergraduates. **Prerequisite(s):** Undergraduates: grade of B or better in ENGL 212. Registration restrictions: Graduate students must obtain approval of the Department of English.

ENGL 492
Advanced Writing of Nonfiction Prose 3 OR 4 hrs.
Advanced practice in writing essays, articles, reviews, or other forms of nonfiction prose. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s) by undergraduates. **Prerequisite(s):** Undergraduates: grade of B or better in ENGL 201. Registration restrictions: Graduate students must obtain approval of the Department of English.

ENGL 493
Internship in Nonfiction Writing 0 TO 6 hrs.
Approved internship where students learn professional writing and organizational communication with an emphasis on initiative, planning, and meeting deadlines. Both the instructor and a supervisor mentor students during the course. May be repeated to a maximum of 6 hours. A maximum of 3 hours may be applied toward either the undergraduate major in English or a graduate degree in English. Credit is not given for ENGL 493 if the student has credit in ENGL 593. **Prerequisite(s):** ENGL 201 and ENGL 202 or completion of the Chicago Civic Leadership Certificate Program (CCLCP) and an interview with the coordinator of the internship program prior to registration. Students will be registered in this course subject to approval by the coordinator. Resume and writing samples are required for the application process.

ENGL 494
Topics in the Teaching of English 1 TO 4 hrs.
Study of a topic in literature, composition, and/or pedagogy. The content varies with each offering. May be repeated to a maximum of 8 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

ENGL 495
Playwriting 3 OR 4 hrs.
The development of scripts for stage performance. **Same as** THTR 423. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing or above; and approval of the department and submission and approval of a playwriting sample or dialog-centered fiction prior to registration.

ENGL 498
Educational Practice with Seminar I 6 hrs.
The first half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Satisfactory/Unsatisfactory grading only. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, and approval of the department.

ENGL 499
Educational Practice with Seminar II 6 hrs.
The second half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Satisfactory/Unsatisfactory grading only. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, credit or concurrent registration in ENGL 498, and approval of the department.

ENGL 500
Master's Proseminar 4 hrs.
Study of disciplinary foundations of research in literary criticism, broadly defined.

ENGL 501
Introduction to Research in Language, Literacy, and Rhetoric 4 hrs.
Surveys disciplinary foundations of research on language, literacy, and rhetoric. Issues and methods are introduced with special emphasis on work relating to culture, cognition, and rhetoric.

ENGL 503
Proseminar I: Theory and Practice of Criticism 4 hrs.
Forms and theories of criticism, analysis of their application to specific genres and works, and practice in writing criticism. The first semester of the two-part required PhD proseminar.

ENGL 504
Proseminar II: Seminar in Critical Studies 4 hrs.
More focused attention on the themes presented in Proseminar I. Students will complete major research projects based on bibliographies compiled in Proseminar I. **Prerequisite(s):** ENGL 503.

ENGL 505
Seminar in Old English 4 hrs.
A topic in Old English: emphasis on literature or philology. Content varies.

**ENGL 507
Theory, Rhetoric,
and Aesthetics** 4 hrs.
Emphasizing breadth of knowledge
in a field of inquiry involving
genres, authors, topics, or periods
in theory, rhetoric, or aesthetics.

**ENGL 510
Seminar in Language
and Rhetoric** 4 hrs.
Study of a topic or movement in
linguistic or rhetorical theory.
Content varies. May be repeated to
a maximum of 12 hours.
Prerequisite(s): ENGL 401 or
ENGL 402 or consent of the
instructor.

**ENGL 515
Seminar in
Medieval Studies** 4 hrs.
The works of Chaucer and other
Middle English writers. Content
varies. May be repeated to a
maximum of 12 hours.
Prerequisite(s): A minimum of 3
hours in Middle English literature.

**ENGL 517
British Literature
and Culture** 4 hrs.
Emphasizing breadth of knowledge
in a field of inquiry involving
genres, authors, topics, or periods
in British literature and culture.

**ENGL 518
Newberry Library
Seminar in
Renaissance
Literature** 4 hrs.
Late medieval and Renaissance
literature. In conjunction with the
Newberry Library Center for
Renaissance Studies. May be
repeated to a maximum of 12
hours. **Prerequisite(s):** ENGL 503
and 3 hours of medieval or
Renaissance literature.

**ENGL 520
Seminar in
Renaissance Studies** 4 hrs.
English literature and culture of
the sixteenth and seventeenth
centuries. Topic varies. May be
repeated to a maximum of 12
hours. **Prerequisite(s):** One course
in Renaissance literature.

**ENGL 525
Seminar in
Restoration and
Eighteenth-Century
Studies** 4 hrs.
Content varies. Restoration and
18th century studies by topic.
May be repeated to a maximum of
12 hours. **Prerequisite(s):** One
course in Restoration or
18th-century literature.

**ENGL 527
American
Literature
and Culture** 4 hrs.
Emphasizing breadth of knowledge
in a field of inquiry involving
genres, authors, topics, or periods
in American literature and culture.

**ENGL 530
Seminar in
British Romantic
Studies** 4 hrs.
Advanced study of author(s), topic,
movement, or genre. Content
varies. May be repeated to a
maximum of 12 hours.
Prerequisite(s): A course in
Romantic literature.

**ENGL 535
Seminar in
Victorian Studies** 4 hrs.
Focus on author, topic, movement,
or genre. Content varies. May be
repeated to a maximum of 12
hours. **Prerequisite(s):** 3 hours
Victorian literature or consent of
the instructor.

**ENGL 537
Global and
Multiethnic
Literatures
and Cultures** 4 hrs.
Emphasizing breadth of knowledge
in a field of inquiry involving
genres, authors, topics, or periods
in global and/or multiethnic
literatures and cultures.

**ENGL 540
Seminar in Modern
and/or Contemporary
Studies in English** 4 hrs.
Study of an author, topic,
movement, or genre. Content
varies. As part of the "Discourse,
Text, and Context" series, provides
seminar-level instruction in a key
field of modern or contemporary
English studies. Topic varies by
instructor. May be repeated to a
maximum of 12 hours.
Prerequisite(s): A minimum of
three hours in modern literature.

**ENGL 545
Seminar in American
Studies to 1865** 4 hrs.
As part of the "Discourse, Text,
and Context" series, provides
seminar-level instruction in a key
field in American studies to 1865.
May be repeated to a maximum of
12 hours. **Prerequisite(s):** One
advanced course in American
literature.

**ENGL 547
Media, Film, and
Performance Studies** 4 hrs.
Emphasizing breadth of knowledge
in a field of inquiry involving
genres, authors, topics, or periods
in media, film, and/or performance
studies.

**ENGL 550
Seminar in
American Studies
After 1865** 4 hrs.
Seminar topic in American Studies,
possibly including mixed media,
after 1865. May be repeated to a
maximum of 12 hours.

**ENGL 552
Research Practicum
in Language and
Cognition** 4 hrs.
Research design and methods
examining theories of the
development of literacy and
relationships among learner, text,
and context. May be repeated to a
maximum of 12 hours.
Prerequisite(s): ENGL 484.

**ENGL 553
Research Practicum in
Discourse Analysis** 4 hrs.
Discourse analysis addresses issues
of intentional communication,
inference, the structure of texts or
talk-in-interaction, and the
interactive construction of social
actions or identities in discourse.
Same as LING 553. May be
repeated to a maximum of 12
hours.

**ENGL 554
Seminar in
English Education** 4 hrs.
Critical examination of theory and
practice in the teaching of English.
Content varies.

**ENGL 555
Teaching
College Writing** 4 hrs.
Methods, materials, and practice in
teaching college writing.
Satisfactory/Unsatisfactory grading
only.

**ENGL 556
Teaching
Creative Writing** 4 hrs.
Methods, materials, and practice in
teaching creative writing.
Satisfactory/Unsatisfactory grading
only. **Prerequisite(s):** Admission to
the Program for Writers or consent
of the instructor.

**ENGL 557
Language
and Literacy** 4 hrs.
Emphasizing breadth of knowledge
in a field of inquiry involving
genres, authors, topics, periods, or
issues in language and literacy,
broadly conceived.

**ENGL 560
Practicum in
the Teaching
of English** 1 TO 4 hrs.
Provides an opportunity for
supervised discussion and
evaluation of materials and
methods used in undergraduate
English instruction. Participation
in appropriate departmental
workshops. For English
Department teaching assistants.
Satisfactory/Unsatisfactory grading
only. May be repeated. No
graduation credit. **Prerequisite(s):**
Students may enroll only during
terms in which they hold a
teaching assistantship in the
English Department.

**ENGL 567
Discourse Analysis** 4 hrs.
Addresses issues of intentional
communication, inference, the
structure of texts or talk-in-
interaction, and the interactive
construction of social actions or
identities in discourse. **Same as**
SPAN 567 and LING 567.

**ENGL 570
Program for
Writers: Poetry
Workshop** 4 hrs.
Emphasis on poems written by
students. May be repeated to a
maximum of 12 hours.
Prerequisite(s): Admission to the
Program for Writers.

**ENGL 571
Program for
Writers: Fiction
Workshop** 4 hrs.
Emphasis on fiction written by
students. May be repeated to a
maximum of 12 hours.
Prerequisite(s): Admission to the
Program for Writers.

**ENGL 572
Program for
Writers: Novel
Workshop** 4 hrs.
Emphasis on novels written by
students. May be repeated to a
maximum of 12 hours.
Prerequisite(s): Admission to the
Program for Writers.

**ENGL 573
Program for
Writers: Translation
Workshop** 4 hrs.
Emphasis on translations by
students. May be repeated to a
maximum of 12 hours.
Prerequisite(s): Admission to the
Program for Writers or consent of
the instructor.

**ENGL 574
Program for Writers:
Nonfiction Workshop** 4 hrs.
Emphasis on nonfiction written by
students. May be repeated to a
maximum of 12 hours.
Prerequisite(s): Admission to the
Program for Writers.

**ENGL 575
Program for Writers:
Experimental
Writing Workshop** 4 hrs.
Emphasis on experimentation by
students. May be repeated to a
maximum of 12 hours.
Prerequisite(s): Admission to the
Program for Writers.

**ENGL 576
Program for
Writers: Editing and
Publishing** 4 hrs.
Practicum in basic procedures for
students desiring careers in
publishing, or who wish to
understand the stages of
production from proposal to
publication. **Prerequisite(s):**
Consent of the instructor.

**ENGL 579
The Past Decade** 4 hrs.
Discussion of the past decade of
critical work in any given field
within literary, rhetorical,
linguistic, or cultural studies.

**ENGL 580
Seminar in Genres
of Literature, Film,
and Media** 4 hrs.
A single genre, such as the Gothic
novel, or mode, such as poetry,
fiction, or drama. May be repeated
to a maximum of 12 hours.

**ENGL 581
Seminar in
Interdisciplinary
English Studies** 4 hrs.
Relation between literature and
such fields as fine arts, philosophy,
psychology, religion, science,
sociology, and politics. Content
varies. May be repeated to a
maximum of 12 hours.
Prerequisite(s): 4 hours in area of
literature to be studied.

ENGL 582
Seminar in
Multiethnic and
Transatlantic Cultures 4 hrs.
 Study of a genre, movement, topic, or author in American multiethnic and/or transatlantic culture. Content varies. May be repeated to a maximum of 12 hours.

ENGL 583
Seminar in
Theories of
the Popular 4 hrs.
 Study of a theme, form, era, or methodological approach. Content varies. May be repeated to a maximum of 12 hours.

ENGL 584
Seminar in
Visual Technologies 4 hrs.
 One topic or movement. Content varies. May be repeated to a maximum of 12 hours.
Prerequisite(s): Minimum of 3 hours in film.

ENGL 585
Seminar in
Theoretical Sites 4 hrs.
 One author, topic, or movement in advanced theory. Topic varies by instructor. May be repeated to a maximum of 12 hours.
Prerequisite(s): Theory course at the undergraduate or graduate level.

ENGL 586
Seminar in
Discourse,
Culture, Mind 4 hrs.
 Interdisciplinary readings relating language and cognition from writing, rhetoric, cognitive psychology, and linguistics on a particular topic. May be repeated to a maximum of 12 hours.
Prerequisite(s): ENGL 484.

ENGL 588
Seminar in Great
Cities/Global Cultures 4 hrs.
 One author, topic, or movement in text, culture, and public space. May be repeated to a maximum of 12 hours.

ENGL 591
Prospectus
Preparation 1 TO 12 hrs.
 Students who have passed their preliminary exams may enroll in this independent study with their primary advisor the semester after they have successfully completed their exams. Satisfactory/Unsatisfactory grading only. May be repeated for a maximum of 24 hours of credit. **Prerequisite(s):** Consent of the instructor and consent of the director of graduate studies.

ENGL 592
Preliminary
Examination
Research 1 TO 12 hrs.
 Supervised research and reading in preparation for the preliminary examinations. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 24 hours. **Prerequisite(s):** Consent of the instructor and consent of the director of graduate studies.

ENGL 593
Graduate
Internship in
Nonfiction
Writing 1 TO 4 hrs.
 Directed field experience in an approved professional setting to practice writing, editing, and research skills at an advanced level. May be repeated. A maximum of four hours of credit may be applied toward a graduate degree in English. Credit is not given for ENGL 593 if the student has credit for ENGL 493.
Prerequisite(s): Consent of the English Department internship coordinator. Resume and writing samples are required.

ENGL 596
Independent
Study 1 TO 4 hrs.
 Independent study and research in literature, creative writing, or language, literacy, and rhetoric. May be repeated to a maximum of 12 hours. Students may register in more than one section per term.
Prerequisite(s): Consent of the instructor and consent of the director of graduate studies.

ENGL 597
Master's
Project Research
in English 0 TO 4 hrs.
 Supervised research and reading that facilitates the student in preparation of the project research. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 12 hours. No more than 4 hours of ENGL 597 may be applied toward the degree.
Prerequisite(s): Consent of the instructor and consent of the director of graduate studies. Open only to master's degree students.

ENGL 599
Thesis
Research 0 TO 16 hrs.
 For students involved in dissertation research and writing. Satisfactory/Unsatisfactory grading only. May be repeated.
Prerequisite(s): Consent of instructor and the director of graduate studies.

English as a Second Language

ESL 401
Communication and
Teaching Methods for
International
Teaching
Assistants 1 TO 3 hrs.
 Basic communication and presentation skills for international teaching assistants in the culture of the American college classroom. Satisfactory/Unsatisfactory grading only. May be repeated for credit. Students may register for more than one section per term. No graduation credit. **Prerequisite(s):** Graduate or professional standing. Students must take the SPEAK Test and must obtain consent of the instructor.

Entrepreneurship

ENTR 430
Family Business
Management 3 hrs.
 Competitive strengths/weaknesses of a family business, dynamics of family interactions within the overlapping family, management and ownership systems. Credit is not given for ENTR 430 if the student has credit for MGMT 430. Recommended background: Prior experience in a family business.

ENTR 450
Entrepreneurship
for Scientists and
Engineers 3 OR 4 hrs.
 Gives nonbusiness students an appreciation for the rewards and challenges of entrepreneurship, especially as it relates to commercializing emerging technologies. 3 undergraduate hours. 4 graduate hours. Credit is not given for students enrolled in a Business Administration degree program.

ENTR 454
New Venture
Formation 3 hrs.
 Awareness and realistic understanding of the new venture formation process; role of the entrepreneur in the economy and society; self-evaluation, venture feasibility. Credit is not given for ENTR 454 if the student has credit for MGMT 455 or MKTG 454. **Prerequisite(s):** FIN 300 and MGMT 340 and MKTG 360, or consent of the instructor.

ENTR 464
Entrepreneurial
Consulting 3 hrs.
 Student teams diagnose and recommend solutions to problems and opportunities facing Chicago-area entrepreneurs and smaller enterprises. Application of previous course work. Credit is not given for ENTR 464 if the student has credit for MKTG 464. **Prerequisite(s):** ENTR 454; and ECON 218 or ECON 220, and 6 credit hours of other entrepreneurship courses.

ENTR 494
Special Topics in
Entrepreneurship 3 hrs.
 Exploration of areas not covered in existing course offerings or study of selected topics in greater depth. Subject will vary from semester to semester. May be repeated to a maximum of 6 hours. May be repeated if topics vary. **Prerequisite(s):** ENTR 454 and senior standing or above and approval of the department.

ENTR 499
Independent
Study in
Entrepreneurship 1 TO 3 hrs.
 Independent study of an approved topic in entrepreneurship. Student must prepare a written report under the guidance of the instructor. **Prerequisite(s):** Approval of the department.

ENTR 502
Entrepreneurship 4 hrs.
 Launching new ventures and entrepreneurial companies; components of successful business plans and feasibility studies; perceptual processes of opportunity recognition; entrepreneurial creativity and innovation. Career opportunities. Credit is not given for ENTR 502 if the student has credit for MBA 510 or MGMT 502 or MKTG 502. **Prerequisite(s):** ACTG 500 and MKTG 500 or the equivalent courses.

ENTR 545
New Venture
Formation 4 hrs.
 Students gain awareness and understanding of how to start business ventures by writing and presenting business plans. **Prerequisite(s):** ENTR 502.

ENTR 554
Fundamentals of
Technology Ventures 4 hrs.
 Students gain an understanding of regulatory processes, capital markets, business plans, and other requirements for creating, and launching technology-based new business ventures. **Prerequisite(s):** Consent of the instructor.

ENTR 555
Technology Venture
Formation I 4 hrs.
 Student teams learn about specific emerging technologies, assess their market potential and write business plans to commercialize those technologies. Credit is not given for ENTR 555 if the student has credit for MGMT 555 or MKTG 555. **Prerequisite(s):** ENTR 554 and consent of the instructor.

ENTR 556
Technology
Venture Formation II 4 hrs.
 Mentors from the business community guide student teams as they revise business plans, research capital markets, pitch to potential investors, and attempt to launch technology-based new ventures conceived in ENTR 555. **Prerequisite(s):** Credit or concurrent registration in ENTR 554 and ENTR 555; and consent of the instructor.

ENTR 558
Entrepreneurial
Electronic Commerce 4 hrs.
 The role of electronic commerce in entrepreneurship; competitive practices, marketing strategies, financing options, creating an e-commerce business plan. Credit is not given for ENTR 558 if the student has credit in MGMT 558 or MKTG 558. **Prerequisite(s):** ACTG 500 or MBA 501; and MKTG 500 or MBA 506.

**ENTR 559
Entrepreneurial
Consulting** 4 hrs.
Application of principles from management and marketing to entrepreneurial firms. Emphasis on consulting with young and small firms and developing a consulting practice. Assessment, problem solving, and change facilitation. Credit is not given for ENTR 559 if the student has credit for MGMT 559 or MKTG 559. Fieldwork required.
Prerequisite(s): ENTR 502.

**ENTR 594
Special Topics in
Entrepreneurship** 4 hrs.
Exploration of areas not covered in existing course offerings or study of selected topics in greater depth. Subject will vary from semester to semester. **Prerequisite(s):** ENTR 502 and approval of the department.

**ENTR 596
Independent
Study in
Entrepreneurship** 1 TO 4 hrs.
Independent study of an approved topic in entrepreneurship. Student must prepare a written report under the guidance of the instructor. **Prerequisite(s):** Approval of the department.

Environmental and Occupational Health Sciences

**EOHS 400
Principles of
Environmental
Health Sciences** 3 hrs.
Environmental influences on health: population, food, energy; community hygiene and injury control; solid/hazardous wastes, air and water pollution, radiation; industrial hygiene and occupational health. **Prerequisite(s):** Enrollment restricted to Public Health students; other graduate, professional, and advanced undergraduate students admitted by consent as space permits. To obtain consent, see the SPH registrar.

**EOHS 405
Environmental
Calculations** 2 hrs.
Problem-solving techniques as applied to environmental and occupational health: dimensional analysis, mass and energy balances, trial and error solutions, numerical and graphical techniques. Recommended background: Mathematics through calculus, college physics, and chemistry.

**EOHS 408
Biological, Chemical,
Explosives, and
Nuclear Weapons as
Public Health Threats** 3 hrs.
Preparation, understanding of threats, and rescue and response issues pertaining to potential terrorist incidents from a public health perspective. **Same as** EPID 408. **Prerequisite(s):** Graduate or professional standing; or consent of the instructor. Recommended background: EOHS 400 and EPID 410.

**EOHS 411
Water Quality
Management** 4 hrs.
Water pollution; historical and current developments in problems and solutions: characterization of pollutants, regulatory framework, risk assessment, standards, modeling, water purification, public health concerns. **Prerequisite(s):** Taught online. Consent of the instructor.

**EOHS 418
Analysis of Water and
Wastewater Quality** 2 hrs.
Basic instrumentation and procedures related to measurement and surveillance of various water quality parameters.

**EOHS 421
Fundamentals of
Industrial Hygiene** 2 hrs.
Recognition, evaluation, control of chemical, biological, and physical agents in the workplace. Application to preliminary surveys, measurement of exposure, and evaluation of control measures. **Prerequisite(s):** EOHS 400 or consent of the instructor.

**EOHS 424
Environmental
Acoustics** 2 hrs.
Fundamentals of noise generation/propagation; filtering; weighting; hearing biomechanics; health effects; audiometry; hearing control methods; sound fields; directivity; diffraction/barriers; regulations; instrumentation; control. **Prerequisite(s):** General college physics, and ordinary calculus; or consent of the instructor.

**EOHS 428
Industrial Hygiene
Laboratory I** 2 hrs.
Detailed methods and experiments for measuring chemical, biological, and physical agents; and methods for evaluating the effectiveness of control measures. **Prerequisite(s):** EOHS 400 and EOHS 405 and EOHS 421, or consent of the instructor.

**EOHS 431
Air Quality
Management I** 3 hrs.
Sources, control, dispersion, and effects upon receptors of air pollution: health and other adverse effects, meteorology and dispersion estimation, photochemistry, aerosol characterization. **Same as** CME 419. **Prerequisite(s):** EOHS 405 or CME 216 or consent of instructor.

**EOHS 438
Air Quality Laboratory** 2 hrs.
Basic instrumentation and procedures related to measurement and surveillance of ambient air quality. Methods for collection and identification of gaseous and particulate pollutants. **Prerequisite(s):** EOHS 405 or consent of the instructor.

**EOHS 440
Chemistry for
Environmental
Professionals** 3 hrs.
Introductory atmospheric chemistry, aspects of air pollution, chemistry related to natural water and water treatment; priority organic pollutants and heavy metals. **Same as** CME 411. **Prerequisite(s):** One year of college chemistry.

**EOHS 450
Principles of
Occupational and
Environmental
Medicine** 2 hrs.
Causes, transmission, control, and prevention of the physical/chemical environmental stressors in the work environment; industrial processes and hazards, contrasts between developed and developing countries.

**EOHS 455
Environmental
and Occupational
Toxicology** 3 hrs.
General and applied toxicology as it relates to environmental and occupational exposures to hazardous agents. Emphasis on basic principles, specific types of toxicity, and major classes of toxic agents. **Prerequisite(s):** CHEM 232 and CHEM 234 and BIOS 100 or the equivalent courses and senior standing or above or consent of the instructor.

**EOHS 460
Safety
Engineering** 3 OR 4 hrs.
Human protection systems; accident and emergency handling; manufacturing and service hazard systems. **Same as** IE 461. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IE 342 or consent of the instructor.

**EOHS 461
Community Health
and Consumer
Protection** 2 hrs.
Prevention of health hazards due to infectious and chemical agents and physical processes, especially in the home and small community environments; role of health agencies. **Prerequisite(s):** EOHS 400 or consent of the instructor.

**EOHS 463
Safety Management
Systems** 2 hrs.
Introduction to practical aspects of initiating a safety program in a moderately sized production plant. **Prerequisite(s):** Consent of the instructor.

**EOHS 472
Management of
Solid and Hazardous
Wastes** 3 hrs.
Management of solid and hazardous waste, including radioactive waste: landfills, incineration, recycling, composting, source reduction, groundwater and air pollution impacts, control, regulations, siting, health impacts. **Same as** CME 423 and GEOG 444.

**EOHS 482
Occupational
Safety Science** 2 hrs.
Principles of occupational safety, safety regulations, accident investigation procedures and engineering, behavioral, and administrative techniques for occupational accident control. **Prerequisite(s):** EOHS 421 or consent of the instructor.

**EOHS 495
Environmental/
Occupational Health
Seminar** 1 hour.
Discussions of current environmental health and occupational health topics, with presentations by students, faculty members, and visiting scientists.

**EOHS 512
Advanced Water
Quality Management
Topics** 4 hrs.
Water quality management course examining drinking water quality and contaminant discharge topics. Risk assessment methodologies are applied for deriving optimal decisions. Extensive computer use required. **Prerequisite(s):** EOHS 411 or consent of the instructor.

**EOHS 523
Engineering
Controls/Ventilation** 4 hrs.
Design/evaluation of engineering control technology for workplace hazards: process modification, industrial ventilation, air cleaning, shielding, toxic air contaminants, mechanical hazards, (non)ionizing radiation, temperature. **Prerequisite(s):** EOHS 405 and EOHS 421 and EOHS 428, or consent of the instructor.

**EOHS 529
Industrial Hygiene
Laboratory II** 2 hrs.
Fieldwork: comprehensive industrial hygiene surveys of local work places. Health hazard analysis, design of sampling strategies, collection of field data, report preparation. **Prerequisite(s):** EOHS 428 and EOHS 438; or consent of the instructor.

**EOHS 532
Air Quality
Management II** 2 hrs.
Air quality management: integration of diverse aspects. Data interpretation; standards setting; policy implementation; equipment design; hazardous spill modeling; indoor air pollution; case studies. **Same as** CME 526. **Prerequisite(s):** EOHS 431 or CME 419.

EOHS 542
Water Chemistry 4 hrs.
Chemical equilibria and kinetic principles as applied to processes occurring in natural and engineered water systems. **Same as CME 524. Prerequisite(s):** EOHS 440 or CME 411.

EOHS 543
Environmental Organic Chemistry 4 hrs.
Properties and behavior of environmental organic pollutants. Theory and estimation techniques. Concepts of environmental fate assessment. Applications of fate models. **Same as CME 523. Prerequisite(s):** EOHS 440 or CME 411.

EOHS 551
Occupational Diseases 4 hrs.
Diseases caused by physical, chemical, and biological agents in the workplace: toxicology, epidemiology, pathophysiology, diagnosis, treatment, prevention, high-risk populations, and early detection.

EOHS 553
Global Environmental and Occupational Health 2 hrs.
Examines the major current issues in occupational and environmental health and their policy solutions. **Prerequisite(s):** EOHS 400; or consent of the instructor.

EOHS 554
Occupational and Environmental Epidemiology 2 hrs.
Methods and issues of environmental epidemiology: outbreak, cluster analysis, cross-sectional, case-control, cohort, ecological, and time series designs; contemporary issues: cancer and reproductive hazards. **Same as EPID 554. Prerequisite(s):** EPID 401 and BSTT 401 and EOHS 400; or consent of the instructor.

EOHS 555
Advanced Topics in Toxicology 3 hrs.
An in-depth consideration of biotransformation, toxicokinetic modeling, biomarkers, and chemical carcinogenesis. The course is based on articles from the primary literature. Molecular through physiological level effects are considered. **Prerequisite(s):** Grade of B or better in EOHS 455; or consent of the instructor.

EOHS 556
Risk Assessment in Environmental and Occupational Health 3 hrs.
Methodologies for utilizing toxicological and epidemiological data to estimate health risks due to exposures to pollutants in environments. **Prerequisite(s):** EOHS 405 and BSTT 401 and EPID 400; or consent of the instructor.

EOHS 557
Design and Analysis of Experiments 4 hrs.
Detailed consideration of the mathematical, statistical, and practical aspects of design and analysis of experiments that are encountered in physicochemical, biological, and engineering investigations. Extensive computer use required. **Prerequisite(s):** Completion of one course in statistics, working knowledge of at least one statistical software package (SAS, Design Expert, Minitab, etc.), and consent of the instructor. Recommended Background: A working knowledge of linear algebra and additional advanced course work in statistics.

EOHS 558
Industrial Toxicology 2 hrs.
Clinical toxicology and mechanisms of workplace toxicants: metals, fibers, dusts, and organics. Diagnosis and treatment. **Prerequisite(s):** EOHS 400 and EOHS 457.

EOHS 564
Geographic Information System Application in Public Health 3 hrs.
Examination of GIS applications in public health and the process of designing a GIS-based public health investigation. **Same as HPA 564.** This is an online course. **Prerequisite(s):** BSTT 400 and HPA 465 and consent of the instructor.

EOHS 565
Data-Mining Applications in Public Health 3 hrs.
Presents the key public health information system sources, describes the process of data mining and introduces the student to a sample of data-mining techniques. **Same as HPA 565.** Extensive computer use required. **Prerequisite(s):** BSTT 400.

EOHS 570
Hazardous Materials Management 3 hrs.
Definition and application of methods for managing hazardous materials: site health and safety plan development; remediation technique evaluations; incinerator design; computerized hazard response program applications. **Prerequisite(s):** EOHS 405 and EOHS 421 and EOHS 428; or consent of instructor.

EOHS 571
Injury Epidemiology and Prevention 3 hrs.
Covers general principles of injury epidemiology and intervention research and will engage students in development and application of preventive activities in workplaces and in the community. **Same as EPID 571. Prerequisite(s):** Grade of B or better in EPID 400 or grade of B or better in EPID 403; and graduate or professional standing; or consent of the instructor. Recommended background: Grade of B or better in EOHS 400.

EOHS 572
Environmental Risk Assessment and Management 4 hrs.
Risk assessment from a public health, quantitative, and environmental risk management perspective.

EOHS 584
Radiation Protection 3 hrs.
Radioactivity, energetics, kinetics, interactions, external protection, dosimetry, recommendations and standards, measurement, radon. **Prerequisite(s):** EOHS 405 or consent of the instructor.

EOHS 594
Advanced Special Topics in Environmental Health 1 TO 4 hrs.
Environmental/occupational topics of current importance to public health: pollution, industrial hygiene, and related topics. Variable course contents arranged to supplement the existing curriculum. **Prerequisite(s):** Consent of the instructor.

EOHS 597
Advanced Laboratory Projects in Environmental Health 1 TO 4 hrs.
Application and integration of sampling and measurement techniques for characterization of inside and ambient environments. Individuals or groups supervised by EOHS faculty members. **Prerequisite(s):** Consent of the instructor.

Epidemiology

EPID 400
Principles of Epidemiology 3 hrs.
Introduction to descriptive and analytic epidemiology, determinants of health and disease in populations, and application of epidemiologic methods to disease control; includes use of basic epidemiologic software. **Prerequisite(s):** Credit or concurrent registration in BSTT 400 or consent of the instructor. Enrollment restricted to public health students; other graduate, professional, and advanced undergraduate students admitted by consent as space permits. To obtain consent, see the SPH registrar.

EPID 403
Introduction to Epidemiology: Principles and Methods 3 hrs.
Introduction to descriptive and analytic epidemiology, and determinants of health and disease in populations. Measures of occurrence, association, and statistical testing will be addressed, along with study designs, bias, and confounding. **Prerequisite(s):** Credit or concurrent registration in BSTT 400 and graduate or professional standing; or consent of the instructor.

EPID 404
Intermediate Epidemiologic Methods 4 hrs.
Introduction to multivariable methods in epidemiology, including stratified analysis and regression modeling. Students will use statistical software to analyze data from epidemiologic studies. **Prerequisite(s):** EPID 403 and EPID 406; and credit or concurrent registration in BSTT 401; and graduate or professional standing; or consent of the instructor.

EPID 405
Human Growth and Nutrition 3 hrs.
Worldwide variation in human growth and the factors that contribute to differences between populations and individuals in the timing and pattern of growth and development. **Same as ANTH 405.**

EPID 406
Epidemiologic Computing 3 hrs.
Hands-on course for students using SAS and other computer tools for epidemiologic analysis. Addresses theoretical and practical issues in statistical programming for epidemiology students. **Prerequisite(s):** BSTT 400 and EPID 400; or BSTT 400 and EPID 403; or consent of the instructor.

EPID 408
Biological, Chemical, Explosives, and Nuclear Weapons as Public Health Threats 3 hrs.
Preparation, understanding of threats, and rescue-and-response issues pertaining to potential terrorist incidents from a public health perspective. **Same as EOHS 408. Prerequisite(s):** Graduate or professional standing; or consent of the instructor. Recommended background: EOHS 400 and EPID 410.

EPID 409
The Epidemiology of HIV/AIDS 2 hrs.
Review of the HIV/AIDS pandemic and the global response to it focusing on patterns of transmission, risk factors, and prevention/intervention. **Prerequisite(s):** EPID 400 or consent of the instructor.

EPID 410
Epidemiology of Infectious Diseases 2 hrs.
Epidemiology of selected infectious diseases, including incidence, prevalence, and control of disease. Epidemic investigation is emphasized. **Prerequisite(s):** Credit or concurrent registration in EPID 400; or credit or concurrent registration in EPID 403.

EPID 411
Epidemiology of Chronic Diseases 3 hrs.
Selected topics in chronic diseases with critical analysis of current epidemiologic literature. **Prerequisite(s):** EPID 400 or consent of the instructor.

EPID 412
Introduction to Psychosocial Epidemiology 2 hrs.
Reviews landmark studies of psychosocial and psychiatric disorders in U.S. communities; evaluates research methodology, case definition, identification, and empirical findings. **Prerequisite(s):** EPID 400 or consent of instructor.

EPID 426
Pharmacoepidemiology 2 hrs.
Reviews processes of ethical drug development. EPI methodologies for drug evaluation are presented, giving students opportunity to critically appraise efficacy and safety of clinical data. Course complements BSTT 430. **Prerequisite(s):** EPID 400 or consent of the instructor.

EPID 428
Epidemiology of Violence 2 hrs.
Reviews public health aspects of violence-related mortality and morbidity; examines existing databases and conceptual frameworks focusing on etiology, epidemiology, surveillance, and prevention. **Prerequisite(s):** EPID 400 or consent of the instructor.

EPID 471
Population 3 OR 4 hrs.
The measurement and study of major trends and differentials in fertility, mortality, migration, growth, and compositional characteristics of the population of the United States and other nations. **Same as** SOC 471. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** 6 hours of upper-division sociology, including SOC 201, or consent of the instructor.

EPID 494
Introductory Special Topics in Epidemiology 1 TO 4 hrs.
Special topics in substantive areas of epidemiology (including infectious disease, chronic disease, environmental/occupational, social). Course content will vary with each offering. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** EPID 400 or EPID 403 or consent of instructor; and graduate or professional standing.

EPID 501
Advanced Quantitative Methods in Epidemiology 4 hrs.
Advanced quantitative methods used in the analysis of case-control studies, cohort studies, and meta-analysis, including computer applications. **Prerequisite(s):** EPID 403 and EPID 404; and BSTT 401 and BSTT 505; and consent of the instructor.

EPID 510
Advanced Epidemiology of Infectious Diseases 2 hrs.
Controversies regarding the etiology, transmission, and prevention of selected infectious diseases. Literature reviews and study designs developed by students are a prominent part of course. **Prerequisite(s):** EPID 410 or consent of instructor.

EPID 513
Epidemiology of Aging 2 hrs.
Current methodologic and public health issues in the epidemiology of aging will be explored. **Prerequisite(s):** EPID 401 or EPID 411; and consent of the instructor.

EPID 515
Cancer Epidemiology 3 hrs.
Critical review of topics and issues relevant to cancer epidemiology, to promote synthesis of current knowledge and awareness of research issues. **Prerequisite(s):** EPID 401 and EPID 411; or consent of the instructor.

EPID 516
Advanced Cancer Epidemiology 2 hrs.
Critical review of the epidemiology of selected cancer sites to promote synthesis of knowledge, awareness of methodologic issues, and stimulate future research. **Prerequisite(s):** EPID 501 and EPID 515; or consent of the instructor. Recommended background: EPID 520.

EPID 517
Epidemiology of Cardiovascular Diseases 2 hrs.
Epidemiology and risk factors of cardiovascular diseases. **Prerequisite(s):** EPID 411 or consent of instructor.

EPID 518
The Epidemiology of Pediatric Diseases 3 hrs.
Familiarizes the student with issues unique to research on children. Lecture topics include epidemiology of childhood diseases, important research studies, and methodologic problems specific to studying children. **Same as** CHSC 518. **Prerequisite(s):** EPID 400 or EPID 403, EPID 404 and BSTT 400; or consent of the instructor.

EPID 519
Research Protocol and Grant Development 1 hour.
A review of funding options and examples of developing fundable research proposals. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** EPID 400.

EPID 520
Genetics in Epidemiology 2 hrs.
Topics in genetic/molecular epidemiology, including genetics, population genetics, molecular biology, and molecular genetics. Familiarizes students with laboratory/statistical concepts and applications in epidemiological studies. **Prerequisite(s):** EPID 401 or consent of the instructor.

EPID 545
Reproductive and Perinatal Health 3 hrs.
Focuses on the epidemiology of key reproductive and perinatal health outcomes and relevant health services and health policies. **Same as** CHSC 545. **Prerequisite(s):** BSTT 400; and EPID 400 and EPID 403; or consent of the instructor.

EPID 548
Readings in Reproductive and Perinatal Epidemiology 2 hrs.
Advanced seminar in reproductive/perinatal epidemiology with particular emphasis on methodologic issues. **Same as** CHSC 548. **Prerequisite(s):** CHSC 441 and EPID 404 or consent of the instructor. Recommended background: Maternal and child health and epidemiology.

EPID 549
Advanced Applied Methods in MCH Epidemiology 3 hrs.
Gives conceptual and technical understanding of statistical and epidemiological methods, builds skills/proficiency in applying these. Attention is given to data-handling tasks and to statistical/epidemiologic strategies for analysis and presentation. **Same as** CHSC 549. **Prerequisite(s):** EPID 402 or EPID 404; and BSTT 401 and EPID 406; or consent of the instructor. Recommended background: Credit or concurrent registration in EPID 501.

EPID 554
Occupational and Environmental Epidemiology 2 hrs.
Methods and issues of environmental epidemiology: outbreak, clusteranalysis, cross-sectional, case-control, cohort, ecological, and time series designs; contemporary issues: cancer and reproductive hazards. **Same as** EOHS 554. **Prerequisite(s):** EPID 401 and BSTT 401 and EOHS 400; or consent of the instructor.

EPID 571
Injury Epidemiology and Prevention 3 hrs.
Covers general principles of injury epidemiology and intervention research and will engage students in development and application of preventive activities in workplaces and in the community. **Same as** EOHS 571. **Prerequisite(s):** Grade of B or better in EPID 400 or grade of B or better in EPID 403; and graduate or professional standing; or consent of the instructor. Recommended background: Grade of B or better in EOHS 400.

EPID 591
Current Epidemiologic Literature 2 hrs.
Student presentation of recently published scientific papers of epidemiologic interest, to promote breadth of knowledge and critical examination of evidence. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** EPID 401 or EPID 403 or consent of instructor.

EPID 594
Advanced Special Topics in Epidemiology 1 TO 4 hrs.
Advanced special topics in substantive areas of epidemiology (including infectious disease, chronic disease, environmental/occupational, social methods, etc.) Course content will vary with each offering. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** EPID 401 or EPID 403 or consent of instructor.

EPID 595
Epidemiology Research Seminar 1 hour.
Current developments in theory and application of biostatistics and epidemiology with presentations by faculty and visiting scientists. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Credit or concurrent registration in EPID 400 or EPID 403 or consent of the instructor.

Finance
FIN 412
Portfolio Management 3 hrs.
Development of portfolio theory; establishment of portfolio objectives for individuals, corporations, banks, pension, and mutual funds; evaluation of portfolio performance. **Prerequisite(s):** FIN 310.

FIN 415
Fixed Income Securities 3 hrs.
Valuation of fixed income securities, term structure estimation and arbitrage trading with practical application using real data. **Prerequisite(s):** FIN 310.

**FIN 416
Options and
Futures Markets** 3 hrs.
History and institutional structure of options and futures markets. Uses of futures and options for arbitrage, speculation, and hedging by managers of domestic and multinational organizations. Analysis of factors which determine futures and options prices. **Prerequisite(s):** FIN 310.

**FIN 430
Introduction to
Money and Banking** 3 hrs.
Payment and banking systems; credit and market risk management; the Federal Reserve System; globalization of monetary, banking, and regulatory systems. **Prerequisite(s):** FIN 300.

**FIN 431
Theory and Structure
of Financial Markets** 3 hrs.
The distribution of saving and credit over time and risk categories. The financial services industry. Administration and regulation of global money, security, and derivatives markets. **Prerequisite(s):** FIN 300.

**FIN 442
International Finance** 3 hrs.
Financial management within an international context. International monetary system and financial markets, management of foreign investments, working capital management, exchange risks, taxation, and earnings reports. **Prerequisite(s):** FIN 300 and FIN 310.

**FIN 444
Small Business
Finance** 3 hrs.
Aspects of acquiring funds for small business enterprises. Topics include the trade-off of liquidity and profitability, management of working capital, and capitalization. **Prerequisite(s):** FIN 300.

**FIN 465
Property
and Liability
Insurance** 3 OR 4 hrs.
Using property and liability insurance to manage risk. Topics may include fire, marine, consequential loss, crime, title, automobile, and workers' compensation insurance. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** FIN 300; or consent of the instructor.

**FIN 466
Life and Health
Insurance** 3 OR 4 hrs.
Types, uses, and evaluation of life and health insurance. Economics of the industry. Regulation and taxation. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** FIN 300; or consent of the instructor.

**FIN 472
Real Estate
Finance** 3 OR 4 hrs.
Finance principles applied to real estate; financing of residential and income-producing real estate; real estate development finance; secondary mortgage market; taxation and real estate finance. **Same as** ECON 472. 3 undergraduate hours. 4 graduate hours. May not be used to satisfy the economics credit requirement for the MA in Economics and PhD in Economics. Elective credit only will be applied toward these degrees. **Prerequisite(s):** ECON 218 or ECON 220.

**FIN 473
Introduction to Risk
Management** 3 hrs.
Introduction to risk management. Loan and credit management; credit scoring. Risk measurements and reserves; banking and insurance capital requirements, the Basel Accord, tail events, and catastrophic event insurance. Financial contracts and hedging. **Same as** IDS 473. **Prerequisite(s):** FIN 300 and IDS 371.

**FIN 494
Special Topics
in Finance** 1 TO 4 hrs.
An intensive study of a selected topic in finance. Topics vary by sections and by term. 1 to 3 undergraduate hours. 2 to 4 graduate hours. May be repeated if topics vary. Students may register for more than one section per term. May be repeated to a maximum of 6 hours for undergraduates; may be repeated to a maximum of 8 hours for graduate students. Consent of the instructor.

**FIN 495
Competitive
Strategy** 4 hrs.
Multidisciplinary analysis of organization strategy and policy using case method and/or business simulation. Assignments involve extensive library research as well as oral and written reports. **Prerequisite(s):** Senior standing in the College of Business Administration and completion of all other CBA core courses, or consent of the instructor.

**FIN 500
Introduction to
Corporate Finance** 4 hrs.
Theory of corporate finance: goal of the firm, time value of money, investment decisions (under certainty and uncertainty), net present value, capital markets, and corporate financing decisions. **Prerequisite(s):** ACTG 500 and credit or concurrent registration in ECON 520 and admission to the MBA program, the MA in Real Estate program, the Master of Health Administration program, or approval of the director of graduate studies.

**FIN 510
Investments** 4 hrs.
Theory and practice of investment analysis. Topics included are the institutional organization of security markets, and fundamental principles of asset valuation with application to specific securities. **Prerequisite(s):** FIN 500.

**FIN 512
Portfolio Analysis** 4 hrs.
Development of portfolio theory; establishment of portfolio objectives; evaluation of portfolio performance; investment objectives for individuals, corporations, banks, pension, and mutual funds, and their interrelation with economic environment. **Prerequisite(s):** FIN 510.

**FIN 516
Theory and Structure
of Options and
Futures Markets** 4 hrs.
History and institutional structure of options and futures markets. Uses of futures and options for arbitrage, speculation, and hedging by financial and portfolio managers of domestic and multinational organizations. Analysis of factors which determine futures and options prices. **Prerequisite(s):** FIN 510.

**FIN 520
Corporate Finance** 4 hrs.
Advanced topics in corporate finance, including capital structure, dividend policy, financial restructuring, bankruptcy, and leasing. Emphasis on recent developments in corporate finance and financial economics. **Prerequisite(s):** FIN 500.

**FIN 530
Money and Banking** 4 hrs.
The functions of money; monetary standards; development and operation of commercial banking and the Federal Reserve System. Theories of the supply and demand for money; effects of monetary changes on economic activity, interest rates, and income. **Prerequisite(s):** FIN 500.

**FIN 531
Capital Markets** 4 hrs.
Capital markets in the private economy. Flow of funds in financial markets and financial intermediaries. Pricing of securities. Short-term money markets and the Federal Reserve System. Market for long-term securities. Financial markets and the stability and progress of the economy. **Prerequisite(s):** FIN 500.

**FIN 542
International Finance** 4 hrs.
Financial management within an international context. International monetary system, exchange rates, foreign investments, working capital management, financing trade, taxation, and earnings reports. **Prerequisite(s):** FIN 510.

**FIN 544
Entrepreneurial and
New Venture
Financing** 4 hrs.
The financing of new business. Estimating cash needs and then determining sources to finance them. This course is designed for those wanting to start their own business. **Prerequisite(s):** FIN 500.

**FIN 551
Financial
Decision Making I** 4 hrs.
First foundation course for the study of modern financial economics. Two-period individual consumption and portfolio decisions under uncertainty and their implications for the valuation of securities. **Prerequisite(s):** Consent of the instructor.

**FIN 570
Quantitative Methods
in Finance** 4 hrs.
Statistical and optimization techniques for portfolio management, risk management, proprietary trading, securities regulation, and market making. **Prerequisite(s):** ACTG 500 and ECON 520 and FIN 500 and IDS 570; or consent of the instructor.

**FIN 571
Empirical Issues
in Finance** 4 hrs.
The methodology used in analyses of market efficiency, asset pricing, and capital allocation. **Prerequisite(s):** FIN 500 and consent of the instructor.

**FIN 573
Risk Management** 4 hrs.
Introduction to risk management. Risk measurements and reserves; banking and insurance capital requirements, the Basel Accord, tail events, catastrophic event insurance, reinsurance. Financial contracts and hedging. **Same as** IDS 573. **Prerequisite(s):** Credit or concurrent registration in IDS 570 and FIN 500.

**FIN 594
Special Topics in
Finance** 1 TO 4 hrs.
An intensive study of a selected topic in finance. Topics vary by sections and by term. May be repeated to a maximum of 12 hours if topics vary. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**FIN 596
Independent
Study in Finance** 1 TO 4 hrs.
Independent study under the direction of a faculty member. Must be arranged before the start of the semester. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of department head or instructor.

FIN 599
PhD Thesis
Research 0 TO 16 hrs.
Independent research on topic approved for doctoral dissertation under supervision of faculty advisor. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

French

FR 401
Reading French
for Graduate
Students 4 hrs.
Grammar, vocabulary, general and specialized reading practice; for graduate students wishing to fulfill French reading requirements for the PhD. Credit may not be applied toward a graduate degree. Taught in English. **Prerequisite(s):** Graduate standing and consent of the instructor. Recommended background: Some prior experience with elementary French.

FR 413
French
Feminist and
Gender Theory 3 OR 4 hrs.
An introduction to French theories of gender, including feminisms influenced by Lacanian psychoanalysis, political philosophy, and multicultural studies. **Same as** GWS 413. 3 undergraduate hours. 4 graduate hours. May be used for credit in the French major only with consent of the director of undergraduate studies. Taught in English. Students who intend to use FR 413 toward the major in French must complete assignments in French. **Prerequisite(s):** FR 301 or FR 302; or consent of the instructor.

FR 415
French
Literature of the
Middle Ages 3 OR 4 hrs.
Introduction to major medieval genres (epic, romance, lyric, theater, allegory), works and authors, such as le Chanson de Roland, Tristan, Chretien de Troyes, Marie de France, and Villon. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). **Prerequisite(s):** FR 301 or consent of the instructor.

FR 416
Topics in
Sixteenth-Century
French
Literature 3 OR 4 hrs.
Intensive analysis of Renaissance literature (Rabelais, Montaigne, Marguerite de Navarre, poetry of the Pleiade, etc.) in the cultural context of humanism and the Reformation. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). **Prerequisite(s):** FR 301 or consent of the instructor.

FR 417
Topics in
Seventeenth-
Century French
Literature 3 OR 4 hrs.
Intensive study of Baroque and Classicism, with focus on major genres: theater (Corneille, Moliere, Racine); poetry (La Fontaine); prose (Pascal, de Sevigne); novel (de Lafayette). 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). Students may register in more than one section per term. **Prerequisite(s):** FR 301 or consent of the instructor.

FR 418
Topics in
Eighteenth-
Century French
Literature 3 OR 4 hrs.
Introduction to the literature and philosophy of the Enlightenment through representative authors (Rousseau, Diderot, etc.) and major genres (novel, essay, conte, theater, etc.). 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). **Prerequisite(s):** FR 301 or consent of the instructor.

FR 419
Topics in
Nineteenth-
Century French
Literature 3 OR 4 hrs.
Major genres and works from Romanticism to realism, naturalism, and symbolism will be studied within the context of the social, cultural, and political movements of the century. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). **Prerequisite(s):** FR 301 or consent of the instructor.

FR 420
Topics in Twentieth-
Century French
Literature 3 OR 4 hrs.
Study of major literary movements (surrealism, existentialism, nouveau roman, theater of the absurd) and intensive analysis of works by major authors from Proust to Beckett. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). **Prerequisite(s):** FR 301 or consent of the instructor.

FR 422
Francophone
Novel 3 OR 4 hrs.
Intensive analysis of a topic in Francophone literature. Scope includes Quebec, Africa, the Antilles, and French novelists outside of France. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). **Prerequisite(s):** FR 301 or consent of the instructor.

FR 433
Advanced Oral
and Written
French 3 OR 4 hrs.
Exercises in French pronunciation; oral interpretation of different texts (familiar style and formal discourse); discussion of newspapers and magazine articles; practice in critical writing. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** FR 334 or consent of the instructor.

FR 440
Topics in French
and Francophone
Cinema 3 OR 4 hrs.
This course will examine a selection of French and Francophone films chosen around a period or theme or genre. Topics will vary. 3 undergraduate hours. 4 graduate hour. May be used for credit in the French major only with consent of the Director of Undergraduate Studies. Taught in English. Students who intend to use FR 440 toward the major in French must complete assignments in French. **Prerequisite(s):** FR 301 or FR 302; or consent of the instructor.

FR 448
Foundations of
Second Language
Teaching 3 OR 4 hrs.
Provides an introduction to second language acquisition research and its implications for communicative language teaching. Emphasis is on creating activities to develop high school students' communicative abilities in speaking and listening. **Same as** GER 448, and SPAN 448. 3 undergraduate hours. 4 graduate hours. Taught in English. **Prerequisite(s):** Junior standing or above; and consent of the instructor and three courses at the 200- and 300-levels.

FR 449
Teaching Second
Language Literacy
and Cultural
Awareness 3 OR 4 hrs.
Examines the nature of literacy as a reciprocal relationship between readers, writers, texts, and culture. Students learn the practical and theoretical foundations of classroom teaching of second language reading and writing skills. **Same as** GER 449 and SPAN 449. 3 undergraduate hours. 4 graduate hours. Taught in English. **Prerequisite(s):** Junior standing or above; and consent of the instructor.

FR 461
French
Civilization I:
Medieval and
Renaissance 3 OR 4 hrs.
Interdisciplinary approach to French civilization of the Middle Ages and the Renaissance, including history, literature, the beaux-arts, and philosophy. 3 undergraduate hours. 4 graduate hours. Lectures and discussion in French. **Prerequisite(s):** FR 302 or consent of the instructor.

FR 462
French Civilization II:
Seventeenth
and Eighteenth
Centuries 3 OR 4 hrs.
Interdisciplinary approach to French civilization of the seventeenth and eighteenth centuries, including history, literature, the beaux-arts, and philosophy. 3 undergraduate hours. 4 graduate hours. Lectures and discussion in French. **Prerequisite(s):** FR 302 or consent of the instructor.

FR 463
French Civilization III:
Nineteenth
and Twentieth
Centuries 3 OR 4 hrs.
An interdisciplinary approach to French civilization of the nineteenth and twentieth centuries, including history, literature, the beaux-arts, and philosophy. 3 undergraduate hours. 4 graduate hours. Lectures and discussion in French. **Prerequisite(s):** FR 302 or consent of the instructor.

FR 464
Topics in French
Civilization 3 OR 4 hrs.
An interdisciplinary approach to French civilization, including history, literature, the beaux-arts, and philosophy. Each topic focuses on a specific period between the Middle Ages and the present. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). **Prerequisite(s):** FR 302 or consent of the instructor.

FR 470
Educational
Practice with
Seminar I 6 hrs.
The first half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, and approval of the department.

FR 471
Educational
Practice with
Seminar II 6 hrs.
The second half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, credit or concurrent registration in FR 470, and approval of the department.

FR 494
Special Topics 3 OR 4 hrs.
Topics will vary from term to term and may cover such areas as literary theory or culture. **Same as** SPAN 494 and ITAL 494. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. Taught in English. **Prerequisite(s):** Junior standing or above; and approval of the department.

FR 496
Independent Study 1 TO 4 hrs.
Supervised study in an area not covered by regularly scheduled courses under the direction of a faculty member designated by the chairperson of the department. **Prerequisite(s):** French major with senior or graduate standing and consent of the department.

FR 502
Theoretical and Research Foundations of Communicative Language Teaching 4 hrs.
Introduces students to contemporary theory and research on second language acquisition. Emphasis is on understanding the research and examining classroom practice. **Same as** SPAN 502. Credit is not given for FR 502/SPAN 502 if the student has credit for SPAN 450 or FR 450 or GER 407. Taught in English. **Prerequisite(s):** Appointment as a teaching assistant. For students outside the department: consent of the instructor.

FR 510
Seminar in Literary Studies 4 hrs.
Topics vary. May be repeated. Beyond 12 hours of credit earned, consent of the director of graduate studies required.

FR 560
Seminar in Cultural Studies 4 hrs.
Topics vary. May be repeated to a maximum of 12 hours.

FR 570
Seminar in Literary Theory and Criticism 4 hrs.
Theories of literary production and reception; their application to the practice of literary criticism. Specific themes and topics vary. **Same as** SPAN 570. May be repeated to a maximum of 8 hours with approval. Approval to repeat course granted by the instructor. Taught in English.

FR 575
French Abroad 0 TO 16 hrs.
Lectures, seminars, and practical work in francophone literature and civilization in France. May be repeated to a maximum of 33 hours. **Prerequisite(s):** Approval of the department.

FR 596
Independent Study 1 TO 4 hrs.
Supervised study in an area not covered by regularly scheduled courses under the direction of a faculty member designated by the chairperson of the department. **Prerequisite(s):** Graduate standing in French and approval of the department.

FR 598
Thesis Research 0 TO 16 hrs.
Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 8 hours. **Prerequisite(s):** Approval of the director of graduate studies.

Gender and Women's Studies

GWS 403
Culture and Sexuality: Cultural History of Same-Sex Relations 3 OR 4 hrs.
Lesbian/gay studies; issues in the history of (homo)sexuality; cultural and historical analysis of same-sexuality in several periods, including our own. **Same as** HIST 403. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing or consent of the instructor.

GWS 406
Politics of Race, Gender, and Class 3 OR 4 hrs.
Formation of social status categories, individual and collective identity construction, the mechanisms of group-based marginalization and stigmatization; relationship between social status categories. **Same as** AAST 406. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** AAST 100 or GWS 102 or GWS 101; or graduate or professional standing; or consent of the instructor.

GWS 412
Women and the Environment 3 OR 4 hrs.
Women's place in the built environment; the role of gender in environmental experience, including women as users, designers, planners, policy makers, and critics. **Same as** ARCH 412. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Advanced undergraduate or graduate standing, or consent of the instructor.

GWS 413
French Feminist and Gender Theory 3 OR 4 hrs.
An introduction to French theories of gender, including feminisms influenced by Lacanian psychoanalysis, political philosophy, and multicultural studies. **Same as** FR 413. 3 undergraduate hours. 4 graduate hours. May be used for credit in the French major only with consent of the director of undergraduate studies. Taught in English. Students who intend to use FR 413 toward the major in French must complete assignments in French. **Prerequisite(s):** FR 301 or FR 302; or consent of the instructor.

GWS 419
Public Health Aspects of Sexuality and Women's Health 3 hrs.
An overview of human sexuality from a public health view with special emphasis on family planning, sexuality, and behavior effects on women's health. **Same as** CHSC 419. **Prerequisite(s):** Graduate standing; or junior standing or above with consent of the instructor.

GWS 424
Gender, Crime, and Justice 3 OR 4 hrs.
An in-depth examination of the etiology of female crime and the involvement of females in the criminal justice system as offenders, victims, and workers/professionals. **Same as** CLJ 424. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CLJ 101 and CLJ 220; or consent of the instructor.

GWS 425
Sociology of Gender 3 OR 4 hrs.
Variety and change in gender roles; patterns and consequences of gender inequality; gender and sexuality; gender and social institutions such as family, economy. **Same as** SOC 424. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** 6 hours of upper-division sociology or gender and women's studies courses or consent of the instructor.

GWS 428
Asian/Asian American Women in the Global Economy 3 OR 4 hrs.
Examines the racialization and feminization of a global division of labor and focuses primarily on Asian and Asian American women's participation and incorporation as workers and key actors in the development of the global economy. **Same as** ASAM 428 and SOC 428. 3 undergraduate hours; 4 graduate hours. **Prerequisite(s):** ASAM 125 or ENGL 125 or SOC 125 or AAST 225 or LALS 225 or SOC 225 or ASAM 228 or ASST 228 or SOC 228 or ASAM 290 or two 200-level courses in either SOC, GWS or ASAM, or a combination of these.

GWS 439
Gender and Cultural Production 3 OR 4 hrs.
Issues of gender representation and gender politics examined through the use of theoretical texts or through the study of women authors. **Same as** GER 439. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s) if topics vary. Taught in English. Students who intend to use GER 439/GWS 439 toward a degree offered by the Department in Germanic Studies will do assignments in German. Area: Literature/Culture. **Prerequisite(s):** GER 212 or consent of the instructor.

GWS 441
Introduction to Maternal and Child Health 3 hrs.
Title V maternal and child health programs; concepts of delivery risks by age; effective interventions and public sector organization for delivery of MCH services. **Same as** CHSC 441. **Prerequisite(s):** Consent of the instructor. Recommended background: Some knowledge of maternal and child health issues.

GWS 443
Topics in Gender, Sexuality, and Literature 3 OR 4 hrs.
Specific study of topics in gender and literature. Content varies. **Same as** ENGL 443. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 361 or ENGL 362 or ENGL 363 or GWS 101 or GWS 102; and senior standing or above; or consent of the instructor.

**GWS 444
Topics in
Theories of
Gender and
Sexuality** 3 OR 4 hrs.
Advanced study of topics related to theories of gender and sexuality. **Same as ENGL 444.** 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** ENGL 361 or ENGL 362 or ENGL 363 or GWS 101 or GWS 102; and senior standing or above; or consent of the instructor.

**GWS 450
Women and
Mental Health
Nursing** 3 hrs.
Theories of female psychology; women's daily lives and mental health; gender differences in mental illness; strategies for improving women's mental health. **Same as NUSC 450, and NUWH 450.** **Prerequisite(s):** Consent of the instructor. Students enrolled in the College of Liberal Arts and Sciences must have credit in PSCH 100 and either PSCH 270 or PSCH 315 or GWS 315.

**GWS 462
AIDS, Politics,
and Culture** 3 OR 4 hrs.
Introduction to the study of AIDS as a medical, social, political, and cultural construction. Explores the epidemiology of AIDS, the politics of the state's response, how activists have addressed AIDS, and media representations of AIDS. **Same as HIST 462.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** GWS 101 or GWS 102 or GWS 203 or GWS 214 and junior standing or above; or consent of the instructor.

**GWS 469
Women's
Literary
Traditions** 3 OR 4 hrs.
An exploration of issues such as the female aesthetic; women's popular literature; factors that enable creativity; differences of race and class. **Same as ENGL 469.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ENGL 361 or ENGL 362 or ENGL 363; and senior standing or above; or consent of instructor.

**GWS 472
Women and Film** 3 OR 4 hrs.
Roles and representations of women in classical Hollywood, European art, and independent feminist cinemas. **Same as AH 434 and ENGL 472.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ENGL 302 or ENGL 342 or ENGL 361 or ENGL 362 or ENGL 363; and senior standing or above; or consent of instructor.

**GWS 478
Women in
Chinese History** 3 OR 4 hrs.
Focuses on scholarship on women in Chinese society throughout history, dealing with topics such as marriage and family, literacy, career options, women in revolution, and the historiography of the field. **Same as ASST 478, and HIST 478.** 3 undergraduate hours. 4 graduate hours. Recommended background: Previous course work in Chinese history or women's studies.

**GWS 484
Topics in
the History
of Women** 3 OR 4 hrs.
Specific topics are announced each term. **Same as HIST 484.** 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history or gender and women's studies or consent of the instructor.

**GWS 485
Gender
and Politics** 3 OR 4 hrs.
Impact of gender on basic categories of western political thought. Distinctions between reason and emotion, public and private, among others, examined from feminist perspective. **Same as POLS 485.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** POLS 190 and one 200-level course in political theory; or consent of the instructor.

**GWS 490
Advanced Topics
in the Study of
Sexuality** 3 OR 4 hrs.
Special study at an advanced level of a topic concerning sexuality. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of gender and women's studies, or consent of the instructor.

**GWS 494
Advanced
Topics in Gender
and Women's
Studies** 3 OR 4 hrs.
Specialized study of a problem, topic, or issue relevant to the interdisciplinary area of Gender and Women's Studies at the advanced level. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Senior or graduate standing.

**GWS 501
Feminist Theories** 4 hrs.
An analysis of important trends in historical and contemporary feminist theories.

**GWS 502
Research Approaches
in Gender and Women's
Studies** 4 hrs.
An exploration of feminist methodologies and pedagogy from an interdisciplinary perspective.

**GWS 514
Gender Issues in
Cross-Cultural
Perspectives** 4 hrs.
Selected substantive and theoretical issues in the cross-cultural study of gender roles, conceptions, and relations. **Same as ANTH 514.** **Prerequisite(s):** ANTH 500 or consent of the instructor.

**GWS 515
Psychology of
Women and Gender** 3 hrs.
Critical examination of psychological theories and research on women and gender, including biological, psychoanalytic, socialization, power, and social constructionist perspectives. **Same as PSCH 515.** **Prerequisite(s):** Graduate standing in Psychology; or PSCH 315 or GWS 315, and consent of the instructor.

**GWS 521
Violence
Against Women** 4 hrs.
Examines the extent, causes, and consequences of sexual assault, intimate partner violence (e.g., domestic violence, dating violence), and sexual harassment, and considers the impact of culture and community on violence and its victims. **Same as PSCH 521.** **Prerequisite(s):** Consent of the instructor.

**GWS 525
Social Work
with Women** 3 hrs.
Research, policy, and practice approaches to working with women in diverse urban settings; empowerment and diversity perspectives. **Same as SOCW 525.** **Prerequisite(s):** SOCW 410; or consent of the instructor.

**GWS 540
Language
and Gender** 4 hrs.
Examination of sociolinguistic research and theories on the interrelationships between language and gender, including gender categories in linguistic systems, gender differences in language use, interaction, and cross-cultural comparisons. **Same as LING 540.**

**GWS 547
Race, Class,
and Gender
Dimensions of
Crime and Justice** 4 hrs.
Theories addressing the intersections of race, class, gender, crime, and justice. Specifically, students examine criminological theories, social construction of race, class, and gender, legal decision making, and implications of this for justice in our society. **Same as CLJ 547.**

**GWS 583
Women in Education** 4 hrs.
An overview of girl's and women's educational experiences and placement within the academic structure (as students, professionals, and intellectuals). The impact of gender on the realization of educational, economic, and social opportunities. **Same as EDP5 583.** **Prerequisite(s):** Consent of the instructor or enrollment in the PhD in Policy Studies in Urban Education program.

**GWS 594
Special Topics
in Gender and
Women's Studies** 1 TO 4 hrs.
Study of a problem, topic, or issue relevant to the interdisciplinary area of gender and women's studies. Content varies. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor or one course in gender and women's studies.

**GWS 596
Independent
Study** 1 TO 4 hrs.
Topics and plan of study must be approved by the instructor. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

Geography

**GEOG 401
Topics in
Regional
Geography** 3 OR 4 hrs.
Geographic analysis of cultural and environmental systems of a political, economic, or climatic region of the world as defined by the instructor. 3 undergraduate hours. 4 graduate hours. May be repeated to a maximum of 6 hours. **Prerequisite(s):** One upper-division course in each of the areas of skills, systematic and regional/urban geography.

**GEOG 418
Ethnographic
and Qualitative
Research
Methods** 3 OR 4 hrs.
Practical introduction to the techniques of social scientists for research in natural social settings: participant observation/nonparticipant observation, interviewing, use of documentary sources, etc. **Same as ANTH 418.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing or above.

GEOG 425
Field Techniques in Archaeology 4 hrs.
Exposure to field methods in archaeology through participation in an actual research project. Students are instructed in field excavation techniques. Usually offered in summer session. **Same as ANTH 425.** May be repeated to a maximum of 8 hours.
Prerequisite(s): ANTH 102 or consent of the instructor.
Recommended: Concurrent registration in ANTH 426 or GEOG 426.

GEOG 426
Laboratory Techniques in Archaeology 4 hrs.
Exposes students to laboratory methods in archaeology through the analysis of excavated materials. Students are instructed in laboratory techniques. **Same as ANTH 426.** May be repeated to a maximum of 8 hours.
Prerequisite(s): ANTH 102 or consent of the instructor.
Recommended: Concurrent registration in ANTH 425 or GEOG 425.

GEOG 429
Archaeological Methods 3 OR 4 hrs.
This course will familiarize students with various methodologies used by archaeologists and geoarchaeologists. Course will concentrate on a different method each time it is taught. **Same as ANTH 429.** 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). Students may register for more than one section per term.

GEOG 431
Advanced Landform Geography 3 OR 4 hrs.
Genesis of surficial landforms and processes that sculpt them. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** GEOG 131 or EAES 101 or consent of the instructor.

GEOG 432
Geomorphology and Archaeology 3 OR 4 hrs.
Relevance of geomorphic processes and landform development to archaeology; role of geomorphology in archaeological surveys, paleogeographic reconstruction, and archaeological interpretation. Elements of geoarchaeology. **Same as ANTH 421.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** GEOG 131 or EAES 101 or consent of the instructor.

GEOG 441
Topics in Resource Management and Policy 3 OR 4 hrs.
Selected topics dealing with environmental problems at local, regional, or global levels. Topics vary. 3 undergraduate hours. 4 graduate hours. May be repeated to a maximum of 6 hours.
Prerequisite(s): GEOG 341 or GEOG 361 or consent of the instructor.

GEOG 442
Environmental Hazards and Risks 3 OR 4 hrs.
Environmental risks of natural and technological hazards; causes and consequences to people; social theories of risks; coping mechanisms used to reduce risk. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** GEOG 251 or GEOG 441 or consent of the instructor.

GEOG 444
Management of Solid and Hazardous Wastes 3 hrs.
Management of solid and hazardous waste, including radioactive waste: landfills, incineration, recycling, composting, source reduction, groundwater and air pollution impacts, control, regulations, siting, health impacts. **Same as CME 423 and EOHs 472.**

GEOG 453
Seminar in Cultural Ecology 3 OR 4 hrs.
Cultural ecology and cultural evolution, emphasizing peasant farming and other subsistence systems. Soil management under shifting and sedentary agriculture. **Same as ANTH 453.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ANTH 101 or GEOG 151 or consent of the instructor.

GEOG 455
Quantitative Methods 3 OR 4 hrs.
Introductory statistics course in statistical methods for anthropological problem solving. Primary emphasis is on univariate and bivariate statistics, such as means standard deviations, correlation, chi square, t-tests, and simple regressions. **Same as ANTH 455.** 3 undergraduate hours. 4 graduate hours. Extensive computer use required.
Prerequisite(s): Junior standing or above; and consent of the instructor.

GEOG 461
Location and Land Use 3 OR 4 hrs.
Environmental, demographic, and institutional influences on land availability/use at global/local scales; geographies of production/use intensity; market/governmental controls over land/users. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** GEOG 361 or consent of the instructor.

GEOG 464
Geographic Modeling of Transportation Systems 3 OR 4 hrs.
Discussions of the principles of spatial interaction, emphasizing passenger movements, commodity flows, the practicality of network analysis, and the impact of transportation facilities on land use and regional development. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** GEOG 100 and GEOG 161.

GEOG 470
Educational Practice with Seminar I 6 hrs.
The first half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department.
Prerequisite(s): Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, and approval of the department.

GEOG 471
Educational Practice with Seminar II 6 hrs.
The second half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department.
Prerequisite(s): Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, credit or concurrent registration in GEOG 470, and approval of the department.

GEOG 475
Thematic Cartography 4 hrs.
Discussion and projects involving representation of real-world areal patterns; preservation of geodetic, locational, and informational relationships; information generalization and reconstruction; computer software, and programs for computer-assisted cartography.
Prerequisite(s): GEOG 276 or GEOG 278 or consent of the instructor.

GEOG 477
Remote Sensing of the Environment 4 hrs.
Principles and practices of processing and interpretation of remotely sensed imagery including aerial photographs, radar, and multispectral satellite images. Hands-on use of image-processing software. **Same as ANTH 477.** Extensive computer use required.

GEOG 478
Mapping with Microcomputers 4 hrs.
Microcomputer applications, including computer principles for mapping, alternative design for coordinate files, kinds of devices for mapping, direct control of devices for mapping, characteristics and limitations of mapping programs. **Same as ANTH 484.**
Prerequisite(s): GEOG 475 or consent of the instructor.

GEOG 481
Geographic Information Systems I 4 hrs.
Components and performance properties of geographic information systems. Geographic hierarchies and data structures. Problems and solutions in handling large geographic files. Geocoding. **Same as ANTH 481.**
Prerequisite(s): GEOG 100 and one from GEOG 278, GEOG 386, IDS 100; or consent of the instructor.

GEOG 482
Geographic Information Systems II 4 hrs.
Application of raster (or grid-based) geographic information systems to the spatial analysis of landscapes. **Same as ANTH 482.**

GEOG 483
Geographic Information Systems III 4 hrs.
Problems encountered in the analysis and portrayal of geographic data. Topics include taxonomy, regionalization, trend surface analysis, time series, Markov probabilities, and computer cartographic procedures for displaying output from analytic procedures. **Same as ANTH 483.**
Prerequisite(s): GEOG 482 or ANTH 482 or consent of the instructor.

GEOG 484
Qualitative Methods in Geographic Research 3 OR 4 hrs.
Use of qualitative methods in geographic research. Research design choices, data collection and analysis, writing. Applications in environmental and urban geography. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** GEOG 481 or Geography major or minor or consent of instructor.

GEOG 485
Computer Cartography 4 hrs.
The fundamentals of cartography and cartographic design. The use of state-of-the-art, Windows-based computer mapping software for querying and displaying cartographic data contained in GIS databases. **Same as ANTH 485.**

GEOG 486
Analysis of Geographic Patterns 4 hrs.
Analytical methods for evaluating arrangements of points, lines, and subareas across regions. Development of noncentral measures of spatial association as an alternative to correlation analysis. **Prerequisite(s):** GEOG 482 or consent of the instructor.

GEOG 491
History and Philosophy of Geography 3 OR 4 hrs.
The philosophy of geography, its theory and research techniques. Analysis of bibliographic sources; criticism of papers on assigned topics. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Declared major or minor in Geography; or consent of the instructor.

GEOG 496
Internship 1 TO 4 hrs.
Professional field experience with an agency or organization in the private or public sector on projects related to the student's area of specialization. **Same as** ANTH 496. May be repeated to a maximum of 8 hours. Only 4 hours of credit may be applied toward the minor in Geography. **Prerequisite(s):** Declared major in Anthropology, minor in Geography or full graduate standing in Anthropology or Geography and consent of the faculty advisor, head of the department, or the director of internship programs.

GEOG 505
Seminar on the Geography of Colonialism and Neocolonialism 3 hrs.
Colonialism: historical, political, and development geographies. Colonialism in the evolution of Europe and the Third World. Anti-colonial liberation movements. Theories of neocolonialism, underdevelopment, and dependency. May be repeated to a maximum of 6 hours. **Prerequisite(s):** GEOG 353 or GEOG 401 or consent of the instructor.

GEOG 510
Seminar in Social Organization 4 hrs.
Theoretical and substantive issue about how societies are organized. **Same as** ANTH 510. May be repeated to a maximum of 12 hours.

GEOG 511
Topics in Urban Geography 3 hrs.
Critical analysis of selected theories, methods, and problems of urban and settlement geography. May be repeated to a maximum of 9 hours. **Prerequisite(s):** One 400-level course in urban, economic, or transportation geography.

GEOG 530
Seminar in Physical Geography 3 hrs.
General topic to be defined by instructor; specific approved topic to be defined, researched, and discussed by student. May be repeated to a maximum of 6 hours. **Prerequisite(s):** GEOG 421 or GEOG 431 or consent of the instructor.

GEOG 541
Seminar on Resource Management and Policy 3 hrs.
Social policy issues in the resolution of resource management conflicts. Topics will vary. May be repeated to a maximum of 6 hours. **Prerequisite(s):** GEOG 441 or GEOG 461 or consent of the instructor.

GEOG 551
Research Seminar on the Ecology of Mapping Behavior 4 hrs.
Mapping behavior examined cross-culturally, historically, and developmentally. Ecological functions of mapping in macro-spatial behavior. **Prerequisite(s):** Consent of the instructor.

GEOG 575
Seminar in Cartography 3 hrs.
Review of recent developments in computer mapping and identification of mapping needs. Research on conceptual and program solutions to computer mapping problems. May be repeated to a maximum of 6 hours. **Prerequisite(s):** GEOG 475 and GEOG 481; or consent of the instructor.

GEOG 589
Geographic Information Systems for Planning 4 hrs.
Applications of geographic information systems to urban planning and policy making. **Same as** UPP 508. **Prerequisite(s):** Graduate standing in Urban Planning and Policy or consent of the instructor.

GEOG 592
Research Proposal Design 1 hour.
Research techniques, including problem definition, literature search, and methodological design. **Prerequisite(s):** GEOG 595.

GEOG 595
Departmental Seminar 3 hrs.
Review of contemporary geographic theory in academic research and professional practice. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Graduate standing in Geography.

GEOG 596
Independent Study 1 TO 4 hrs.
Independent research on approved topic not related to thesis preparation. May be repeated to a maximum of 6 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of faculty advisor and the instructor.

GEOG 598
Master's Thesis Research 0 TO 16 hrs.
Independent research on a topic approved for a graduate thesis. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 16 hours. **Prerequisite(s):** Consent of thesis research advisor.

Germanic Studies

GER 400
German for Reading Knowledge 3 OR 4 hrs.
Preparation for the Graduate Proficiency Exam. Basic components of German grammar, sentence structure, and vocabulary. Selected texts in humanities, social sciences, and natural sciences. 3 undergraduate hours. 4 graduate hours. Credit may not be applied toward a degree or minor offered by the Department of Germanic Studies. Does not satisfy the graduation requirement in foreign languages.

GER 401
Advanced Practice in German Language Skills 3 OR 4 hrs.
Communicative use of German techniques for understanding written and spoken texts, practicing conversation, and writing texts, such as essays, compositions, letters, and e-mail. 3 undergraduate hours. 4 graduate hours. May be repeated. Only majors and minors outside the Department of Germanic Studies may repeat this course for a maximum of 6 hours of credit. Area: language. **Prerequisite(s):** GER 212, or the equivalent. Recommended background: Credit or concurrent registration in GER 310.

GER 404
Yiddish for Reading Knowledge 3 OR 4 hrs.
Preparation for the Graduate Proficiency Exam. Basic components of Yiddish grammar, sentence structure, and vocabulary. Selected texts in the original language will be studied. 3 undergraduate hours. 4 graduate hours. Does not satisfy the graduation requirement in foreign languages. **Prerequisite(s):** GER 211; or consent of the instructor or graduate standing.

GER 407
Theoretical and Research Foundations of Communicative Language Teaching 3 OR 4 hrs.
Focuses on theory and practice of communicative language teaching and explores current approaches of task-based instruction, testing, and media-enhanced instruction. 3 undergraduate hours. 4 graduate hours. Taught in English. Pedagogical examples are in German. Ten hours of high school observation required. Area: Language. **Prerequisite(s):** GER 212 or the equivalent.

GER 408
Introduction to Translation Theory 3 OR 4 hrs.
The study of translation theory and its application to translating German texts of various types into English. Appropriate for students who want to become translators. 3 undergraduate hours. 4 graduate hours. Area: language. **Prerequisite(s):** GER 212 or the equivalent, or graduate standing.

GER 411
The City as Cultural Focus 3 OR 4 hrs.
Interdisciplinary study of urban culture with focus on German-speaking countries. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). Taught in English. No knowledge of German required. Students who intend to use GER 411 toward a degree offered by the Department of Germanic Studies will do assignments in German. Area: literature/culture. **Prerequisite(s):** For majors and minors in the Department of Germanic Studies only: GER 212 or the equivalent or consent of the instructor.

GER 420
Germanic Cultural Studies I: Genres 3 OR 4 hrs.
Concentration on a genre, with stress on cultural analysis and theoretical inquiry. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s) if topics vary. Students who intend to use GER 420 toward a degree offered by the Department of Germanic Studies will do assignments in German. Area: literature/culture. **Prerequisite(s):** GER 212 or consent of the instructor.

GER 421
Germanic Cultural Studies II: Authors, Movements, Periods 3 OR 4 hrs.
Critical analysis of texts in the biographical, social, cultural, and historical context. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s) if topics vary. Students who intend to use GER 421 toward a degree offered by the Department of Germanic Studies will do assignments in German. Area: literature/culture. **Prerequisite(s):** GER 212 or consent of the instructor.

GER 422
Germanic Cultural Studies III: Themes 3 OR 4 hrs.
Explores themes in German-speaking societies, such as the family, xenophobia, crime, and science, with stress on literary analysis and interpretation. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s) if topics vary. Students who intend to use GER 422 toward a degree offered by the Department of Germanic Studies will do assignments in German. Area: literature/culture. **Prerequisite(s):** GER 212 or consent of the instructor.

GER 430
Classical German Philosophy 3 OR 4 hrs.
Introduction to German philosophy and intellectual history through the critical analysis of major authors and texts. 3 undergraduate hours. 4 graduate hours. Area: literature/culture. **Prerequisite(s):** One 300-level course in Germanic Studies or consent of the instructor.

GER 437
Contemporary German Literature 3 OR 4 hrs.
Literature of the German-speaking world since World War II, with emphasis on current issues and recent critical approaches to literature. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s) if topics vary. Area: literature/culture. **Prerequisite(s):** GER 211 or the equivalent, or graduate standing or consent of the instructor.

GER 438
The Faust Legend 3 OR 4 hrs.
Discusses Goethe's Faust within the context of European and non-European literatures. Traces the origins, significance, and interpretation of the Faust figure. 3 undergraduate hours. 4 graduate hours. Area: literature/culture. **Prerequisite(s):** GER 212 or the equivalent or graduate standing or consent of the instructor.

GER 439
Gender and Cultural Production 3 OR 4 hrs.
Issues of gender representation and gender politics examined through the use of theoretical texts or through the study of women authors. **Same as** GWS 439. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s) if topics vary. Taught in English. Students who intend to use GER 439 toward a degree offered by the Department of Germanic Studies will do assignments in German. Area: literature/culture. **Prerequisite(s):** GER 212 or consent of the instructor.

GER 448
Foundations of Second Language Teaching 3 OR 4 hrs.
Provides an introduction to second language acquisition research and its implications for communicative language teaching. Emphasis is on creating activities to develop high school students' communicative abilities in speaking and listening. **Same as** FR 448 and SPAN 448. 3 undergraduate hours. 4 graduate hours. Taught in English. **Prerequisite(s):** Junior standing or above; and consent of the instructor and three courses at the 200- and 300-levels.

GER 449
Teaching Second Language Literacy and Cultural Awareness 3 OR 4 hrs.
Examines the nature of literacy as a reciprocal relationship between readers, writers, texts, and culture. Students learn the practical and theoretical foundations of classroom teaching of second language reading and writing skills. **Same as** FR 449 and SPAN 449. 3 undergraduate hours. 4 graduate hours. Taught in English. **Prerequisite(s):** Junior standing or above; and consent of the instructor.

GER 450
Business Operations in German-Speaking Countries 3 OR 4 hrs.
The political, cultural, historical, and economic environment in which business operates in the German-speaking countries; the effects of this environment on international business. 3 undergraduate hours. 4 graduate hours. Knowledge of German not required.

GER 461
German Abroad 0 TO 17 hrs.
Taken in a German-speaking country. Lectures, seminars, and practical work in German language, literature, and civilization. May be repeated to a maximum of 34 hours. **Prerequisite(s):** GER 104 or the equivalent, a 2.75 overall grade point average, a 3.00 grade point average in Germanic Studies, and approval of the department.

GER 470
Exploring the Field of Germanic Studies 3 OR 4 hrs.
Team-taught. Research in film studies, gender studies, Jewish culture, minorities, literary studies, intellectual history, applied linguistics in Germanic Studies. Each unit taught by a different faculty member from Department of Germanic Studies. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Undergraduate students must obtain approval of the department.

GER 480
Hegel Studies 3 OR 4 hrs.
Studies in the philosophy of Hegel, including principal texts (e.g., Phenomenology), or problems (e.g., critique of metaphysics) or comparative studies (e.g., Hegel's critique of Kant). 3 undergraduate hours. 4 graduate hours. May be repeated if topics vary. Taught in English. Area: literature/culture. **Prerequisite(s):** GER 430; or consent of the instructor. Recommended background: PHIL 224 or PHIL 425.

GER 487
Computer Assisted Language Learning 3 OR 4 hrs.
An introduction to computer assisted language learning (CALL): the use of computer technology in second language reading and research. The effectiveness of CALL technology is assessed based on SLA theory and research studies. **Same as** LING 487 and SPAN 487. 3 undergraduate hours. 4 graduate hours. Taught in English. Extensive computer use required. **Prerequisite(s):** LING 483 or CIE 483 or GER 448 or FR 448 or SPAN 448 or GER 449 or FR 449 or SPAN 449; or SPAN 502 or FR 502 or the equivalent; and senior standing or above.

GER 492
Internship in International Business 0 TO 12 hrs.
Student placement in an international organization or firm in a German-speaking country or its U.S. subsidiary or division. Satisfactory/Unsatisfactory grading only. May be repeated with approval. Approval to repeat course granted by the department. **Prerequisite(s):** GER 211; and consent of the instructor and a GPA of 2.00. Recommended background: Concurrent registration in GER 493 or registration in GER 493 in the semester immediately following.

GER 493
Internship Seminar: Business 1 TO 4 hrs.
Academic component of the internship experience. Studies in the field of the internship and further investigation of related topics. May be repeated with approval. Approval to repeat course granted by the department. A maximum of 3 hours of credit may be applied toward an undergraduate degree offered by the Department of Germanic Studies, and a maximum of 4 hours of credit may be applied toward a graduate degree offered by the Department of Germanic Studies. **Prerequisite(s):** GER 211 and credit or concurrent registration in GER 492 and consent of the instructor and a grade point average of 2.00.

GER 494
Educational Practice with Seminar I 6 hrs.
The first half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, and approval of the department.

GER 495
Educational Practice with Seminar II 6 hrs.
The second half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, credit or concurrent registration in GER 494, and approval of the department.

GER 513
Germanic Culture from the Enlightenment to the 1848 Revolution 4 hrs.
Representative works and authors studied in a cultural context. May be repeated if topics vary.

GER 514
Germanic Culture from the Industrial Revolution to the Present 4 hrs.
Representative works and authors are studied in a cultural context. May be repeated if topics vary.

GER 515
Film and Media Culture 4 hrs.
Explores the theory and history of film and other visual media. Emphasis will be given to the status of media texts in their cultural contexts, as well as to their function as components of modern social institutions. Taught in English. Students will be asked to watch films outside of class.

GER 531
Seminar in Special Topics 4 hrs.
In-depth study of a theme, genre, or other element in Germanic literature and culture not confined to a single historical period. Topics vary. May be repeated to a maximum of 12 hours if topics vary.

GER 572
The Role of Reading in Second Language Acquisition 4 hrs.
Analyzes current theoretical and research directions in text comprehension processes as well as reading as a source of input for second language acquisition. Taught in English.

GER 593
**Internship Seminar:
Academic Training** 4 hrs.
Training in instruction of literature and culture courses at the college level. Students will be involved in a faculty-taught culture/literature course. Restricted to graduate students in Germanic Studies.

GER 596
**Independent Study
for Graduate
Students** 1 TO 4 hrs.
Independent study in the field of Germanic Studies. **Prerequisite(s):** Consent of the instructor.

GER 598
**Master's Thesis
Research** 0 TO 16 hrs.
Independent research under faculty supervision on a topic approved by the Graduate Program Committee. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of supervising faculty member and committee approval.

GER 599
**PhD Thesis
Research** 0 TO 16 hrs.
Independent research for the PhD. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Approval of the department and consent of the instructor.

Graduate College

GC 401
**Scientific Integrity
and Responsible
Research** 0 hrs.
Designed to meet NIH requirements for formal training in the responsible conduct of research. Ethical and legal issues in the conduct of research; University of Illinois at Chicago research standards, regulations, and procedures. Satisfactory/Unsatisfactory grading only. Meets during the first seven weeks of the term on the west side of campus, and on the east side of campus during the last seven weeks. **Prerequisite(s):** Graduate standing.

GC 470
**Essentials for
Animal Research** 1 hour.
Will acquaint the students with the regulations, sources of information, humane principles, and ethical considerations involving the appropriate use of animals for research and teaching purposes. Satisfactory/Unsatisfactory grading only.

GC 471
**Experimental
Animal Techniques** 2 hrs.
Noninvasive and invasive techniques commonly used in laboratory animals are performed with emphasis placed upon the proper use of anesthetic, analgesics, and aseptic techniques. Satisfactory/Unsatisfactory grading only. Animals used in instruction. **Prerequisite(s):** GC 470.

GC 473
**Seminar in
Comparative
Medicine** 1 TO 2 hrs.
Selected fields of interest and research in comparative medicine will be presented in the areas of comparative biology, model development, and experimental techniques. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** GC 471 or consent of the instructor.

GC 491
**Graduate Study
Abroad** 0 TO 16 hrs.
Lectures, seminars, and independent travel/study abroad in conjunction with an approved graduate program. May be repeated to a maximum of 32 hours. **Prerequisite(s):** Graduate standing and approval of the Graduate College.

GC 495
**Graduate Summer
Interdisciplinary
Seminars** 3 hrs.
These summer seminars provide unique opportunities for students and faculty to explore new and interdisciplinary fields of inquiry in intense periods of mutual inquiry outside the regular curriculum. Topics vary. May be repeated. Students must check with program director to apply credit toward degree. **Prerequisite(s):** Graduate standing and consent of the instructor.

Graduate College— Life Sciences

GCLS 500
Physiology 3 hrs.
Lectures in human physiology. Emphasis is on an integrated approach to systems physiology. Restricted to students enrolled in a graduate program offered through the College of Medicine or Pharmacy or Applied Health Sciences or in the Departments of Bioengineering or Biological Sciences, or consent of the instructor. **Prerequisite(s):** Mathematics, undergraduate physics, organic chemistry, or consent of the instructor.

GCLS 501
Biochemistry 3 hrs.
Fundamental properties of biomacromolecules, the thermodynamics underlying basic biochemical processes and the properties of enzymes, including the kinetics of operation, and regulation, illustrated with important examples. Restricted to students enrolled in a graduate program offered through the Colleges of Medicine or Pharmacy or the Departments of Bioengineering or Biological Sciences or consent of the instructor. Recommended background: Course work in organic and physical chemistry.

GCLS 502
Molecular Biology 3 hrs.
Core molecular biology course covering basic principles of gene expression, genome replication, and molecular interactions important to biological processes in prokaryotes and eukaryotes. Restricted to students enrolled in a graduate program offered through the Colleges of Medicine or Pharmacy or the Departments of Bioengineering or Biological Sciences or consent of the instructor.

GCLS 503
Cell Biology 3 hrs.
Advanced course on fundamental aspects of cell biology; basic concepts will be integrated with key examples which span gene, protein, cell, and tissue function. Credit is not given for GCLS 503 if the student has credit in BCHE 561 or ANAT 585 or MIM 585 or PHYB 585. Restricted to students enrolled in a graduate program offered through the Colleges of Medicine, Pharmacy, or Applied Health or the Departments of Bioengineering or Biological Sciences or consent of the instructor.

GCLS 504
**Research
Methods I** 1 TO 2 hrs.
Lectures, demonstrations, and discussions concerned with principles and practical aspects of modern quantitative biochemical, molecular biological, physiological, and biophysical methodology such as separation techniques and studies of biomembranes. May be repeated. Students may register for more than one section per term. Restricted to students enrolled in a graduate program offered through the Colleges of Medicine or Pharmacy or the Departments of Bioengineering or Biological Sciences or consent of the instructor.

GCLS 505
**Research
Methods II** 1 TO 3 hrs.
Lectures, demonstrations, and discussions concerned with principles and practical aspects of modern quantitative biochemical, molecular biological, physiological, and biophysical methodology such as bioimaging and biochemical analysis. May be repeated. Students may register for more than one section per term. Restricted to students enrolled in a graduate program offered through the Colleges of Medicine or Pharmacy or the Departments of Bioengineering or Biological Sciences or consent of the instructor.

GCLS 506
**GEMS Research
Rotation** 2 TO 5 hrs.
Research rotation course in which first year students from the GEMS program will undertake research projects in laboratories affiliated with this program. Satisfactory/Unsatisfactory grading only. May be repeated. Animals used in instruction. **Prerequisite(s):** Open only to PhD degree students.

GCLS 510
Integrative Biology 3 hrs.
Advanced-level, intensive course addressing fundamental topics of developmental biology, immunology, and cancer biology, with concentration on thematic issues that integrate these subjects. **Prerequisite(s):** GCLS 501 and GCLS 502 and GCLS 503; or demonstrated proficiency of the material covered in these courses. Restricted to students enrolled in a graduate program offered through the Colleges of Medicine or Pharmacy or the Departments of Bioengineering or Biological Sciences or consent of the instructor.

GCLS 511
Molecular Genetics 3 hrs.
Core molecular genetics course covering classical and molecular principles of microbial and Mendelian genetics. Systems covered include bacteria, bacteriophage, animal viruses, yeast, *Drosophila*, mouse, and human. **Prerequisite(s):** GCLS 501 and GCLS 502 and GCLS 503; or demonstrated proficiency of the material covered in these courses. Restricted to students enrolled in a graduate program offered through the Colleges of Medicine or Pharmacy or the Departments of Bioengineering or Biological Sciences or consent of the instructor.

GCLS 515
**Receptor
Pharmacology
and Cell Signaling** 3 hrs.
Advanced course on cell-surface and nuclear receptors and mechanisms of signaling through receptors. Provides an overview of receptor theory, hands-on data analysis, and lectures and discussions on various signaling mechanisms. Credit is not given for GCLS 515 if the student has credit in PCOL 505 or PHYB 505. **Prerequisite(s):** GCLS 501 or approval of the department. Restricted to students enrolled in a graduate program offered through the Colleges of Medicine or Pharmacy or the Departments of Bioengineering or Biological Sciences or consent of the instructor.

GCLS 594
**Special Topics
in Life Sciences** 1 TO 4 hrs.
Systematic study of advanced selected topics in life sciences from an interdisciplinary approach. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

Health Policy and Administration

HPA 400 Principles of Management in Public Health 3 hrs.

A detailed discussion of the conceptual and theoretical foundations to the principles of management with an emphasis on public health and healthcare settings. **Prerequisite(s):** Enrollment restricted to Public Health students; other graduate, professional, and advanced undergraduate students admitted by consent as space permits. To obtain consent, see the SPH registrar.

HPA 402 Social Ethics and Public Health 3 hrs.

Application of ideas from philosophy, law, political science, and economics to analyze the ethical basis of public health policies and programs.

HPA 403 U.S. Healthcare System 3 hrs.

Overview of the U.S. healthcare system, including its evolution, utilization patterns, providers—human, institutional, and organizational—financing, regulating, evaluating, and reforming.

HPA 405 Leadership in Public Health Practice 3 hrs.

Utilizing public health core functions, this course explores leadership style and practice through case studies and techniques which enhance leadership development. **Same as** CHSC 405. **Prerequisite(s):** CHSC 400 and consent of the instructor.

HPA 407 Foundations of Emergency Management in Business Continuity Planning 3 hrs.

Designed to provide the student with the core public health and emergency management practices and principles to prepare for and execute emergency management and business-continuity planning and operations. Taught online only. **Prerequisite(s):** Graduate or professional standing; or consent of the instructor.

HPA 410 Health Organizational Leadership 3 hrs.

Examines the roles, responsibilities, and impact of leaders of organizations in the health industry. Critical structures and techniques of effective organizational leaders are taught.

HPA 417 Quality Management in Health Services 3 hrs.

Surveys development of quality management and theoretical basics and diverse perspectives of quality management and regulation. Presents relevant research and management methodologies.

HPA 429 Introduction to Health Services Research 2 hrs.

Introduction to health services research using classic studies and current trends which examine access, cost, quality, and organization of healthcare. **Prerequisite(s):** HPA 400.

HPA 430 Introduction to Public Health Policy Analysis 3 hrs.

Identifies and discusses health status as a function of public policy; policy making to improve the public's health; current health policy topics and methodology.

HPA 431 Law and Public Health 3 hrs.

Surveys basic concepts and content in major areas of health law; explains the sources of legal authority; and develops familiarity with legal language and thinking.

HPA 432 Public Health Advocacy 3 hrs.

Examination of the courts, government agencies, legislatures, and public opinion and an analysis of their decision making; planning an advocacy campaign using "strategic analysis."

HPA 434 Law and the Healthcare System 3 hrs.

Survey of legal topics important to the management of healthcare organizations. They include relationships among the parties involved in the delivery of healthcare and the law of business organizations. **Prerequisite(s):** Graduate or professional standing and approval of the department.

HPA 437 Healthcare Data 3 hrs.

Review of data types in a healthcare information system. How data is transformed into information and then again transformed into knowledge through integrated computer systems. **Same as** BHIS 437. Taught online only. A UIC netid is required. **Prerequisite(s):** Graduate standing and consent of the instructor.

HPA 441 Strategic Management of Healthcare Organizations 4 hrs.

Introduction to strategic competitive analysis for healthcare organizations. Topics include: healthcare competition, entrepreneurship, technology and innovation, multi-constituent environment, and human resources. **Prerequisite(s):** Graduate or professional standing and approval of the department.

HPA 444 Healthcare Budgeting and Strategic Planning 3 hrs.

Budgeting systems in healthcare; budgeting techniques, flexible budgeting, cost behavior and forecasting, revenue and expense analysis; strategic planning in healthcare agencies; continuous quality improvement.

HPA 451 Healthcare Finance 3 hrs.

Examines practical aspects of finance in healthcare and recent developments in financial management of healthcare organizations, and applications of financial management techniques to specific problems facing healthcare managers.

Prerequisite(s): Graduate or professional standing and approval of the department.

HPA 460 Introduction to the Economics of Health and Healthcare 2 hrs.

Introduces principles of economic analysis, with examples from public health and medical care. Examines how consumers and companies decide what to buy or sell, why markets determine a product's price, and when public intervention improves welfare.

HPA 463 Managerial Health Economics 3 hrs.

Uses managerial economics to study healthcare system: demand for medical services; role of health insurance; productivity/cost measurement; labor markets and competition. **Prerequisite(s):** HPA 400 or consent of the instructor.

HPA 465 Health Information and Decision Support Systems 4 hrs.

Introduction to computer-assisted management information and decision systems in health organizations: analysis and design of databases; data and information flow; reports; and uses microcomputers. This is an online course.

HPA 494 Introductory Special Topics in Health Policy and Administration 1 TO 4 hrs.

Introductory topics in health administration, policy analysis, healthcare financing, cost-effectiveness evaluation. Topics vary by semesters.

HPA 495 MHA Preceptorship 1 TO 3 hrs.

Preceptor-guided field experience in health administration designed to promote critical-thinking and problem-solving skills, and application of management knowledge and skills in a practice setting. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 6 hours.

Prerequisite(s): Graduate or professional standing and approval of the department.

HPA 496 MHA Capstone 2 hrs.

Individual, integrative product in health administration designed to demonstrate student's mastery of health administration concepts and skills, including information access, synthesis, and use in critical thinking. **Prerequisite(s):** Graduate or professional standing and approval of the department.

HPA 497 Integrative Project in Emergency Management 2 hrs.

Independent investigation that draws upon the professional experience and knowledge synthesis of the student. Students investigate a topic/problem in their field and write an article. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

HPA 510 Healthcare Information Systems 4 hrs.

Examination, through case studies, group and class discussions, and problem-based learning, of the effective utilization of information technology applications currently in place and on the horizon in healthcare organizations. **Same as** BHIS 510. Taught online only. A UIC netid is required.

Prerequisite(s): Graduate standing and consent of the instructor.

HPA 511 Organization Theory Applied to Health Programs 3 hrs.

Classical and modern organization theories applied to health programs. Includes organization structure and goals, management functions and processes, and managerial controls and evaluation. **Prerequisite(s):** HPA 400 or consent of the instructor.

HPA 512 Ethics in Clinical Research 1 hour.

Survey of key ethical issues involved in conducting research with human subjects, including informed consent, confidentiality, access, and equity. **Same as** MHPE 512. Extensive computer use required. Requires completion of an online course in human subjects research, to be supplemented by classroom discussion of the topics raised in that course and others.

Prerequisite(s): Approval of the department. Students must be enrolled in the Master of Science in Public Health program.

HPA 516 Health Personnel Management 3 hrs.

Health personnel policies and programs, human resources requirements, recruitment, development, performance appraisal, salary and wage administration, and management/labor relations in the health industry. **Prerequisite(s):** HPA 400 and consent of the instructor.

**HPA 520
Management of
Healthcare
Communication
Systems 4 hrs.**
Examination and management of data communications in and between healthcare facilities, including examination of issues, standards, technologies, and system configurations. **Same as** BHIS 515. Taught online only. A UIC netid is required. **Prerequisite(s):** HPA 510 or BHIS 510; and graduate standing and consent of the instructor.

**HPA 522
Public Health
Research Design
and Methods 3 hrs.**
Graduate-level quantitative research methods course. Utilizes social science research methods with an emphasis on experimental and quasi-experimental research designs in the study of methodologically sound public health research investigations. **Prerequisite(s):** BSTT 400.

**HPA 525
Management of
Population
Health Risks 3 hrs.**
Examines the roles that healthcare delivery organizations can play, and methodologies used, in developing programs specific to the needs of the community they serve. **Prerequisite(s):** HPA 403 and HPA 410 and HPA 495.

**HPA 527
Critical Issues
in Long-Term
Care Policy 3 hrs.**
Long-term care organization, financing, delivery utilization, and policy, emphasizing affordability, access, and quality in a managed-care environment. **Same as** CHSC 527. **Prerequisite(s):** CHSC 400 and CHSC 425; or consent of the instructor.

**HPA 531
Health Information
Systems Analysis
and Design 4 hrs.**
A project course applying systems analysis and design theory to healthcare systems evaluation, modeling, and implementation. **Same as** BHIS 520. Taught online only. A UIC netid is required. **Prerequisite(s):** HPA 510 or BHIS 510; and graduate standing and consent of the instructor.

**HPA 534
Research Design
and Grant Writing 2 hrs.**
Introduction to the skills necessary to plan a research project and write a research grant proposal using a systematic approach. **Same as** MHPE 534. Previously listed as MHPE 431. **Prerequisite(s):** Graduate or professional standing; and approval of the department.

**HPA 535
Translating
Research into
Practice 3 hrs.**
Current theory and practical reality related to the adoption and use of new scientific findings in patient care. The influence of research on public policy. **Same as** MHPE 535. Extensive computer use required. **Prerequisite(s):** Graduate or professional standing; and approval of the department.

**HPA 540
Social and
Organizational Issues
in Health Informatics 4 hrs.**
Examines the impact of information systems on the healthcare organization and applies theory through case study analysis. **Same as** BHIS 525. Taught online only. A UIC netid is required. **Prerequisite(s):** BHIS 510 or HPA 510; and BHIS 515 or BHIS 520 or BHIS 530 or HPA 520 or HPA 531 or HPA 550; or consent of the instructor.

**HPA 550
Topics in Health
Informatics 4 hrs.**
Current theories and methods in health informatics. **Same as** BHIS 530. Taught online only. A UIC netid is required. **Prerequisite(s):** HPA 510 or BHIS 510; and HPA 520 or BHIS 515, or HPA 531 or BHIS 520, or HPA 540 or BHIS 525; and graduate standing and consent of the instructor.

**HPA 551
Marketing Health
Programs 3 hrs.**
Concepts of marketing as a management tool; application of marketing to healthcare: the marketing process, marketing resources, and strategies for accomplishing marketing objectives. **Prerequisite(s):** HPA 400 or MKTG 563 or consent of the instructor.

**HPA 556
U.S. Mental
Health Policy 2 hrs.**
Public policies which have supported the U.S. mental health service system from 1946 to the present. Theory, development, and evaluation of mental health policy in the U.S. **Prerequisite(s):** HPA 400 and HPA 430 and either EPID 400 or BSTT 400.

**HPA 557
Measurement in
Health Services
Research 3 hrs.**
Presents measurement, reliability, and validity theory and assessment using correlation, internal consistency, factor analysis, and others. Application in developing, analyzing, and reporting behavioral and/or organizational measures. **Prerequisite(s):** BSTT 400 and BSTT 401; or consent of the instructor.

**HPA 563
Web-Based Public
Health Information
Systems 4 hrs.**
Examination of Web-based applications in public health practice and factors in the design of Web-based public health education and database systems. This is an online course. **Prerequisite(s):** HPA 465; and consent of the instructor. Unless otherwise permitted, limited to students in the Public Health Informatics track of HPA.

**HPA 564
Geographic
Information System
Application in
Public Health 3 hrs.**
Examination of GIS applications in public health and the process of designing a GIS-based public health investigation. **Same as** EOHS 564. This is an online course. **Prerequisite(s):** BSTT 400 and HPA 465 and consent of the instructor.

**HPA 565
Data-Mining
Applications in
Public Health 3 hrs.**
Presents the key public health information system sources, describes the process of data mining and introduces the student to a sample of data-mining techniques. **Same as** EOHS 565. Extensive computer use required. **Prerequisite(s):** BSTT 400.

**HPA 573
Principles of
Economic Evaluations
of Healthcare
Interventions 3 hrs.**
Principles, models, and practical methods for the economic evaluation of healthcare services with an emphasis on pharmaceutical care. **Same as** PMAD 573. Previously listed as PMAD 571. **Prerequisite(s):** HPA 460; and graduate standing; and consent of the instructor.

**HPA 590
Grant Writing 1 hour.**
Students will learn how to write a grant application through the guidance of a mentoring committee. They will formulate a research proposal which will be presented to a panel of researchers who will critique the proposed study.

**HPA 594
Advanced Special
Topics in Health
Policy and
Administration 1 TO 4 hrs.**
Advanced topics in health administration, policy analysis, healthcare financing, cost-effectiveness evaluation. Topics vary by semester. **Prerequisite(s):** Consent of the instructor.

Histology

**HSTL 451
Oral Histology 4 hrs.**
Comprehensive learning experiences in the structure and function of human tissue, organs, and organ systems with special emphasis on the oral cavity. Registration in HSTL 452 is required in the spring term. **HSTL 451 Prerequisite(s):** Approval of the department. Students must also register for HSTL 452 in the spring term.

**HSTL 452
Histology II 4 hrs.**
Continuation of HSTL 451. Provides a baseline of normal structure and function of human tissues necessary for the study of oral pathology and advanced courses in histology. **Prerequisite(s):** HSTL 451; and approval of the department or first year standing in the Doctor of Dental Surgery program.

**HSTL 503
Biology of
Mineralized Tissues 2 hrs.**
Lectures and discussion on the formation, structure, and functions of bone, dentin, and enamel. Emphasizes the mechanisms of mineralization. **Prerequisite(s):** A basic course in histology and consent of the instructor.

**HSTL 504
Fine Structure
of Oral Soft Tissues 2 hrs.**
Discussions of electron microscopic research methodologies as applied to oral biology with special emphasis on structural-functional relationships in oral soft tissues. **Prerequisite(s):** HSTL 401 and HSTL 451 or the equivalents and consent of the instructor.

**HSTL 506
Advanced
Oral Histology-
Lymphoid Tissues 2 hrs.**
Lectures and discussions on the structure and functions of lymphoid tissues with special interest in orally related diseases. **Prerequisite(s):** HSTL 401, a course in microbiology, and consent of the instructor.

**HSTL 507
Physiological
Basis of Pathology 2 hrs.**
Subject matter allied to general pathology but going deeper into physical chemistry and physiological principles, as set forth in N.R. Joseph's "Comparative Physical Biology." **Same as** PATH 507. **Prerequisite(s):** HSTL 401 or PATH 421 and PATH 422.

**HSTL 514
Oral Biology
Seminar 1 hour.**
Invited speakers present the progress of current research work in their field of interest related to oral tissues. **Same as** OMDS 527. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

HSTL 515
Electron Microscopy in Dentistry 1 hour.
Principles, theory, and practice of transmission and scanning electron microscopy, and energy dispersive X-ray microanalysis. Processing, sectioning, staining, and examination of tissues. **Same as OMDS 529.** **Prerequisite(s):** Consent of the instructor.

History

HIST 100
Topics in Ancient History 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term.
Prerequisite(s): 3 hours of history.

HIST 401
Topics in Greek History 3 OR 4 hrs.
Specific topics are announced each term. **Same as** CL 401. 3 undergraduate hours. 4 graduate hours. May be repeated.
Prerequisite(s): 3 hours of history or classics.

HIST 402
Topics in Roman History 3 OR 4 hrs.
Specific topics are announced each term. **Same as** CL 402. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history or classics.

HIST 403
Culture and Sexuality: Cultural History of Same-Sex Relations 3 OR 4 hrs.
Lesbian/gay studies; issues in the history of (homo)sexuality; cultural and historical analysis of same-sexuality in several periods, including our own. **Same as** GWS 403. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing or consent of the instructor.

HIST 404
Roman Law and the Civil Law Tradition 3 OR 4 hrs.
Roman law and its relationship to values and social structure; social analysis through law; continental law tradition. **Same as** CL 404, and CLJ 404. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CLJ 200 or CL 203 or HIST 203 or consent of the instructor.

HIST 405
Herodotus and His World 3 OR 4 hrs.
Examines the Histories of Herodotus—both the text and the culture of Classical Greece compared to the Near East and Egypt. **Same as** CL 405. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Sophomore standing or above.

HIST 406
Topics in Medieval History 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term.
Prerequisite(s): 3 hours of history, or junior standing or above, or consent of the instructor.

HIST 409
Topics in Early Modern European History 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term.
Prerequisite(s): 3 hours of history.

HIST 410
Topics in Modern European History 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term.
Prerequisite(s): 3 hours of history.

HIST 415
American Indian Ethnohistory 3 OR 4 hrs.
Introduction to ethnohistory, an interdisciplinary approach to researching, conceptualizing, and writing American Indian history. The course is organized topically and centers on classic and current monographs and articles. **Same as** NAST 415. 3 undergraduate hours. 4 graduate hours.
Prerequisite(s): Junior standing or above and consent of the instructor. Recommended background: Courses in cultural anthropology, American Indian anthropology, American Indian literature.

HIST 418
Topics in German History 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term.
Prerequisite(s): 3 hours of European history, or consent of the instructor.

HIST 420
Teaching the Social Sciences 3 OR 4 hrs.
This course focuses on acquiring and practicing the skills for teaching the social sciences at the secondary level within the context of history. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** 9 hours of credit in the social sciences and approval of the instructor.

HIST 421
Topics in British and Irish History 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term.
Prerequisite(s): 6 hours of history or consent of the instructor.

HIST 424
Topics in French History 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term.
Prerequisite(s): One 200-level course in French or European history or consent of the instructor.

HIST 429
Topics in Italian History 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term.
Prerequisite(s): 3 hours of history.

HIST 433
Topics in Eastern European History 3 OR 4 hrs.
Specific topics are announced each term. **Same as** SLAV 433. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of European history or consent of the instructor.

HIST 435
Topics in Russian History 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term.
Prerequisite(s): 3 hours of European history or consent of the instructor.

HIST 441
Topics in African History 3 OR 4 hrs.
Specific topics are announced each term. **Same as** AAST 441. 3 undergraduate hours. 4 graduate hours. May be repeated.
Prerequisite(s): 3 hours of African history, African American studies, or consent of the instructor.

HIST 445
History of Islam in the African World 3 OR 4 hrs.
A comprehensive study of the history of Islam and its role among the people of African descent in sub-Saharan Africa and the United States. **Same as** AAST 445. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Consent of the instructor.

HIST 451
Topics in Colonial American History 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term.
Prerequisite(s): 3 hours of U.S. history or consent of the instructor.

HIST 452
Topics in Revolutionary and Early National United States History 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term.
Prerequisite(s): 3 hours of history.

HIST 453
Topics in Nineteenth-Century United States History 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term.
Prerequisite(s): 3 hours of history.

HIST 454
Topics in Twentieth-Century United States History 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term.
Prerequisite(s): 3 hours of U.S. history or consent of the instructor.

HIST 455
Topics in Southern History 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term.
Prerequisite(s): 3 hours of history.

HIST 456
Topics in the History of Communications 3 OR 4 hrs.
This course introduces students to major developments in the history of communications, with a focus on the political and cultural dimension of technologies. **Same as** COMM 456. 3 undergraduate hours. 4 graduate hours.
Prerequisite(s): Consent of the instructor. Recommended background: At least one history course at the 100-level.

HIST 461
Topics in Latin American History 3 OR 4 hrs.
Specific topics are announced each term. **Same as** LALS 461. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history, Latin American and Latino studies, or consent of the instructor.

**HIST 462
AIDS, Politics,
and Culture** 3 OR 4 hrs.
Introduction to the study of AIDS as a medical, social, political, and cultural construction. Explores the epidemiology of AIDS, the politics of the state's response, how activists have addressed AIDS, and media representations of AIDS. **Same as GWS 462.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** GWS 101 or GWS 102 or GWS 203 or GWS 214 and junior standing or above; or consent of the instructor.

**HIST 472
Issues and
Events in
Twentieth-
Century China** 3 OR 4 hrs.
Covers the events, places, people, political movements, ideologies, and issues that shaped twentieth-century China, and considers different approaches to the writing of that history. **Same as ASST 472.** 3 undergraduate hours. 4 graduate hours. Recommended background: Previous course work in Chinese history at the 100- or 200-level.

**HIST 473
Topics in
East Asian
History** 3 OR 4 hrs.
Specific topics are announced each term. **Same as ASST 473.** 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of East Asian history or consent of the instructor.

**HIST 475
Educational
Practice with
Seminar I** 6 hrs.
The first half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, and approval of the department.

**HIST 476
Educational
Practice with
Seminar II** 6 hrs.
The second half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, credit or concurrent registration in HIST 475, and approval of the department.

**HIST 477
Topics in Middle
Eastern History** 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history.

**HIST 478
Women in
Chinese History** 3 OR 4 hrs.
Focuses on scholarship on women in Chinese society throughout history, dealing with topics such as marriage and family, literacy, career options, women in revolution, and the historiography of the field. **Same as ASST 478,** and GWS 478. 3 undergraduate hours. 4 graduate hours. Recommended background: Previous course work in Chinese history or women's studies.

**HIST 479
Culture and
Colonialism in
South Asia** 3 OR 4 hrs.
Examines the emergence of colonial cultures of domination and resistance on the Indian subcontinent from the 18th century to 1947. **Same as ANTH 479** and ASST 479. 3 undergraduate hours. 4 graduate hours.

**HIST 480
Topics in
Economic History** 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history or consent of the instructor.

**HIST 481
Topics in
Social History** 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history.

**HIST 482
Topics in
Migration History** 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history.

**HIST 483
Topics in the
History of Public
Policy** 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history.

**HIST 484
Topics in the
History of Women** 3 OR 4 hrs.
Specific topics are announced each term. **Same as GWS 484.** 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history or gender and women's studies or consent of the instructor.

**HIST 485
Topics in African
and African
American History** 3 OR 4 hrs.
African and/or African American history for students with significant background in the field. Topics vary. **Same as AAST 481.** 3 undergraduate hours. 4 graduate hours. May be repeated if topics vary. Students may register in more than one section per term. **Prerequisite(s):** AAST 247 or AAST 248 or HIST 104 or HIST 247 or HIST 248 or consent of the instructor.

**HIST 486
Topics in
the History of
Science** 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 credit hours of history.

**HIST 487
Topics in the History of
Sexuality** 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours in history or consent of the instructor.

**HIST 488
Topics in
Urban History** 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history.

**HIST 489
Topics in
Military History** 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history.

**HIST 490
Topics in
Diplomatic
History** 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history.

**HIST 491
Topics in
Constitutional
History** 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history.

**HIST 492
Topics in
Intellectual
History** 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history.

**HIST 493
Topics in
Historiography** 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history.

**HIST 494
Topics in
Political History** 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history.

**HIST 495
Topics in
Religious History** 3 OR 4 hrs.
Specific topics are announced each term. **Same as RELS 495.** 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history or consent of the instructor.

**HIST 496
Topics in
Race, Ethnic,
and Minority
History** 3 OR 4 hrs.
Specific topics are announced each term. **Same as AAST 496.** 3 undergraduate hours. 4 graduate hours. May be repeated. **Prerequisite(s):** 3 hours of history or consent of the instructor.

**HIST 497
Topics in
Cultural History** 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history or consent of the instructor.

**HIST 498
Topics in
Quantitative
Methods** 3 OR 4 hrs.
Specific topics are announced each term. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history or consent of the instructor.

HIST 500
Colloquium on the Teaching of History 1 TO 4 hrs.

Reading in topics. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

HIST 501
Introduction to Graduate Study in History 4 hrs.

Introduction to history as a discipline and profession. Approach is comparative and by topic. Required for graduate students in the MA and PhD in History programs. **Prerequisite(s):** Graduate standing in History.

HIST 502
Seminar on Ancient History 4 hrs.

Research in topics. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

HIST 503
Colloquium on World History 4 hrs.

Graduate introduction to theories and historiography of the new world history. **Prerequisite(s):** Open only to PhD degree students; and approval of the department.

HIST 508
Seminar on Medieval History 4 hrs.

Research in topics. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

HIST 511
Colloquium on European History 4 hrs.

Reading in topics. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

HIST 512
Seminar on European History 4 hrs.

Research in topics. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

HIST 521
Colloquium on British History 4 hrs.

Reading in topics. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

HIST 522
Seminar on British History 4 hrs.

Research in topics. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

HIST 532
Seminar on Russian History 4 hrs.

Research in topics. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

HIST 541
Colloquium on African History 4 hrs.

Readings on select topics in African history. May be repeated. Students may register in more than one section per term.

HIST 542
Seminar on African History 4 hrs.

Research in topics. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

HIST 551
Colloquium on American History 4 hrs.

Reading in topics. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

HIST 552
Seminar on American History 4 hrs.

Research in topics. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

HIST 561
Colloquium on Latin American History 4 hrs.

Topics on themes in Latin American history. Specific topics are announced each term. **Same as** LALS 561. May be repeated. Students may register in more than one section per term.

HIST 562
Seminar on Latin American History 4 hrs.

Research in topics. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

HIST 591
Preliminary Examination and Dissertation Prospectus Preparation 1 TO 8 hrs.

Under the supervision of a faculty mentor, the student will prepare for the preliminary examination and prepare the dissertation prospectus required by the department. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 8 hours. **Prerequisite(s):** Approval of the department or completion of all didactic course work in the PhD in History program.

HIST 592
Colloquium on Approaches to History 4 hrs.

Reading in topics. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

HIST 596
Independent Study 1 TO 4 hrs.

Independent study in selected areas in history. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

HIST 599
PhD Thesis Research 0 TO 16 hrs.

Thesis research for the PhD in History. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Preliminary examination.

Honors College Courses

HON 401
Advanced Honors Seminar 3 hrs.

Student, faculty, and invited guests act as partners in the in-depth exploration of a focused topic. This interaction is fostered through common readings, written assignments, and open discussions. May be repeated to a maximum of 6 hours. Students may register for more than one section per term. **Prerequisite(s):** Sophomore standing or above and consent of the instructor. Graduate students may obtain instructor consent. Recommended background: HON 201.

Human Nutrition

HN 413
Principles of Delivering Public Health Nutrition Services 3 hrs.

Assessment, planning, and evaluation of community nutrition programs using a systems approach.

HN 420
Clinical Nutrition II 2 hrs.

Principles of nutrition, biochemistry, physiology, pathology, education, and psychology related to management of selected diseases (renal disease, AIDS and cancer, and pediatrics). **Prerequisite(s):** HN 320; or consent of the instructor.

HN 421
Clinical Practice II 4 hrs.

Practical experiences in the nutritional management and support of selected disease processes such as cancer, and gastrointestinal and hypermetabolic states. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** HN 321 and credit or concurrent registration in HN 420; or consent of the instructor.

HN 422
Clinical Nutrition III 2 hrs.

Principles of nutrition, biochemistry, physiology, and pathology related to the management of critically ill patients. **Prerequisite(s):** HN 309 and HN 420; or consent of the instructor.

HN 423
Clinical Practice III 5 hrs.

Clinical practicum which focuses on the nutritional management of critically ill patients or specialized patient populations (renal and pediatric patients). Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** HN 421 and credit or concurrent registration in HN 422; or consent of the instructor.

HN 450
Professional Practice 6 hrs.

Extended practicum which integrates acquired skills, knowledge, and attitudes in dietetics. Special emphasis on current dietetic issues facing the healthcare professional. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** HN 423; or consent of the instructor.

HN 480
Field Study 2 hrs.

Provides practical experience to develop/strengthen the student's knowledge and skills in an area of nutrition practice. **Prerequisite(s):** HN 410; or consent of the instructor.

HN 510
Nutrition—Physiological Aspects 3 hrs.

A thorough discussion of the absorption, transport, and metabolism of macronutrients, plus factors affecting these processes. Treats in an integrated fashion how various organs participate. **Prerequisite(s):** HN 410 and PHYB 341 or the equivalent, or consent of the instructor.

HN 514
Vitamins in Human Nutrition 2 hrs.

Clinical aspects of vitamin requirements and metabolism in human nutrition; bioavailability, nutrient interactions and interrelationships of vitamins with various disease states. **Prerequisite(s):** HN 410; or consent of the instructor.

HN 515
Minerals in Human Nutrition 2 hrs.

Clinical aspects of essential mineral requirements and metabolism in human nutrition; bioavailability, nutrient interactions, and trace and ultra-trace elements. **Prerequisite(s):** HN 410; or consent of the instructor.

HN 530
Research Methods in Human Nutrition 3 hrs.
Research designs in human nutrition; conceptual issues in clinical and population studies; problems in collection and analysis of dietary, behavioral, and self-reported data. **Prerequisite(s):** AHS 510; or consent of the instructor.

HN 532
Evaluation of Nutritional Status 3 hrs.
Community and clinical considerations in nutrition status surveillance and monitoring systems; characterization in the collection, standards, and reference population development. **Prerequisite(s):** HN 410; or consent of the instructor.

HN 535
Nutrition and Human Performance 2 hrs.
Nutrition which impacts on human performance; impaired performance due to nutritional problems; aspects relevant to the professional athlete. **Same as** MVSC 535. **Prerequisite(s):** HN 410; and PHYB 341 or MVSC 352; or consent of the instructor.

HN 541
Research on Clinical Nutrition Problems 2 hrs.
Development and conduct of research on clinical nutrition problems, patient outcomes, or nutrition or food service delivery systems within a hospital or ambulatory-care setting. **Prerequisite(s):** Consent of the instructor.

HN 550
Quantitative Methods in Nutritional and Epidemiological Studies 3 hrs.
Address methodological issues of nutritional/epidemiologic studies; discuss concepts, principles, study designs, statistical methods, and specific issues such as measurement error/remedies, energy adjustment; practice data management/analysis. Extensive computer use required. **Prerequisite(s):** HN 200 and BSTT 400 and BSTT 410 and EPID 400; or consent of the instructor.

HN 570
Advances in Clinical Nutrition I 2 hrs.
Selected topics in clinical nutrition, emphasizing current theory, research, and practice in such areas as cardiovascular disease, obesity, diabetes, and iatrogenic malnutrition. **Prerequisite(s):** HN 422; or consent of the instructor.

HN 580
Advanced Field Practicum 2 hrs.
Advanced practical experience in a specialized area of human nutrition and dietetics. The practicum may be carried out in a clinical setting, business, industry, or government agency. **Prerequisite(s):** HN 410; or consent of the instructor.

HN 581
Dietetics/Nutrition Instructional Practicum 2 hrs.
Teaching practicum in clinical dietetics and/or nutrition. **Prerequisite(s):** HN 201 and HN 410 and HN 570 or the equivalent, or consent of the instructor.

HN 594
Special Topics in Human Nutrition 1 TO 4 hrs.
Advanced course dealing with selected topics. Topics vary from year to year and may include drug/nutrient interaction, protein metabolism, nutrition and behavior, nutrition and exercise. May be repeated. **Prerequisite(s):** HN 410; or consent of the instructor.

HN 595
Seminar in Human Nutrition 1 hour.
Topics of current interest in human nutrition. Includes discussions of current journal articles and important new developments in the specific disciplines. Satisfactory/Unsatisfactory grading only. May be repeated with approval. Approval to repeat course granted by the department. **Prerequisite(s):** HN 410; or consent of the instructor.

HN 596
Independent Study in Human Nutrition 1 TO 4 hrs.
Study in selected areas of human nutrition is carried out under the direction of a faculty member. Modes of investigation are determined by the nature of the problem selected. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Admission to the Human Nutrition graduate program and consent of the instructor.

HN 597
Project Research 1 TO 4 hrs.
For graduate students who wish to pursue a project other than thesis research. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 4 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

HN 598
Research in Human Nutrition 0 TO 16 hrs.
Independent research in one area of human nutrition. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

HN 599
PhD Thesis Research 0 TO 16 hrs.
Independent dissertation research by the student, under the guidance of the advisor. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the faculty advisor.

Industrial Engineering

IE 411
Mechatronics I 0 TO 4 hrs.
Elements of mechatronic systems, sensors, actuators, microcontrollers, modeling, hardware-in-the-loop simulations, real-time software, electromechanical systems, and laboratory experiments. **Same as** ME 411. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** Senior standing or above or approval of the department.

IE 412
Dynamic Systems Analysis I 3 OR 4 hrs.
Classical control theory, concept of feedback, Laplace transform, transfer functions, control system characteristics, root locus, frequency response, compensator design. **Same as** ME 412. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ME 308.

IE 444
Interdisciplinary Product Development I 3 OR 4 hrs.
Cross-functional teams (w/students from AD 420/423 and MKTG 594) research and develop new product concepts. Focus on the identification of technologically appropriate product design problems. **Same as** ME 444. 3 undergraduate hours. 4 graduate hours. Year-long (with IE/ME 445) project course. **Prerequisite(s):** Senior standing or above; and consent of the instructor.

IE 445
Interdisciplinary Product Development II 4 hrs.
Cross-functional teams (w/students from AD 420 and MKTG 594) research and develop new product concepts. Focus on solutions to the opportunities identified in IE/ME 444 to functional prototypes. Serves as a replacement for IE/ME 396. **Same as** ME 445. Year-long (with IE/ME 444) project course. **Prerequisite(s):** IE 444 or ME 444; and senior standing or above; and consent of the instructor.

IE 446
Quality Control and Reliability 3 OR 4 hrs.
Principles of statistical quality control, including control by variable and by attribute, construction and use of control charts for variables, fraction defectives and number of defects and use of standard plans, reliability and life-cycle testing. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IE 342.

IE 461
Safety Engineering 3 OR 4 hrs.
Human protection systems; accident and emergency handling; manufacturing and service hazard systems. **Same as** EOHS 460. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IE 342 or consent of the instructor.

IE 463
Plant Layout and Materials Handling 3 OR 4 hrs.
Facilities design functions, computer-aided plant layout, facility location, warehouse layout, minimax location, deterministic and probabilistic conveyor models. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IE 471.

IE 464
Virtual Automation 3 OR 4 hrs.
Fundamentals of manufacturing and automation modeling using CAD/CAM and computer-integrated manufacturing methods; concepts of virtual manufacturing; industrial robots and automated factory models within virtual environments. **Same as** ME 464. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IE 201; and CS 107 or CS 108.

IE 465
Manufacturing Information Systems 0 TO 4 hrs.
Design and implementation of supervisory control and data-acquisition systems; manufacturing systems controller and communication networks. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Senior or graduate standing, or consent of the instructor; and familiarity with computer programming.

IE 466
Production Planning and Inventory Control 3 OR 4 hrs.
Principles of demand forecasting, production planning, master scheduling, critical path scheduling, job sequencing, design and control of deterministic and stochastic inventory systems, and material requirement planning. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IE 345 and IE 471.

IE 467
Industrial Systems Simulation 3 OR 4 hrs.
The solution of industrial problems by means of computer simulation. Simulation strategies. Simulation perspectives. In-depth study of some specific simulation programming languages, with projects. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CS 107 or CS 108.

IE 468
Virtual Manufacturing 3 OR 4 hrs.
Virtual reality applications in manufacturing systems design, manufacturing applications of networked virtual reality, virtual reality modeling of occupational safety engineering. **Same as** ME 468. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CS 107 or CS 108.

**IE 471
Operations
Research I** 3 OR 4 hrs.
Introduction to operations research, formulation of linear programming problems, simplex methods, duality theory, sensitivity analysis, network models, and integer linear programming. 3 undergraduate hours. 4 graduate hours. No graduate credit for Industrial Engineering majors. **Prerequisite(s):** MATH 210.

**IE 472
Operations
Research II** 3 OR 4 hrs.
Nonlinear programming problems, unconstrained optimization search techniques, Kuhn-Tucker theorems, quadratic programming, separable programming, Markov chain, queueing theory, and dynamic programming. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IE 342 and IE 471 or graduate standing.

**IE 494
Special Topics
in Industrial
Engineering** 3 OR 4 hrs.
Particular topics vary from term to term depending on the interests of the students and the specialties of the instructor. 3 undergraduate hours. 4 graduate hours. May be repeated. **Prerequisite(s):** Consent of the instructor.

**IE 499
Professional
Development
Seminar** 0 hrs.
Students are provided general information about their role as UIC alumni in society and the role of the University in their future careers. Students provide evaluations of their educational experience in the MIE department. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Open only to seniors; and approval of the department. Must be taken in the student's last semester of study.

**IE 511
Mechatronics II** 4 hrs.
Microcontrollers used in electromechanical systems for measurement and control purposes, interface hardware, real-time software and development tools, applications in robotic motion control and factory automation. **Same as** ME 511. **Prerequisite(s):** ME 411 and consent of the instructor.

**IE 525
Technology to
Promote Physical
Activity Among
Persons with
Disabilities** 3 hrs.
Applications of new and emerging technologies to promote participation in and adherence to healthful physical activity by people with disabilities. Considers ways of redesigning physical, social, and attitudinal environments to achieve these outcomes. **Same as** DHD 525. Recommended background: DHD 515 or an equivalent course on interpreting research findings.

**IE 542
Advanced
Computational Methods
for Product and
Process Design** 4 hrs.
Deterministic and statistical methods for modeling and optimizing engineering systems, in the broad context of product design, manufacturing process development, and designing for life cycle issues. **Same as** ME 542. **Prerequisite(s):** Programming language experience.

**IE 552
Applied Stochastic
Processes** 4 hrs.
Stationary point processes; Markov renewal theory; semi-Markov processes; regenerative processes; computational methods and applications to queues, inventories, dams, and reliability. **Prerequisite(s):** IE 342.

**IE 562
Supervisory
Control of Discrete
Event Systems** 4 hrs.
Discrete event systems; languages and automata, supervisory control, timed models, supervisory control applications. Extensive computer use required.

**IE 565
Expert Systems
in Manufacturing** 4 hrs.
Industrial uses of expert systems; applicability to industrial processes; availability of commercial expert systems; design and implementation of expert systems; knowledge engineering, research uses of expert systems. **Prerequisite(s):** CS 102 or CS 107 or the equivalent.

**IE 567
Data Mining for
Machine Health
Diagnosis and
Prognosis** 4 hrs.
Theories and techniques of data mining to machinery health diagnosis and prognosis, case studies on rotor shafts, bearing, gearboxes fault diagnosis, and remaining useful life prognosis.

**IE 569
Advanced Virtual
Manufacturing** 4 hrs.
Manufacturing systems design optimization using virtual environments, optimization of manufacturing decision support using virtual reality interfaces, analysis and evaluation of virtual environments. **Same as** ME 569. **Prerequisite(s):** Consent of the instructor.

**IE 571
Statistical
Quality Control
and Assurance** 4 hrs.
The importance of quality in products and services, quality surveillance, Deming's management method, Ishikawa's seven tools, control charts, acceptance sampling, quality improvement using directed experiments. **Same as** IDS 571. **Prerequisite(s):** At least one term of statistics.

**IE 575
Integer
and Combinatorial
Optimization** 4 hrs.
Modeling, computational complexity, polyhedral theory, valid inequalities, duality and relaxation, branch-and-bound algorithms, cutting plane algorithms, heuristic algorithms, and real-world application. **Prerequisite(s):** IE 471.

**IE 576
Nonlinear
Optimization** 4 hrs.
Convex analysis, line-search techniques, unconstrained and constrained optimization, optimality conditions, duality, convex and nonconvex optimization, large-scale optimization, and real-world applications. **Prerequisite(s):** IE 471 or the equivalent.

**IE 594
Current Topics
in Industrial
Engineering** 4 hrs.
Particular topics vary from term to term depending on the interests of the students and the specialties of the instructor. May be repeated. **Prerequisite(s):** Consent of the instructor.

**IE 595
Seminar on
Industrial
Engineering
Research** 1 hour.
Advances in industrial engineering research will be discussed in a seminar setting. Students will be expected to make presentations in various areas, as well as invited faculty speakers. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Graduate standing in Industrial Engineering.

**IE 596
Independent
Study** 1 TO 4 hrs.
Individual study under close supervision of a faculty member. May be repeated to a maximum of 4 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**IE 598
MS Thesis
Research** 0 TO 16 hrs.
Individual research in specialized problems under close faculty supervision. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

**IE 599
PhD Thesis
Research** 0 TO 16 hrs.
Individual research on specialized problems under close faculty supervision. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

Information and Decision Sciences

**IDS 400
Advanced
Business
Programming
Using Java** 0 TO 4 hrs.
Visual extended business language capabilities, including creating and using controls, menus and dialogs, objects and instances, mouse events, graphics, file-system controls. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IDS 201 or IDS 331 or a programming course in mathematics or computer science, or consent of the instructor.

**IDS 401
Business
Object
Programming
using Java** 0 TO 4 hrs.
Basic concepts in object-oriented programming such as objects, classes, class inheritance and interfaces, data abstraction and encapsulation, polymorphism, and dynamic binding. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IDS 201 or the equivalent.

**IDS 403
Information
Security** 3 OR 4 hrs.
Examine the field of information security to prepare students for their future roles as business decision makers. Presents a balance of the managerial and technical aspects of information security. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IDS 200 or the equivalent.

**IDS 405
Business
Systems Analysis
and Design** 3 OR 4 hrs.
Theory of analysis, design, and development of information systems; information management and database management systems; data management and analysis; case studies in systems implementation and evaluation. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IDS 201.

**IDS 406
Business
Systems Project** 3 OR 4 hrs.
Project experience in a business setting. Analysis, design, development, and evaluation of computer-based business information systems. Project planning, scheduling, and management. Project work at an outside company or University office. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** Knowledge of programming and databases; or consent of the instructor. Recommended background: Familiarity with systems analysis and design (IDS 405).

**IDS 410
Business Database
Technology** 3 OR 4 hrs.
Computer software techniques used in business with emphasis on information management and database management systems. Data management and analysis. Major types of database management systems, query languages. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IDS 201 or IDS 331.

**IDS 412
Distributed
Business
Systems** 3 OR 4 hrs.
Organizational aspects and underlying concepts of distributed business systems, decentralization versus centralization issues, costs of distributed computing, and performance evaluation measures. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IDS 201 or IDS 330; and credit or concurrent registration in IDS 410.

**IDS 413
Internet
Technology
and Management** 3 hrs.
The technologies of World Wide Web development. Topics include: TCP/IP, HTTP, HTML, HTML authoring, XML, ASP programming, client-side programming, Web 2.0, Web servers, database servers, business application servers, and Internet. Credit is not given for IDS 413 if the student has credit for IDS 424. Extensive computer use required. **Prerequisite(s):** IDS 201 and IDS 410.

**IDS 420
Business Model
Simulation** 3 OR 4 hrs.
Simulation analysis of strategic business decision models for investment, marketing, product introduction, and operational policies concerning inventory, production planning, quality assurance, and supply chain management. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Credit or concurrent registration in IDS 355; or credit or concurrent registration in IDS 331 or the equivalent.

**IDS 422
Knowledge
Management
Systems** 3 OR 4 hrs.
Computer-based methods for decision support. It aims at providing exposure and insights into a range of approaches and tools for decision aiding, and how they can be utilized in supporting various managerial decision processes. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IDS 410 or consent of the instructor.

**IDS 435
Optimization Models
and Methods** 3 OR 4 hrs.
Linear, nonlinear, dynamic programming, combinatorial methods. Use of spreadsheet and other software tools. Duality, sensitivity analysis. Models for business operations and planning, computer systems, transportation, and finance. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IDS 355; and IDS 371 or the equivalent. Business Administration students must have declared a major.

**IDS 437
Stochastic
Methods** 3 OR 4 hrs.
Stochastic processes and other applications of probability theory. Use of spreadsheet and other software tools for analysis, simulation and decision theory. Models for business operations and planning, computer systems, transportation, finance. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IDS 355 and IDS 371.

**IDS 446
Decision
Analysis** 3 OR 4 hrs.
Prior and posterior distributions; conjugate priors; value of information; applications to decision making in business. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IDS 371.

**IDS 450
Advanced
Operations
Management** 0 TO 4 hrs.
Application of management science to the operation and control of production, distribution, and service systems. Emphasis on inventory management, production planning, capacity expansion, and demand forecasting. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** IDS 355 or the equivalent. Business Administration students must have declared a major.

**IDS 454
Introduction to
Supply Chain
Management** 3 OR 4 hrs.
Supply chain management is studied as an information-intensive, integrated system for managing material flows, logistics, and interorganizational partnership to deliver products and services. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IDS 355.

**IDS 460
Survey Sampling:
Theory and
Methods** 3 OR 4 hrs.
Planning and analyzing surveys. Topics include simple random sampling, stratified sampling, systematic sampling, ratio estimation, and cluster sampling. Case studies with applications to real situations. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IDS 371.

**IDS 462
Statistical Software
for Business
Applications** 3 OR 4 hrs.
Statistical software in business applications and data mining. SAS and other packages such as SPSS, MATLAB, Maple, S-Plus, B34S, SCA. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IDS 371 or consent of the instructor.

**IDS 470
Multivariate
Analysis** 3 OR 4 hrs.
Introduction to the structure and analysis of multivariate data. Emphasis on the multivariate normal model. Regression; tests concerning multivariate means, classification; discriminant analysis, principal components. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IDS 371; or MATH 310; or MATH 320.

**IDS 472
Business
Data Mining** 3 OR 4 hrs.
Searching for relationships between variables in databases. Decision trees, cluster analysis, logistic regression, path analysis. Applications to marketing, quality assurance, operations management, human resources. 3 undergraduate hours. 4 graduate hours. Credit is not given for IDS 472 if the student has credit for IDS 572. **Prerequisite(s):** IDS 371 or the equivalent.

**IDS 473
Introduction to
Risk Management** 3 hrs.
Introduction to risk management. Loan and credit management; credit scoring. Risk measurements and reserves; banking and insurance capital requirements, the Basel Accord, tail events, and catastrophic event insurance. Financial contracts and hedging. **Same as** FIN 473. **Prerequisite(s):** FIN 300 and IDS 371.

**IDS 474
Quality
and Productivity
Improvement
Using Statistical
Methods** 3 OR 4 hrs.
Directed experimentation for quality and productivity improvement, quality surveillance, design and analysis of two-level factorial experiments and multi-level experiments, data transformation. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IDS 371 or consent of the instructor.

**IDS 475
Database
Accounting
Systems** 3 OR 4 hrs.
Concepts and principles of designing database systems to perform accounting functions, applications of microcomputer accounting software packages systems design tools, and computerized transaction cycles. **Same as** ACTG 475. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** ACTG 211 and IDS 200.

**IDS 476
Business
Forecasting
Using Time Series
Methods** 3 OR 4 hrs.
Autoregressive, moving average, and seasonal models for time series analysis and business forecasting. Forecasting using multivariable transfer function models is also included. **Same as** ECON 450. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IDS 371 or ECON 346 or consent of the instructor.

**IDS 478
Regression
Analysis** 3 OR 4 hrs.
Data collection and exploration; model building; variable least squares; residual analysis; variable selection; multicollinearity; ridge regression; nonlinear regression; nonparametric regression. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IDS 371.

**IDS 494
Topics in
Information
and Decision
Sciences** 3 OR 4 hrs.
Topics vary; selected readings; case analysis. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s) if topics vary. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**IDS 495
Competitive Strategy** 4 hrs.
Multidisciplinary analysis of organizational strategy and policy using case method and/or business simulation. Assignments involve extensive library research and oral and written reports. **Prerequisite(s):** Senior standing in the College of Business Administration and completion of all other CBA core courses, or consent of the instructor.

**IDS 499
Independent Study
in Information
and Decision
Sciences** 1 TO 3 hrs.
Intensive study of selected topics determined in consultation with the instructor and department head. May be repeated to a maximum of 9 hours. Students may register in more than one section per term. **Prerequisite(s):** Major in Information and Decision Sciences and consent of the instructor.

**IDS 500
Information Systems in Organizations 4 hrs.**

Use of information technology in business; planning, management, and strategic use of information technology, including the role of enterprise-wide systems, the Internet, and electronic commerce.

**IDS 504
Introduction to Electronic Commerce 4 hrs.**

Addresses issues on electronic commerce for businesses and consumers, considering topics, such as competition, distribution, infrastructure on the Internet, shopping, and product characteristics.

**IDS 505
Business Information Systems Analysis and Design 4 hrs.**

Analysis, design, and development of information systems. Management concerns in systems design, development, and evaluation. A student who has taken IDS 405 must see an advisor to determine whether another graduate course from IDS, MATH, or CS must be substituted for IDS 505. **Prerequisite(s):** IDS 500; or consent of the instructor.

**IDS 506
Survey of Healthcare and Information Technology 4 hrs.**

Impact, use, and trends of information technology in healthcare. Healthcare systems technology and stakeholders. Analysis of strategic, economic, operational, ethical, privacy, and security considerations. **Prerequisite(s):** Introductory information systems course is required. Recommended background: Advanced information system courses such as databases and system analysis.

**IDS 507
Advanced Systems Analysis and Design Project 4 hrs.**

Principles and concepts of analysis, design and development of information systems, including project management. Includes a project at an outside company or University office. **Prerequisite(s):** Consent of the instructor and completion of three MS in MIS courses.

**IDS 508
E-Commerce Project 4 hrs.**

Electronic commerce project initiated by local small and medium enterprises, teaming students with technical or entrepreneurial skills/interests, supervised by faculty on board of directors. **Prerequisite(s):** IDS 504 or MGMT 558 or MKTG 558; and consent of the instructor.

**IDS 509
Business Process Analysis and Modeling 4 hrs.**

Principles and concepts for the analysis and design of business processes and for the development of information systems that support such processes. **Prerequisite(s):** IDS 401 or consent of the instructor.

**IDS 510
Organizational Data Resources 4 hrs.**

Data as a competitive resource. Understanding, organizing, and utilizing data in enterprises. Data resource development and management. Leveraging data assets. Exploiting the power of data. Understanding regulatory requirements. A student who has taken IDS 410 must see an advisor to determine whether another graduate course from IDS, MATH, or CS must be substituted for IDS 510. **Prerequisite(s):** IDS 500.

**IDS 511
Query Processing in Database Systems 4 hrs.**

Query processing in deductive databases and in distributed/parallel databases systems. **Same as CS 580. Prerequisite(s):** CS 480.

**IDS 512
Information Systems Project & Program Management 4 hrs.**

Theory and practice of managing IS projects based on a life-cycle management model. Technology, organizational behavior, team dynamics, and economic analysis in the context of larger organizational strategies. Project plans, budgets, and schedules. Extensive computer use required. **Prerequisite(s):** Introductory information systems course. Recommended background: Advanced information system courses such as databases and system analysis.

**IDS 513
Enterprise Components and Web Services 4 hrs.**

Exposes students to advances in the technical aspects of electronic business. Topics include WSDL, UDDI, SOAP, service quality, security, and queuing models. Extensive computer use required.

**IDS 514
Management of Information Systems 4 hrs.**

Administration, control, and management of computer-based information systems, projects, and relationships with the organization. Scheduling of operations; management of computer professionals; planning and control of the systems activity. **Prerequisite(s):** IDS 505 or IDS 510.

**IDS 515
Information Systems Strategy and Policy 4 hrs.**

Examines how businesses can leverage IT and digital technologies to maximize business performance. Covers IS strategy formulation, strategy implementation, e-business transformation, inter-organizational and multiorganizational IS strategies. **Prerequisite(s):** Consent of the instructor.

**IDS 516
Data Warehousing and Decision Support 4 hrs.**

Analysis, design, and development of data warehousing. Related methods and tools in the provision of decision support and business analytics/intelligence. **Prerequisite(s):** IDS 505 or IDS 510 or consent of the instructor.

**IDS 517
Enterprise Application Infrastructure 4 hrs.**

The course explores the choices available for building an enterprise applications infrastructure. Topics such as advanced applications design, and development, tools, methodologies, and technologies will be covered. Extensive computer use required. **Prerequisite(s):** IDS 201 or IDS 400 and IDS 401 and IDS 410 or the equivalent.

**IDS 518
Electronic Marketing 4 hrs.**

Overview of the electronic marketing value chain. Internet and Web technologies, system design, payment systems, business requirements for e-marketing, design, and ethical issues. **Same as MKTG 518. Prerequisite(s):** MKTG 500 or MBA 506 or consent of the instructor.

**IDS 519
Topics in Information Systems 4 hrs.**

Selected topics in information systems, information management and information technology. Content varies. Topics will be announced. May be repeated if topics vary. **Prerequisite(s):** IDS 505 or IDS 510; and consent of the instructor.

**IDS 520
Distributed Processing and Telecommunications Systems 4 hrs.**

Topics include components of telecommunications and distributed information systems, data communication devices, computer networks, configuration management, and distributed databases.

**IDS 521
Advanced Database Management 4 hrs.**

Data analysis for database design; logical data modeling, transaction modeling; implementation models; physical database design; database tuning and performance evaluation; database decomposition; distributed databases; database security.

**IDS 523
Audit and Control of Information Systems 4 hrs.**

Modeling and analysis of information systems application in organizations; measurement of effectiveness; strategies for implementation and updating; interface with other management control systems.

**IDS 524
Strategic Emergency Management and Continuity Planning 3 hrs.**

Introduction to frameworks and methods for designing, developing, implementing, and evaluating for emergency management and business continuity strategies in the public and private sectors. No graduation credit given to students enrolled in the Master of Business Administration program. Students who are not in the EMCP program should contact External Education at emcp@uic.edu for approval to register for this course.

**IDS 526
Computer Performance Evaluation and Modeling 4 hrs.**

Probabilistic, simulation, and statistical techniques for modeling computer systems with a view to evaluating their performance. Models of multi programming systems, multi access systems, input/output systems, priority queues, and paging systems. A student who has taken IDS 426 must see an advisor to determine whether another graduate course from IDS, MATH, or CS must be substituted for IDS 526. **Prerequisite(s):** IDS 532; and IDS 505 or IDS 510.

**IDS 529
Seminar on Management Information Systems 4 hrs.**

Special research topics in management information systems. Topics vary from term to term depending on the interests of the instructor and students. May be repeated if topics vary.

**IDS 532
Introduction to Operations Management 4 hrs.**

The management of operations for the production and delivery of goods and services. Topics include the management of projects, production, supply chain, inventory, and quality. Credit is not given for IDS 532 if the student has credit in MBA 507 and MBA 509. **Prerequisite(s):** Admission to the MBA program.

**IDS 541
Disaster Response and
Recovery Operations 3 hrs.**

Designed to provide the student with the requisite skills to create effective operations, preparedness, and response plans to manage and coordinate private, institutional, and public health emergencies and complex disasters. Extensive computer use required. No graduation credit given to students enrolled in the Master of Business Administration program. Students who are not in the EMCP program should contact External Education at emcp@uic.edu for approval to register for this course.

**IDS 551
Operations
Management in the
Service Sector 4 hrs.**

Comparison of service and manufacturing operations; analysis of effects of capacity, quality, and service firm life cycle on operations. **Prerequisite(s):** Credit or concurrent registration in IDS 532 or the consent of the instructor.

**IDS 552
Supply Chain
Management 4 hrs.**

Structure of inventory decision and operating procedures; single-event and continuous systems for both single and multiple products; order quantity and periodic review models; demand forecasting. **Prerequisite(s):** Credit or concurrent registration in IDS 532 or the consent of the instructor.

**IDS 553
Production Process
Management and
Control 4 hrs.**

Project scheduling and resource allocation; capacity planning; aggregate planning, scheduling and dispatching; plant layout; material requirement planning; production flow and line balancing. **Prerequisite(s):** IDS 532.

**IDS 570
Statistics for
Management 4 hrs.**

Survey of statistical methods with applications for business and management. **Prerequisite(s):** Admission to any business graduate program or consent of the instructor.

**IDS 571
Statistical Quality
Control and Assurance 4 hrs.**

The importance of quality in products and services, quality surveillance, Deming's management method, Ishikawa's seven tools, control charts, acceptance sampling, quality improvement using directed experiments. **Same as** IE 571. **Prerequisite(s):** At least one term of statistics.

**IDS 572
Data Mining
for Business 4 hrs.**

Introduction to data mining for business. Applications to marketing, credit scoring, quality assurance, operations managements and human resources management. Credit is not given for IDS 572 if the student has credit for IDS 472. **Prerequisite(s):** IDS 532.

**IDS 573
Risk Management 4 hrs.**

Introduction to risk management. Risk measurements and reserves; banking and insurance capital requirements, the Basel Accord, tail events, catastrophic event insurance, reinsurance. Financial contracts and hedging. **Same as** FIN 573. **Prerequisite(s):** Credit or concurrent registration in IDS 570 and FIN 500.

**IDS 577
Research
Methodology I 4 hrs.**

Use of statistics and computers in research. Data collection and organization, survey sampling, questionnaire design, experimental design. **Prerequisite(s):** IDS 532 or the equivalent and admission to the PhD program in Business Administration.

**IDS 578
Research
Methodology II 4 hrs.**

Data analysis, including estimation, hypotheses testing, nonparametric methods, analysis of variance, regression analysis, economic forecasting, and time series. **Prerequisite(s):** IDS 577 or the equivalent.

**IDS 582
Business Research
and Forecasting I 4 hrs.**

The role of research in business; forecasting methods and techniques, including models and their applications. **Same as** ECON 537. **Prerequisite(s):** ECON 534 and at least one statistics course with regression analysis at the 300-level or above.

**IDS 583
Business Research
and Forecasting II 4 hrs.**

The role of research in business; forecasting methods and techniques, including multivariate time series models and their applications. **Same as** ECON 538. **Prerequisite(s):** IDS 476 or IDS 582 or ECON 537.

**IDS 594
Special Topics in
Information and
Decision Sciences 4 hrs.**

Intensive study of a selected topic. Content varies. Topics are announced. **Prerequisite(s):** Consent of the instructor.

**IDS 595
Seminar in
Information
and Decision
Sciences 1 TO 4 hrs.**

Topics vary from term to term depending on the interests of the instructor. May be taken for up to four credit hours depending on the outline of the seminar as determined by the instructor. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 8 hours. Students may register for more than one section per term. **Prerequisite(s):** Admission to the PhD program in Business Administration or the PhD program in Management Information Systems.

**IDS 596
Independent
Study in
Information
and Decision
Sciences 1 TO 4 hrs.**

Independent study under the direction of a faculty member. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**IDS 599
PhD Thesis
Research 0 TO 16 hrs.**

Research on topic of the doctoral dissertation. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**Interdisciplinary
Public Health
Sciences**

**IPHS 410
Global Public
Health II 3 hrs.**

Utilizes readings and case studies of successful health interventions in the developing world to orient students to the field of global public health. **Prerequisite(s):** Graduate standing.

**IPHS 415
Foundations in
Anthropology
and Global
Health I 3 OR 4 hrs.**

Explores the field of cultural medical anthropology and provides a theoretical foundation allowing for understanding and exploration of anthropology's role in international health. **Same as** ANTH 415. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of B or better in ANTH 216; and junior standing or above; or consent of the instructor.

**IPHS 416
Foundations in
Anthropology
and Global
Health II 3 OR 4 hrs.**

Provides an evolutionary and biocultural approach to human biology, physiology, health, and disease. **Same as** ANTH 416. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of B or better in ANTH 232; and junior standing or above; or consent of the instructor.

**IPHS 494
Introductory
Special Topics—
Interdepartmental 1 TO 4 hrs.**

Introductory special topics in public health. Course content will vary from semester to semester. May be repeated. Students may register in more than one section per term.

**IPHS 501
Public Health
Leadership Seminar I 4 hrs.**

Doctoral seminar in advanced public health leadership topics, primarily for DrPH degree students. **Prerequisite(s):** Enrollment in the DrPH program or consent of the instructor.

**IPHS 502
Public Health
Leadership Seminar II 4 hrs.**

Doctoral seminar in advanced public health leadership topics. Primarily for DrPH degree students. **Prerequisite(s):** IPHS 501 or consent of the instructor.

**IPHS 503
Public Health
Integrative Seminar I 4 hrs.**

Doctoral seminar in advanced public health leadership topics with emphasis on methodological skills; primarily for DrPH degree students. **Prerequisite(s):** IPHS 502 and EPID 403 and BSTT 401; or consent of the instructor. Recommended background: Enrollment in the DrPH or PhD degree program.

**IPHS 516
Anthropology and
Global health
Integrative Seminar 4 hrs.**

Critical examination of global health issues from social science and public health perspectives. Includes consideration of cultural underpinnings, geopolitical influences, design of appropriate and effective interventions, and policy formation. **Same as** ANTH 516. **Prerequisite(s):** Graduate or professional standing; and consent of the instructor.

**IPHS 530
Practicum in
Mental Health
Diagnosis 4 TO 8 hrs.**

Review of mental health diagnostic process. Students in psychosocial epidemiology participate with medical students in a psychiatry clerkship. **Prerequisite(s):** CHSC 460 and consent of the instructor.

IPHS 591
Readings in Anthropology and Global Health 1 TO 8 hrs.
Student along with his/her advisor will develop a series of readings focused on a specific topic of interest to the student. **Same as ANTH 591.** May be repeated up to 1 time(s). **Prerequisite(s):** Consent of the instructor.

IPHS 592
Research in Anthropology and Global Health 1 TO 8 hrs.
Research and methods class combined with practical fieldwork in anthropology and global health. **Same as ANTH 592.** May be repeated to a maximum of 8 hours. Fieldwork required. **Prerequisite(s):** Consent of the instructor.

IPHS 593
Special Topics in Anthropology and Global Health 4 hrs.
Special topics in anthropology and global health. **Same as ANTH 593.** May be repeated if topics vary. **Prerequisite(s):** Graduate or professional standing; and consent of the instructor.

IPHS 594
Advanced Special Topics—Interdepartmental 1 TO 4 hrs.
Advanced special topics in public health. Course content will vary from semester to semester. May be repeated. Students may register in more than one section per term.

IPHS 595
Seminar in Interdisciplinary Public Health Sciences 1 TO 3 hrs.
Analysis of current research in public health. Course content will vary from semester to semester. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

IPHS 596
Independent Study in Public Health 1 TO 4 hrs.
Selected aspects of specific public health problems; independent study under close supervision of faculty. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of instructor who has supervised at least one course in the area of the independent study.

IPHS 598
Research in Public Health Sciences—MS 0 TO 16 hrs.
Individual research in public health directed by a faculty member. Directed toward the thesis requirements for the Master of Science degree. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

IPHS 599
Research in Public Health Sciences—PhD 0 TO 16 hrs.
Individual research in public health directed by a faculty member. Directed toward the dissertation for the Doctor of Philosophy degree. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

IPHS 650
Field Experience in Public Health 1 TO 5 hrs.
Preceptor-guided field experience in public health practice through an association or public health oriented community program for students in the Master of Public Health degree program. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** All course requirements should be completed for the Master of Public Health degree.

IPHS 698
Master of Public Health Capstone Experience 1 hour
Individual project in public health directed toward the MPH capstone experience which is required for the degree. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

Interdisciplinary Studies in the Arts

ISA 400
Advanced Topics in Interdisciplinary Arts 3 OR 4 hrs.
Exploration of advanced topics in interdisciplinary arts which include architecture, art and design, art history, music, and theater. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s).

ISA 500
Topics in Interdisciplinary Studies in the Arts 4 hrs.
Provides the opportunity for students to explore interdisciplinary methods in research, in specific the arts and historical-related topics not covered in a regular course curriculum. May be repeated to a maximum of 8 hours. Course can also be used as a continuing education module in the visual and performing arts, as well as preservation studies, museology, architectural, and art history. **Prerequisite(s):** Consent of the instructor.

Italian
ITAL 411
Literary Forms in Early Renaissance 3 OR 4 hrs.
The development of epic poetry (Pulci, Boiardo, Ariosto) within the literary, political, and social context (Machiavelli and Castiglione). 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ITAL 310 or consent of the instructor.

ITAL 412
Literary Forms in Late Renaissance and Baroque 3 OR 4 hrs.
Representative literary works of the genres of the late sixteenth and seventeenth centuries: epic poem of Tasso and poetry of Marino. The birth of the Commedia dell'Arte form. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ITAL 310 or consent of the instructor.

ITAL 421
Modern Italian Literature II 3 OR 4 hrs.
From romanticism to decadentism: emphasis on the work of Leopardi and Manzoni; analysis of poems by Carducci, Pascoli, D'Annunzio, Gozzano. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ITAL 311 or consent of the instructor.

ITAL 422
Contemporary Italian Literature 3 OR 4 hrs.
The novel from Verismo to Umberto Eco: readings from Verga, Svevo, Moravia, Calvino. Hermetic poetry: emphasis on Ungaretti, Montale, Sereni, Luzi. Theater: from Pirandello to Fo. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ITAL 322 or consent of the instructor.

ITAL 450
Divina Commedia I 3 OR 4 hrs.
An in-depth study of the Divine Comedy against the philosophical and theological background of the Middle Ages. Covers Inferno and half of Purgatorio. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ITAL 310 or consent of the instructor.

ITAL 451
Divina Commedia II 3 OR 4 hrs.
An in-depth study of the Divine Comedy against the philosophical and theological background of the Middle Ages. Covers Paradiso and half of Purgatorio. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ITAL 310 or consent of the instructor.

ITAL 461
Educational Practice with Seminar I 6 hrs.
The first half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, and approval of the department.

ITAL 462
Educational Practice with Seminar II 6 hrs.
The second half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, credit or concurrent registration in ITAL 461, and approval of the department.

ITAL 494
Special Topics 3 OR 4 hrs.
Topics will vary from term to term and may cover such areas as literary theory or culture. **Same as FR 494 and SPAN 494.** 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. Taught in English. **Prerequisite(s):** Junior standing or above; and approval of the department.

Jewish Studies

JST 478
The Bible as Literature 3 OR 4 hrs.
Literary analysis of the English Bible (including the Apocrypha) in its historical and religious contexts; study of the King James Version and successive revisions of it. **Same as ENGL 478 and RELS 478.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in ENGL 240; and grade of C or better in ENGL 241 or grade of C or better in ENGL 242 or grade of C or better in ENGL 243; or consent of the instructor.

JST 494
Topics in Jewish Studies 3 OR 4 hrs.
Selected topics in Jewish studies. 3 undergraduate hours. 4 graduate hours. May be repeated to a maximum of 6 hours if topics vary. **Prerequisite(s):** JST 101 or JST 102 or consent of the instructor.

Latin

LAT 499
Independent Reading 3 OR 4 hrs.
Individual study under faculty direction. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 4 hours in Latin at the 200-level or the equivalent.

Latin American and Latino Studies

LALS 409
Ancient Maya Writing, Language, and Culture 3 OR 4 hrs.
Recent trends in Maya epigraphy, information gained from Maya hieroglyphs, linguistics, and historical ethnographies are applied to anthropological analyses of past lifeways. **Same as** ANTH 409. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing or above; and consent of the instructor.

LALS 423
Andean Prehistory 3 OR 4 hrs.
An overview of the cultural evolution of the Andean region from the arrival of the first inhabitants to the development of the Inca empire. **Same as** ANTH 423. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ANTH 228 or ANTH 269 or consent of the instructor.

LALS 427
Studies in Language Policy and Cultural Identity 3 OR 4 hrs.
Examines the development, articulation, and effects of language policies on identity formation and culture. Focuses on the United States and the Spanish language, although other countries and languages are included. **Same as** SPAN 427. 3 undergraduate hours. 4 graduate hours. Taught in English. **Prerequisite(s):** Junior standing or above. Reading and writing knowledge of Spanish.

LALS 461
Topics in Latin American History 3 OR 4 hrs.
Specific topics are announced each term. **Same as** HIST 461. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history, Latin American and Latino studies, or consent of the instructor.

LALS 475
Indians of the Andes and the Amazon 3 OR 4 hrs.
Intensive research in theoretical and ethnographic problems in South American Indian social structures and cultures. Special attention will be given Levi-Strauss' ideas on the formulation of cultural theory in South America. **Same as** ANTH 475. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ANTH 213 or consent of the instructor.

LALS 491
Interdisciplinary Seminar in Latin American Studies. 3 OR 4 hrs.
Specific topics as announced each semester. In-depth study of selected topics such as: process of state formation, education, populism, the family, democratization, industrialization, and ideological currents. 3 undergraduate hours. 4 graduate hours. May be repeated if topics vary. **Prerequisite(s):** Any two 200-level Latin American and Latino Studies courses or consent of the instructor.

LALS 495
Interdisciplinary Seminar in Latino Studies 3 OR 4 hrs.
In-depth study of Latino communities and current issues from an interdisciplinary perspective, with emphasis on the learning and use of investigative methodologies. 3 undergraduate hours. 4 graduate hours. May be repeated if topics vary. **Prerequisite(s):** Any two 200-level Latin American and Latino Studies courses or consent of the instructor.

LALS 499
Advanced Independent Study 1 TO 4 hrs.
Individual advanced reading or research project in Latin American or U.S. Latino studies, with instructor's consent and supervision. May be repeated to a maximum of 8 hours. Students may register in more than one section per term. **Prerequisite(s):** Open, with consent of the instructor, to graduate students and Latin American and Latino Studies majors with at least a 3.00 grade point average. Students in other programs or with lower than a 3.00 grade point average are admitted at the instructor's discretion only.

LALS 501
Latinos and Latin America in Transnational Context 4 hrs.
Analysis of transnational processes linking Latin America and Latinos in the U.S. The impact of globalization on migration, culture, identity, work, health, education, family, and politics.

LALS 502
Topics in Latin American and Latino Studies 4 hrs.
In-depth study of selected research topics related to Latin America and/or U.S. Latinos that reflect the major and most current debates in these fields. May be repeated if topics vary. **Prerequisite(s):** Graduate or professional standing; or consent of the instructor.

LALS 561
Colloquium on Latin American History 4 hrs.
Topics on themes in Latin American history. Specific topics are announced each term. **Same as** HIST 561. May be repeated. Students may register in more than one section per term.

LALS 596
Independent Study 1 TO 4 hrs.
Investigation of special problems under the direction of a faculty member. May be repeated to a maximum of 8 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

Learning Sciences

LRSC 500
Introduction to the Learning Sciences 4 hrs.
Key principles of learning, development, and language. Cognitive, social, and affective dimensions of learning. Applicability to diverse learners and contexts of learning. **Prerequisite(s):** Admission to the PhD program in Learning Sciences or consent of the instructor.

LRSC 501
Research Methods in the Learning Sciences I 4 hrs.
Focuses on understanding the components of research design and scientific arguments as they apply to the diverse research issues investigated in the learning sciences. **Prerequisite(s):** Admission to the PhD program in the Learning Sciences or consent of the instructor. Recommended background: Interest in the study of human learning as related to the design and evaluation of complex learning environments.

LRSC 502
Research Methods in the Learning Sciences II 4 hrs.
Focuses on deepening students understanding of the components of scientific arguments and execution of the research design and analysis process as they apply to the diverse research problems that characterize the learning sciences. **Prerequisite(s):** LRSC 500 and LRSC 501 and admission to the PhD program in Learning Sciences; or consent of the instructor.

LRSC 503
Foundations of Scientific Inquiry 4 hrs.
Explores different meanings attached to the idea of inquiry teaching and learning, including how this varies by the age of the student and academic discipline. **Prerequisite(s):** Admission to the PhD program in Learning Sciences or consent of the instructor. Recommended background: Master's degree or advanced study in a learning sciences-related field.

LRSC 511
Analysis of Teaching and Learning Interactions 4 hrs.
Tools and techniques for the capture and analysis of multimodal interaction among learners, teachers, and environments. Discourse, gesture, media, and instrumentation. **Prerequisite(s):** LRSC 500 and admission to the PhD program in Learning Sciences; or consent of the instructor.

LRSC 512
Design of Learning Environments 4 hrs.
This course explores design and evaluation of formal and informal learning environments, with respect to learners, knowledge, assessment, and community. **Prerequisite(s):** LRSC 500 and LRSC 501 and LRSC 502 and LRSC 503.

LRSC 513
Change in Individuals and Organizations: Implementing and Institutionalizing Change for Learning 4 hrs.
This course examines the relationships between processes of learning and the ways in which organizations can be changed to foster learning in individuals or groups. **Prerequisite(s):** LRSC 500 and LRSC 501.

LRSC 540
Learning Sciences Journal Club 2 hrs.
Helps students establish guidelines and criteria by which to judge the efficacy of a research effort as presented in published scholarly literature. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Admission to the PhD program in the Learning Sciences or consent of the instructor.

LRSC 590
Research Apprenticeship 2 TO 8 hrs.
Designed as a supervised research course. Students enroll in between 2 and 8 hours per semester dependent upon the time they are spending on research projects, supervised by the faculty member with whom they enroll. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** LRSC 500 and admission to the PhD program in the Learning Sciences and consent of the faculty member with whom the student enrolls.

LRSC 599
Thesis Research 0 TO 16 hrs.
Designed for students engaged in research that constitutes the dissertation. Hours of enrollment per semester is dependent upon the stage in of dissertation research. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Advancement to candidacy in the PhD program in the Learning Sciences.

Liberal Arts and Sciences

LAS 490 International Student Exchange Program 0 TO 18 hrs.

The Student Exchange Program enables the reciprocal exchange of students between UIC and colleges or universities in other countries. There are a variety of programs tailored to meet the needs of both graduate and undergraduate students. May be repeated for a maximum of 36 hours per academic year or for a total of 48 hours, all of which must be earned within one calendar year. Determination of the number of credits to be granted is part of the proposal approval process. Students from other UIC colleges and schools are eligible for the program. For more information, visit the Web site at <http://www.uic.edu/depts/oia/resources-student/studentexchange.html>. **Prerequisite(s):** Junior standing or above and approval of the student's major department, the LAS College Office, and the Office of International Affairs.

LAS 494 Topics in Cultural Studies 3 OR 4 hrs.

An interdisciplinary approach to a current cultural debate. Topics will vary. 3 undergraduate hours. 4 graduate hours. May be repeated if topics vary. Taught at the Field Museum.

Linguistics

LING 402 Trial Interaction 3 OR 4 hrs.

Language use, culture, and law in the trial process. Analysis of qualitative methods applied to legal processes and change. **Same as** CLJ 402. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CLJ 261 and CLJ 350; or consent of the instructor.

LING 405 Introduction to General Linguistics 3 OR 4 hrs.

Linguistics, the scientific study of language as knowledge, structure, and use, involves phonetics, phonology, morphology, syntax, semantics, and pragmatics. Introduction to General Linguistics explores these disciplines. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing.

LING 415 Linguistic Structures I 3 OR 4 hrs.

Introduction to key concepts in the field, including descriptive and prescriptive grammars, competence, and performance, and human language as a system; articulatory phonetics; phonology; morphology. 3 undergraduate hours. 4 graduate hours.

LING 425 Linguistic Structures II 3 OR 4 hrs.

Fundamentals of semantics and syntax within the broad frameworks of generative and functional linguistics, including key concepts such as sense reference, utterance, sentence, form, and function. 3 undergraduate hours. 4 graduate hours.

LING 459 Topics in Linguistics 3 OR 4 hrs.

Topics vary. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

LING 474 Cognitive Psychology of Language 3 hrs.

Provides students with a survey of methods, theory, and research in language and discourse processing. **Same as** COMM 454 and PSCH 454. **Prerequisite(s):** Graduate standing or consent of the instructor.

LING 480 Sociolinguistics 3 OR 4 hrs.

Variations in language that correlate with variation in societies and smaller social groups; interactions of languages and societies. **Same as** ANTH 480. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** LING 405 or junior standing and consent of the instructor.

LING 483 Methodology of TESOL 3 OR 4 hrs.

Methods of teaching listening, speaking, reading, and writing to speakers of English as a second or foreign language. **Same as** CI 483. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing and consent of the instructor.

LING 487 Computer Assisted Language Learning 3 OR 4 hrs.

An introduction to computer assisted language learning (CALL): the use of computer technology in second language reading and research. The effectiveness of CALL technology is assessed based on SLA theory and research studies. **Same as** GER 487 and SPAN 487. 3 undergraduate hours. 4 graduate hours. Taught in English. Extensive computer use required. **Prerequisite(s):** LING 483 or CI 483 or GER 448 or FR 448 or SPAN 448 or GER 449 or FR 449 or SPAN 449; or SPAN 502 or FR 502 or the equivalent; and senior standing or above.

LING 496 Independent Study 1 TO 4 hrs.

Students are assigned to this course at the discretion of the department. Independent study in an area of linguistics not normally covered by regular course offerings. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. A maximum of 6 hours is allowed for undergraduate students, and 8 hours of credit for graduate students. **Prerequisite(s):** 9 hours of linguistics and approval of the head of the department.

LING 506 Cross-Cultural Communication 4 hrs.

Analysis of different theoretical approaches to cross-cultural communication (sociolinguistic, attributional); contrastive analysis of Western and non-Western cultural systems (interactional etiquette, discourse rules). **Same as** COMM 506.

LING 531 Grammar for TESOL 4 hrs.

Survey of major grammatical structures and patterns as they relate to TESOL instruction.

LING 540 Language and Gender 4 hrs.

Examination of sociolinguistic research and theories on the interrelationships between language and gender, including gender categories in linguistic systems, gender differences in language use, interaction, and cross-cultural comparisons. **Same as** GWS 540.

LING 551 Research Practicum in Sociolinguistics 4 hrs.

Strategies and methods for studying language use in communities: participant observation, interviewing, elicitation, using public-domain data, note taking vs. tape recording, and issues of transcription and ethics. **Same as** SPAN 551. May be repeated to a maximum of 12 hours. **Prerequisite(s):** LING 480; or consent of the instructor.

LING 553 Research Practicum in Discourse Analysis 4 hrs.

Discourse analysis addresses issues of intentional communication, inference, the structure of texts or talk-in-interaction, and the interactive construction of social actions or identities in discourse. **Same as** ENGL 553. May be repeated to a maximum of 12 hours.

LING 556 Second Language Learning 4 hrs.

An introduction to research findings and methods in second language learning. **Same as** SPAN 556. **Prerequisite(s):** Consent of the instructor.

LING 559 Seminar in Linguistics 4 hrs.

Advanced study in linguistics. Topics vary. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

LING 567 Discourse Analysis 4 hrs.

Discourse analysis addresses issues of intentional communication, inference, the structure of texts or talk-in-interaction, and the interactive construction of social actions or identities in discourse. **Same as** ENGL 567 and SPAN 567.

LING 582 Qualitative Methods in Communication 4 hrs.

Qualitative methods course analyzing language and culture patterns. **Same as** COMM 580. **Prerequisite(s):** COMM 501 or consent of the instructor.

LING 583 Materials and Curriculum Development in TESOL 4 hrs.

Evaluation, adaptation, and development of curricula, syllabi, and materials for TESOL. **Prerequisite(s):** LING 483.

LING 586 Classroom Testing for TESOL 4 hrs.

Theory and practice in the creation and evaluation of classroom tests for TESOL.

LING 594 Internship in TESOL 0 TO 12 hrs.

Observation of English as a second or foreign language class. Peer teaching and discussion, followed by supervised teaching experience. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 13 hours. Students register for 1 to 12 hours. **Prerequisite(s):** LING 531 and LING 583 and consent of the instructor.

LING 596 Independent Study in Linguistics 1 TO 6 hrs.

Students are assigned to this course at the discretion of the department. Independent study and research on a topic other than that approved for a graduate thesis. May be repeated to a maximum of 6 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor and approval of the head of the department.

LING 597 Research in Linguistics 0 TO 16 hrs.

Independent research in linguistics. Satisfactory/Unsatisfactory grading only. May be repeated with approval. Approval to repeat course granted by the department. A maximum of 4 hours of credit may be applied toward the MA in Linguistics degree. **Prerequisite(s):** Consent of the instructor and the director of graduate studies. Open only to degree candidates.

LING 598
Master's Thesis
Research 0 TO 16 hrs.

Students engaged in thesis research and writing are assigned to this course at the discretion of the department. Independent research on a topic approved for a graduate thesis. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the thesis supervisor and approval of the head of the department. Open only to degree candidates.

Lithuanian

LITH 410
Structure of
Lithuanian 3 OR 4 hrs.

Synchronic analysis of the structure of Lithuanian; emphasis on discourse analysis of oral and written texts. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** LITH 405 or 18 hours of Lithuanian or the equivalent.

LITH 425
Translation of
Lithuanian Texts 3 OR 4 hrs.

Problems of translating Lithuanian texts; workshop in translating Lithuanian works into English. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** LITH 302 or consent of the instructor.

LITH 499
Independent
Study 1 TO 4 hrs.

Investigation of special problems under the general direction of a staff member. May be repeated to a maximum of 8 hours. Graduate students may register for more than one section per term; undergraduates may only register for one section per term. **Prerequisite(s):** Senior or graduate standing, consent of the instructor, and the head of the department.

LITH 510
History of
Lithuanian
Language 4 hrs.

Development of Lithuanian from its Indo-European origins to the formation of the standard language; the aspects of Lithuanian literary language and its lexical, syntactical, and stylistic problems.

LITH 515
Lithuanian
Linguistics
and Poetics 4 hrs.

Linguistic and stylistic analysis of Lithuanian texts based on contemporary theories of style.

LITH 520
Topics in
Historical
Lithuanian Linguistics 4 hrs.

Covers major topics and trends in historical Lithuanian linguistics: linguistic history, sociolinguistic history, history of grammars, and dictionaries. Will also cover historical sites of various linguistic schools. May be repeated to a maximum of 12 hours. Taught in Lithuanian. **Prerequisite(s):** Consent of the instructor.

LITH 545
Lithuanian
Renaissance and
Baroque Literature 4 hrs.

Lithuanian prose, poetry, and historical works of the sixteenth, seventeenth, and eighteenth centuries.

LITH 550
Studies in Lithuanian
Romanticism 4 hrs.

Study of a genre, movement, or topic. Content varies. May be repeated to a maximum of 12 hours.

LITH 560
Studies in Lithuanian
Realism 4 hrs.

Study of a topic, author, or movement. Content varies. May be repeated to a maximum of 12 hours.

LITH 565
Studies in
Twentieth-Century
Lithuanian Literature 4 hrs.

Study of a topic, author or movement. Content varies. May be repeated to a maximum of 12 hours.

LITH 570
Studies in Lithuanian
Literary Criticism 4 hrs.

Function of literary criticism in all epochs of Lithuanian literature. May be repeated to a maximum of 12 hours.

LITH 596
Independent
Study 1 TO 4 hrs.

Investigation of special problems under the general direction of a staff member. May be repeated to a maximum of 8 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor and the head of the department.

Management

MGMT 445
Organizational Theory 3 hrs.

Emphasis on organizational theories and models to analyze and improve functioning and performance of organizations. Structure, technology, environmental adaptation, and managerial control systems. **Prerequisite(s):** MGMT 340 and junior standing.

MGMT 447
Organizations 3 OR 4 hrs.

Characteristics of business, government, and not-for-profit organizations; approaches used to study organizations; theoretical and empirical analysis of organizational processes. **Same as** SOC 447. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** 6 hours of upper-division sociology, management, or political science; or consent of the instructor.

MGMT 452
Organizational
Behavior 3 hrs.

Emphasis on understanding and managing people at work. Analysis of individual, group, and organization topics, including leadership, motivation, attitudes, group dynamics, and organizational culture. **Prerequisite(s):** Junior standing and MGMT 340.

MGMT 453
Human Resource
Management 3 hrs.

Examination of the activities involved in attracting, retaining, and motivating employees. Topics include planning, selection, compensation, performance appraisal, succession, and legal issues. **Prerequisite(s):** MGMT 340 and MGMT 350 and junior standing.

MGMT 454
Labor-Management
Relations 3 hrs.

Labor unions and their impact on business firms and society. Labor-management relationships and collective-bargaining practices. Public policy, union structure, and bargaining theory. **Prerequisite(s):** MGMT 340 and MGMT 350 and junior standing.

MGMT 460
Business, Society,
and the Global
Economy 3 hrs.

Managing in a free-enterprise system. Market, regulatory, ethical, and cultural norms. Internationalization of business; urban problems of business; landmark and contemporary case analyses. **Prerequisite(s):** MGMT 340 and MGMT 350.

MGMT 463
Negotiation and
Conflict Resolution 3 hrs.

Strategies and techniques for successful agreement negotiation and business conflict resolution. Includes applications to classic situations such as collective bargaining, interpersonal relations, and stakeholder concerns. **Prerequisite(s):** MGMT 340.

MGMT 465
Compensation and
Reward Systems 3 hrs.

Examination of compensation and reward systems designed to enhance employee motivation and performance. Topics include pay structure design, incentive systems, and benefits. **Prerequisite(s):** MGMT 453 and MGMT 454.

MGMT 466
Managerial
Effectiveness

Through Diversity 3 hrs.
Management of diverse work forces. Discrimination, affirmative action, career development, socialization and social change policies; historical, psychological, sociological, legal, and managerial viewpoints. **Prerequisite(s):** MGMT 340.

MGMT 467
Impact of
Technological Change 3 hrs.

Examines the impact of technological change upon the business environment and the managerial process. Emphasis on alternative futures and the planning necessary to attain desired ends. **Prerequisite(s):** MGMT 340 and MGMT 350.

MGMT 470
Career Planning and
Development 3 hrs.

Individual and organizational perspectives in career planning. Self-direction, networking, support facilities, and corporate management systems are considered. **Prerequisite(s):** MGMT 340 or the equivalent and junior standing.

MGMT 471
Organizational Design 3 hrs.

Strategies for promoting the creativity, flexibility, and productivity of the organization and its management personnel. Readings and case studies from the public and private sectors. **Prerequisite(s):** MGMT 340 and MGMT 452, or consent of the instructor.

MGMT 480
Transportation
Systems Management 3 hrs.

Provides a fundamental knowledge of problems and practices encountered in the management of transportation systems. Includes impact of public policy; capital facilities; industry structure; costs; operations pricing and environmental relationships. **Prerequisite(s):** MGMT 340 and MGMT 350, or consent of the instructor.

MGMT 481
Managerial Logistics 3 hrs.

Management of activities governing flow of materials and products through stages of production and distribution. Includes design of logistical systems and use of mathematical techniques. **Prerequisite(s):** IDS 355 or consent of the instructor.

MGMT 485
Business Ethics 3 hrs.

Leading theories of ethics and moral choice. Analysis of ethical problems in business. Guidelines for ethical decision making. Case studies in business ethics. **Prerequisite(s):** MGMT 340 and MGMT 350.

**MGMT 494
Special Topics in
Management 3 hrs.**

Exploration of areas not covered in existing course offerings or study of selected topics in greater depth. Subject matter will vary from semester to semester.

Prerequisite(s): Senior standing and 9 hours of 400-level Management courses, or consent of the instructor.

**MGMT 495
Competitive Strategy 4 hrs.**

Multidisciplinary analysis of organization strategy and policy, using case method and/or business simulation. Assignments involve extensive library research and oral and written reports.

Prerequisite(s): Senior standing in the College of Business Administration and completion of all other CBA core courses, or consent of the instructor.

**MGMT 499
Independent
Study in
Management 1 TO 3 hrs.**

Independent study of an approved topic in management. Student must prepare a written report under the guidance of the instructor. May be repeated to a maximum of 6 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the department head.

**MGMT 530
Family Business
Management 4 hrs.**

Special issues facing family-owned and closely held firms. Emphasis on behavioral, operational, and strategic issues, family dynamics, and interpersonal issues in professional settings; succession planning. **Prerequisite(s):** Admission to the MBA Program. Recommended background: MGMT 502 or MKTG 502.

**MGMT 540
Organizational
Analysis and Practice 4 hrs.**

Organizational analysis and applications based on key organization theories; structure, technology, environmental adaptation, management functions and controls, formal and informal organization. **Prerequisite(s):** Admission to the MBA or MS in Accounting program.

**MGMT 541
Organizational
Behavior 4 hrs.**

The organization as a social system. Topics include leadership, interpersonal effectiveness, group behavior, managing change, conflict management, motivation and behavior, and interpersonal communications. Credit is not given for MGMT 541 if the student has credit for MBA 505.

Prerequisite(s): Admission to MBA or MS in Accounting program.

**MGMT 553
Human Resource
Management 4 hrs.**

Human resource management programs and policies. Staffing, training and development; historical evolution of personnel policies, modern labor force, and technological trends; supervision, salary administration, human resource research, and utilization. **Prerequisite(s):** MGMT 541 or consent of the instructor.

**MGMT 557
International
Management 4 hrs.**

Management practices and problems in major nations. Legal and cultural factors affecting managerial policies and decisions; organization planning and manpower utilization; comparative management systems and ideologies. **Prerequisite(s):** MGMT 541.

**MGMT 564
Negotiations 4 hrs.**

Strategies and techniques for successful agreement negotiation and business conflict resolution. Includes applications to classic situations such as collective bargaining, interpersonal relations, and stakeholder concerns. Credit is not given for MGMT 564 if the student has credit for MGMT 594. Special topics: negotiations. **Prerequisite(s):** MGMT 541.

**MGMT 568
Compensation
Administration 4 hrs.**

Compensation theory, policies, and practices, including job analysis and evaluation, compensation surveys, wage and salary structures, merit and incentive compensation employee benefits, and pension plans. **Prerequisite(s):** MGMT 553.

**MGMT 570
Social and Legal
Environment of
the Firm 4 hrs.**

Exploration of current ethical, social, political, technological, economic, and global issues that they relate to business and management in setting goals, making decisions, and creating policy. **Prerequisite(s):** ECON 520.

**MGMT 573
Research Methods
in Organizational
Behavior and
Human Resource 4 hrs.**

Methodologies and industrial design appropriate for research in human resource and relations management, and organizational behavior. Students expected to complete a theoretically based research paper. **Prerequisite(s):** PhD student status or consent of instructor.

**MGMT 575
Seminar: Topics in
Personnel Practices
and Relations 4 hrs.**

Relationships among work environment, compensation, unions, and worker's performance. Emphasis on legislation affecting employee selection, rewards, and the quality of work life.

Prerequisite(s): PhD student status or consent of instructor.

**MGMT 576
Behavioral Science
Applications in
Human Resource
Management 4 hrs.**

Applies concepts, structures, theories, and methods of organizational behavior to develop techniques useful for research and practice at the micro level of human resource management.

Prerequisite(s): PhD student status or consent of the instructor.

**MGMT 579
Contemporary American
and International
Management 4 hrs.**

Student teams evaluate case studies, present findings and recommendations for business strategies and research corporations of visiting executives, prepare presentations, and critique lectures.

**MGMT 581
Administrative
Structure and
Organizational Design 4 hrs.**

An advanced exploration of theories of administrative structure and organizational design. Course topics include: conceptual models; macro- middle- and micro-level variables and principles and strategies of organizational change and development. **Prerequisite(s):** MGMT 541.

**MGMT 582
Management of
Innovation and
Technological Change 4 hrs.**

Analysis of the role of organization structure and management processes in fostering innovation. Emphasis on issues in research and development, flexible manufacturing, government policy, and technology transfer. **Prerequisite(s):** MGMT 541.

**MGMT 587
Seminar: Topics in
Organizational Behavior
and Human Resources 4 hrs.**

Topics of current research interest in human resource systems and organizational behavior. Focuses on current issues in published literature and unpublished research. **Prerequisite(s):** PhD student status or consent of the instructor.

**MGMT 588
Seminar: Topics in
Strategic Management 4 hrs.**

Selected topics and current problems in organizational strategy. Research and fieldwork in strategic planning. Application of theory and concepts to problems in strategic management.

Prerequisite(s): Admission to the PhD in Business Administration program.

**MGMT 589
Seminar: Topics in
Human Resource
Management 4 hrs.**

Recent literature, including parameters of the field, system designs and applications, information systems, and studies of work systems, quality of work life, productivity, and career management. **Prerequisite(s):** PhD student status or consent of the instructor.

**MGMT 590
Strategic Management 4 hrs.**

Study of strategies and policies that influence the long-term survival, growth, and character of business firms; strategy formulation and implementation in domestic and international organizations.

Prerequisite(s): Enrollment in the final year of the MBA program.

**MGMT 591
Research
Apprenticeship 2 TO 4 hrs.**

Directed training in conducting research in specific areas of management, and in developing skills related to the research. Satisfactory/Unsatisfactory grading only. May be repeated.

Prerequisite(s): Consent of the instructor.

**MGMT 594
Special Topics
in Management 1 TO 4 hrs.**

An intensive study of a selected topic in management. Topics vary by section and by term. May be repeated to a maximum of 12 hours if topics vary. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**MGMT 596
Independent
Study in
Management 1 TO 4 hrs.**

Independent study under direction of a faculty member. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the head of the department.

**MGMT 599
PhD Thesis
Research 0 TO 16 hrs.**

Independent research on topic approved for the doctoral dissertation. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

Marketing

**MKTG 452
Principles of Retailing 3 hrs.**

The theory and practice of making retailing decisions regarding pricing, product, place, and promotion, and the development of strategy based on market competition and trends.

Prerequisite(s): MKTG 360.

**MKTG 460
Marketing Analytics 3 hrs.**
Introduction to data-centered analysis for critical aspects of marketing, such as sales forecasting, profitability analysis, market segmentation, promotion budgeting, and database marketing. **Prerequisite(s):** MKTG 360 and IDS 270.

**MKTG 461
Consumer Market Behavior 3 hrs.**
Understanding consumer decision processes; steps in decision making, including need recognition, perception, cognition, and attitude formation; effect of environmental social, psychological, and individual difference factors on consumer decision making. **Prerequisite(s):** MKTG 360 or consent of the instructor.

**MKTG 462
Marketing Research 3 hrs.**
An investigation of the gathering, analyses, and interpretation of information used in solving marketing problems. Both qualitative and quantitative methods are employed in developing an analytical framework. **Prerequisite(s):** MKTG 360 and IDS 270.

**MKTG 463
Marketing Channels and E-Commerce 3 hrs.**
Develop an integrated distribution system; relationship to firm's marketing structure (logistics); evaluation of decisions on sources, plant and warehouse location, domestic and international outlets. Analysis by marketing channels and e-commerce role in distribution. **Prerequisite(s):** MKTG 360. Business Administration students must have declared a major, or have received consent of the instructor.

**MKTG 465
Strategic Marketing Planning and Management 3 hrs.**
Development of marketing plans for strategic and tactical programs to achieve the firm's marketing objectives. **Prerequisite(s):** 15 hours of marketing.

**MKTG 466
Comparative Marketing Systems 3 hrs.**
Treats the topic of domestic marketing systems in other countries, their structures and processes, in a framework of comparative cultural, political, economic, and social systems. **Prerequisite(s):** MKTG 360 or consent of the instructor. Business Administration students must have declared a major.

**MKTG 469
Global Marketing 3 hrs.**
The strategic and tactical marketing of goods and services to countries beyond domestic or current markets. Distinct economic, sociocultural, and political-legal-regulatory environments are considered. **Prerequisite(s):** MKTG 360 and BA 200; or consent of the instructor.

**MKTG 471
Services Marketing 3 hrs.**
An exploration of the special challenges of services marketing, including analyzing and developing solutions for new services, services quality, design and delivery of services, and services recovery. **Prerequisite(s):** MKTG 360.

**MKTG 473
The Personal Selling Effort in Marketing 3 hrs.**
Analysis of selling strategies and tactics in different situations; problems of managing sales force. Cultural differences in selling techniques as well as ethical concerns will be discussed. **Prerequisite(s):** MKTG 461 or consent of the instructor.

**MKTG 474
Advertising and Sales Promotion 3 hrs.**
The management, planning, creation, evaluation, and use of advertising and sales promotion. Evaluation and critique of an ad campaign. **Prerequisite(s):** MKTG 461 or consent of the instructor.

**MKTG 475
Product Management 3 hrs.**
Development and review of new and existing products during their life cycles; the evolution of products and services from a creative idea to their withdrawal from the market. **Prerequisite(s):** MKTG 462 or consent of the instructor.

**MKTG 476
Business-to-Business (B2B) Marketing 3 hrs.**
Unique concepts and strategies applied when businesses market to other organizations and institutions. Derived demand, systems selling, bid pricing, national account programs, and using distributors. **Prerequisite(s):** MKTG 360.

**MKTG 494
Special Topics in Marketing 3 hrs.**
Intensive study of selected problems. Reading assignments from scholarly and professional journals; emphasis on covering relatively few areas in great depth. **Prerequisite(s):** Business Administration students must have declared a major.

**MKTG 499
Independent Study in Marketing 3 hrs.**
Topic and research methodology is to be determined by consultation with the instructor. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** Major in marketing. Consent of the head of the department and the instructor must be obtained prior to registration.

**MKTG 500
Introduction to Marketing 4 hrs.**
Client/consumer behavior and the way institutions respond to such behavior through the planning, pricing, promotion, and distribution of goods and services. Credit is not given for MKTG 500 if the student has credit for MBA 506. **Prerequisite(s):** Graduate standing in the College of Business Administration or consent of the instructor.

**MKTG 518
Electronic Marketing 4 hrs.**
Overview of the electronic marketing value chain. Internet and Web technologies, system design, payment systems, business requirements for e-marketing, design, and ethical issues. **Same as** IDS 518. **Prerequisite(s):** MKTG 500 or MBA 506 or consent of the instructor.

**MKTG 560
Marketing Management 4 hrs.**
The structural system for the management of marketing: environmental considerations; goal determinations; the sequential process; marketing planning; product-market integration; channel components; demand stimulation; evaluation and audit. **Prerequisite(s):** MKTG 500 or consent of the instructor.

**MKTG 561
Consumer Behavior 4 hrs.**
Application of knowledge from the behavioral sciences to the study of consumer behavior. Individual and group influences on consumer preferences and purchasing patterns are considered. Both theory and application are stressed. **Prerequisite(s):** MKTG 500.

**MKTG 563
Information for Marketing Decisions 4 hrs.**
Definition and selection of appropriate research techniques for solving specific marketing problems. Establishment and administration of information systems giving firms a systematic, continuing appraisal of its market position. **Prerequisite(s):** MKTG 500.

**MKTG 565
Marketing Communication and Promotional Strategy 4 hrs.**
How a firm uses advertising, public relations, sales promotion, and personal selling to communicate with its customers. Functional characteristics of each of these is assessed in terms of varying marketing situations in the process of formulating the firm's strategy. **Prerequisite(s):** MKTG 500.

**MKTG 571
International Business Operations 4 hrs.**
Centers attention on the policies and problems of firms operating across international frontiers and the social questions they generate. Attention is directed at investing overseas, licensing agreements, joint ventures, and contracting. **Prerequisite(s):** MKTG 500.

**MKTG 572
International Marketing 4 hrs.**
Focuses on firms that operate internationally from their home country base. Attention is directed toward working with overseas distributors, promotion and pricing problems, governmental export assistance, and physical distribution matters. **Prerequisite(s):** MKTG 500.

**MKTG 573
Marketing Channels Management 4 hrs.**
Operations of various institutions that constitute the channel(s) for marketing goods and services. Emphasis on the practices of institutions at each level in the distribution system and the interaction that occurs among them. **Prerequisite(s):** MKTG 500.

**MKTG 574
Product Planning 4 hrs.**
In-depth coverage of all aspects of the product, service, and program planning process. Conceptual aspects as applied to new and existing product entries. **Prerequisite(s):** MKTG 500.

**MKTG 576
Advanced Business-to-Business (B2B) Marketing 4 hrs.**
Buyer behavior, market segmentation, derived demand, national account programs, system selling, big pricing. Industrial promotion mix, mass communications, and management of sales force. **Prerequisite(s):** MKTG 500.

**MKTG 581
Seminars in Consumer Behavior 4 hrs.**
Theories and concepts relevant to consumer behavior; the decision-making process for both profit and nonprofit goods and services. **Prerequisite(s):** Admission to the PhD in Business Administration program.

MKTG 583
Seminar in Marketing Theory 4 hrs.

Emphasis on marketing literature evolution and development of marketing practices that reflect/influence the basic literature. Attention devoted to how other fields have contributed to marketing thought.

Prerequisite(s): Admission to the PhD in Business Administration program.

MKTG 584
Product Innovation and Development 4 hrs.

An in-depth investigation of the factors affecting the new product strategy of the firm and its management of product innovation. **Prerequisite(s):** Admission to the PhD in Business Administration program.

MKTG 585
Seminar: Topics in Quantitative Models in Marketing 4 hrs.

Formulation of conceptual and quantitative models which relate marketing activities and behaviors to other behaviors, sales, or profits. Examines methods that researchers have used to test hypothesized marketing models. **Prerequisite(s):** Admission to the PhD in Business Administration program.

MKTG 586
Advanced International Marketing 4 hrs.

Concepts and problems pertaining to export marketing with emphasis on multinational businesses. Includes product modification, differential pricing, national, social, and commercial policies, promotion, and logistical issues. **Prerequisite(s):** Admission to the PhD in Business Administration program.

MKTG 587
Advanced Marketing Research 4 hrs.

Multidimensional scaling, conjoint analysis, including hybrid analysis, choice models, including multinomial logit and probit models, and selectivity models. **Prerequisite(s):** Admission to the PhD in Business Administration program.

MKTG 588
Marketing Communications 4 hrs.

The firm's use of the elements of the promotion mix; advertising, personal selling, sales promotion, publicity, and public relations for effective communication with its markets. **Prerequisite(s):** Admission to the PhD in Business Administration program and consent of the instructor.

MKTG 589
Services Marketing 4 hrs.

Distinctive aspects of services marketing examined from both a conceptual and managerial perspective, with focus on the research frontiers and questions in services marketing. **Prerequisite(s):** Admission to the PhD in Business Administration program.

MKTG 594
Special Topics in Marketing 4 hrs.

An intensive study of a selected topic in marketing. Topics vary. Students should contact the instructor to find out what topics will be covered. **Prerequisite(s):** MKTG 500.

MKTG 596
Independent Study in Marketing 1 TO 4 hrs.

Independent study under the direction of a faculty member. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Enrollment by petition to the director of the MBA program.

MKTG 599
PhD Thesis Research 0 TO 16 hrs.

Independent research on topic approved for the doctoral dissertation. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

Master of Business Administration

MBA 500
Corporate Strategy 2 hrs.

Analysis of major strategic decisions affecting the long-term performance of a firm and its ability to sustain competitive advantage. Meets eight weeks of the semester. **Prerequisite(s):** Admission to the MBA Program.

MBA 501
Business Concepts and Skills 2 hrs.

Introduction to concepts and skills required for success in the MBA program including: institutions and vocabulary of U.S. business, game theory; mathematics and statistics; spreadsheets and databases; and business writing and presentation. Satisfactory/Unsatisfactory grading only. Credit will not be given for MBA 501 if the student has already completed 12 or more hours of MBA course work. Meets 8 weeks of the semester.

MBA 570
Enterprise Decision Making 4 hrs.

Provides content and frameworks to integrate prior course work to address business problems from a cross-functional and enterprise perspective. **Prerequisite(s):** Completion of all other core courses in the MBA Program. This course should be taken during the final semester in the program.

MBA 590
Professional Topics 2 TO 4 hrs.

A series of skills workshops designed to develop critical management skills and to explore timely management issues not directly related to core business functional areas. May be repeated to a maximum of 6 hours if topics vary. Students may register in more than one section per term. **Prerequisite(s):** Admission to the MBA program.

MBA 591
Study Abroad—Master of Business Administration Program 0 TO 16 hrs.

Lectures, seminars, and independent travel/study abroad in conjunction with admission to the MBA program. May be repeated to a maximum of 24 hours. **Prerequisite(s):** Admission to the MBA program and consent of the director.

MBA 592
Master of Business Administration Project 8 hrs.

Multidisciplinary team project at an outside company or University office. A written report and an oral presentation of the project is required. **Prerequisite(s):** Admission to the MBA program and consent of the MBA program director.

MBA 594
Special Topics—Master of Business Administration Program 1 TO 4 hrs.

An intensive study of a selected business topic not available in current course offerings. Subject matter will vary by section and semester. May be repeated to a maximum of 16 hours if topics vary. Students may register in more than one section per term. **Prerequisite(s):** Admission to the MBA program.

MBA 596
Independent Study 0 TO 8 hrs.

Independent study under the direction of a faculty member. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Enrollment by petition to the director of the MBA program.

Maternal-Child Nursing

NUMC 502
Concepts for Pediatric/Perinatal Clinical Nurse Specialist Practice I 2 hrs.

Students analyze theory and research related to the patient/family sphere of influence in order to design care for pediatric or perinatal patients and families. **Prerequisite(s):** NUSC 500 and credit or concurrent registration in NUMC 520.

NUMC 504
Concepts for Pediatric/Perinatal Clinical Nurse Specialist II 2 hrs.

Students analyze theories and research related to pediatric or perinatal nursing personnel and organizational spheres of influence. **Prerequisite(s):** NUMC 502 and credit or concurrent registration in NUMC 521.

NUMC 507
Biological Basis for Women's Health and Perinatal Nursing I 2 hrs.

Focuses on the anatomy and physiology of reproductive function, pregnancy, parturition, the puerperium, and menopause as the biological basis for women's health and perinatal nursing. **Same as NUWH 507. Prerequisite(s):** Consent of the instructor.

NUMC 508
Biological Basis for Women's Health and Perinatal Nursing II 2 hrs.

The anatomy, physiology, and genetics of conception, embryonic development, and fetal and neonatal growth and development as the biological basis for women's health and perinatal nursing. **Prerequisite(s):** NUMC 507 or NUWH 507 or consent of the instructor.

NUMC 510
Advanced Nursing Care of the Well Infant, Child, and Adolescent 3 hrs.

Emphasizes prevention, health promotion, and maintenance for all childhood age groups through teaching, counseling, guidance, and support of children and their families. **Prerequisite(s):** Credit or concurrent registration in NUSC 530 or consent of the instructor.

NUMC 511
Primary Care Management of Acute/Chronic Conditions in Childhood 3 hrs.

Emphasizes clinical decision making and management of acute episodic illnesses and stable chronic illnesses commonly encountered in pediatric ambulatory healthcare settings. **Prerequisite(s):** Credit or concurrent registration in NUSC 530 and credit or concurrent registration in NUSC 531, or consent of the instructor.

NUMC 512
Practicum in
Advanced Pediatric
Primary Care I 1 TO 4 hrs.
Emphasizes clinical experiences in prevention, health promotion, and maintenance through teaching, counseling, guidance, and support of children and their families. May be repeated. **Prerequisite(s):** Credit or concurrent registration in NUMC 510 and credit or concurrent registration in NUSC 532, or consent of the instructor.

NUMC 513
Practicum in
Advanced Pediatric
Primary Care II 1 TO 4 hrs.
Emphasizes clinical experiences and management of acute episodic and stable chronic illnesses commonly encountered in pediatric ambulatory healthcare settings. May be repeated. **Prerequisite(s):** Credit or concurrent registration in NUMC 512 or consent of the instructor.

NUMC 514
Practicum in
Advanced Pediatric
Primary Care III 1 TO 4 hrs.
Emphasizes clinical experiences that integrate prevention, health promotion and maintenance, and clinical management of acute episodic and stable chronic illnesses commonly encountered in pediatric ambulatory healthcare settings. May be repeated. **Prerequisite(s):** Credit or concurrent registration NUMC 513 or consent of the instructor.

NUMC 515
Advanced
Parent-Infant Nursing 3 hrs.
Examines the process of parenting in low-risk and at-risk populations, and health status and behavior of the neonate. **Prerequisite(s):** NUMC 508 or consent of the instructor.

NUMC 517
Healthcare
of Women I 4 hrs.
Healthcare of women through the life span with an emphasis on health promotion and disease prevention, fertility control, and pregnancy care. **Same as** NUWH 517. **Prerequisite(s):** Credit or concurrent registration in NUMC 507 or credit or concurrent registration in NUWH 507, and credit or concurrent registration in NUSC 532, or consent of the instructor.

NUMC 518
Healthcare
of Women II 4 hrs.
Healthcare of women through the life span with an emphasis on the parturition, the puerperium, and common health and pregnancy problems. **Same as** NUWH 518. **Prerequisite(s):** NUMC 508; and NUMC 517 or NUWH 517, or consent of the instructor.

NUMC 519
Healthcare
of Women III 4 hrs.
Healthcare of women through the life span with an emphasis on gynecologic and primary care. **Same as** NUWH 519. **Prerequisite(s):** NUMC 518 or NUWH 518; and NUSC 531 and NUSC 532 and NUSC 535.

NUMC 520
Pediatric and
Perinatal Clinical
Nurse Specialist
Practicum I 3 hrs.
The application of advanced knowledge of theory and research to care for pediatric and perinatal patients and families who require the care of a clinical nurse specialist. **Prerequisite(s):** NUSC 500 and NUSC 531 and NUSC 532 and NUMC 515 and credit or concurrent registration in NUMC 502.

NUMC 521
Pediatric and Perinatal
Clinical Nurse Specialist
Practicum II 4 hrs.
The application of theory and research related to pediatric and perinatal nursing personnel and the healthcare organization; systematic assessment for problem identification and outcome evaluation. **Prerequisite(s):** NUMC 520 and NUMC 504.

NUMC 522
Pediatric and Perinatal
Clinical Nurse Specialist
Practicum III 5 hrs.
The application of theory and research for expansion of professional role competencies related to pediatric and perinatal nursing personnel and the healthcare organization. **Prerequisite(s):** Credit or concurrent registration in NUMC 521.

NUMC 524
Dimensions of
Midwifery and
Women's Health
Practice 3 hrs.
Examines the complex functions and roles of women's healthcare providers. **Prerequisite(s):** NUMC 519 and NUMC 525 and NUSC 528 and NUSC 529.

NUMC 525
Practicum:
Healthcare of
Women 1 TO 8 hrs.
Clinical experiences to develop nurse-midwifery and nurse-practitioner competencies in the healthcare of women. May be repeated. **Prerequisite(s):** NUMC 517 and NUSC 531 and NUSC 532.

NUMC 528
Practicum:
Birth and the
Newborn 1 TO 8 hrs.
Clinical experiences to develop beginning competence in the nurse-midwifery care of women and their newborns during parturition. May be repeated. **Prerequisite(s):** NUMC 518 and NUSC 531 and NUSC 532.

Mathematical Computer Science

MCS 401
Computer
Algorithms I 3 OR 4 hrs.
Design and analysis of computer algorithms. Divide-and-conquer, dynamic programming, greedy method, backtracking. Algorithms for sorting, searching, graph computations, pattern matching, NP-complete problems. **Same as** CS 401. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MCS 360; or grade of C or better in CS 202.

MCS 411
Compiler Design 3 OR 4 hrs.
Language translation: lexical analysis, parsing schemes, symbol table management, syntax and semantic error detection, and code generation. Development of fully functional compiler. **Same as** CS 473. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in CS 301 or grade of C or better in MCS 441; and grade of C or better in CS 202 or grade of C or better in MCS 360; and grade of C or better in CS 266.

MCS 415
Programming
Language Design 3 OR 4 hrs.
Definition, design, and implementation of programming languages. Syntactic and semantic description; variable bindings, control and data structures, parsing, code generation, optimization; exception handling; data abstraction. **Same as** CS 476. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** MCS 360 or CS 340.

MCS 421
Combinatorics 3 OR 4 hrs.
The pigeonhole principle, permutations and combinations, binomial coefficients, inclusion/exclusion principle, recurrence relations and generating functions, special counting sequences, Polya theory of counting. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 215; and grade of C or better in MATH 310 or grade of C or better in MATH 320; or consent of the instructor.

MCS 423
Graph Theory 3 OR 4 hrs.
Basic concepts of graph theory, including Eulerian and Hamiltonian cycles, trees, colorings, connectivity, shortest paths, minimum spanning trees, network flows, bipartite matching, planar graphs. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 215; and grade of C or better in MATH 310 or grade of C or better in MATH 320; or consent of the instructor.

MCS 425
Codes and
Cryptography 3 OR 4 hrs.
Mathematics of communications theory, basic information theory necessary to understand both coding theory and cryptography, basic ideas and highlights for both coding theory and cryptography, including public-key cryptosystems. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 215; and grade of C or better in MATH 310 or grade of C or better in MATH 320; or consent of the instructor.

MCS 441
Theory of
Computation I 3 OR 4 hrs.
Introduction to formal languages; relations between grammars and automata; elements of the theory of computable functions. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** MATH 215.

MCS 451
Object-Oriented
Programming
in C++ 3 OR 4 hrs.
C++ as an object-oriented language, classes and member functions, access control, class scope, constructors, destructors, overloading, conversions, streams, derived classes, polymorphism through virtual functions, templates, class libraries. 3 undergraduate hours. 4 graduate hours. Credit is not given for MCS 451 if the student has credit for CS 474. Extensive computer use required. **Prerequisite(s):** Grade of C or better in MCS 360 or the equivalent or consent of the instructor.

MCS 471
Numerical
Analysis 3 OR 4 hrs.
Introduction to numerical analysis; floating point arithmetic, computational linear algebra, iterative solution to nonlinear equations, interpolation, numerical integration, numerical solution of ODE's, computer subroutine packages. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MCS 275 or grade of C or better in CS 102 or grade of C or better in CS 108; or consent of instructor.

MCS 472
Introduction to
Industrial Math
and Computation 3 OR 4 hrs.
Technical writing and oral presentations in preparation for industrial projects. Topics include quality control, operations research, cost-benefit analysis, differential equations, using scientific software. Extensive computer use required. **Prerequisite(s):** Grade of C or better in MCS 471 or consent of the instructor. Recommended background: Designed for students with a desire to explore mathematics via practical fieldwork.

MCS 481
Computational Geometry 3 OR 4 hrs.
Algorithmic problems on sets of points, rectangles, intervals, arcs, chords, polygons. Counting, reporting, location, intersection, pairing; static and dynamic data structures. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MCS 401 or consent of the instructor.

MCS 494
Special Topics in Computer Science 3 OR 4 hrs.
Topics in mathematical computer science, such as symbolic computation, automated reasoning, cryptography, or geometric algorithms. 3 undergraduate hours. 4 graduate hours. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

MCS 496
Independent Study 1 TO 4 hrs.
Reading course supervised by a faculty member. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the instructor and the department.

MCS 501
Computer Algorithms II 4 hrs.
Continuation of MCS 401 (Same as CS 401). Advanced topics in algorithms. Lower bounds. Union-find problems. Fast Fourier transform. Complexity of arithmetic, polynomial, and matrix calculations. Approximation algorithms. Parallel algorithms. **Same as CS 501. Prerequisite(s):** MCS 401 or CS 401.

MCS 503
Mathematical Methods for Algorithm Analysis 4 hrs.
Discrete mathematical techniques useful in algorithm analysis: summation methods, floor/ceiling expressions, modular arithmetic techniques, harder binomial identities, special numbers, generating functions, asymptotics. **Prerequisite(s):** Grade of C or better in MCS 401 and grade of C or better in MCS 421.

MCS 504
Mathematics and Information Science for Industry Workshop 4 hrs.
A project-based course on one or more topics in applied mathematics, statistics, or computer science, motivated by industrial problems. The topics vary from year to year. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Grade of B or better in MCS 401 and grade of B or better in MCS 471 and grade of B or better in MCS 507.

MCS 507
Mathematical, Statistical, and Scientific Software 4 hrs.
The design, analysis, and use of mathematical, statistical, and scientific software. **Prerequisite(s):** Grade of B or better in MCS 360 or the equivalent or consent of instructor.

MCS 521
Combinatorial Optimization 4 hrs.
Combinatorial optimization: network flows, bipartite matching, Edmonds' algorithm for nonbipartite matching, the matching polytope, matroids, greedy algorithm, matroid union and intersection algorithms, matroid polyhedra, polymatroids. **Prerequisite(s):** MCS 423 and STAT 471.

MCS 531
Error-Correcting Codes 4 hrs.
Finite fields, cyclic codes, quadratic residue codes, BCH codes, decoding schemes. Reed-Muller codes, weight distributions, codes and designs. **Prerequisite(s):** Grade of C or better in MCS 261, and grade of C or better in MATH 310 or grade of C or better in MATH 330.

MCS 541
Computational Complexity 4 hrs.
Time and space complexity of computations, classification of math problems according to their computational complexity, P-not-equal-NP problem. **Prerequisite(s):** Consent of the instructor.

MCS 548
Mathematical Theory of Artificial Intelligence 4 hrs.
Valiant's learning model, positive and negative results in learnability, automation inference, perceptrons, Rosenblatt's theorem, convergence theorem, threshold circuits, inductive inference of programs, grammars, and automata. **Prerequisite(s):** MCS 541.

MCS 551
Generic Programming and the C++ Standard Template Library 4 hrs.
Generic programming in C++. Templates, namespaces, smart pointers, reference counting. Algorithms, ranges, concepts and modeling. Iterators, function objects, adaptors, and containers. Algorithms and container classes in the STL. Extensive computer use required. **Prerequisite(s):** Grade of C or better in MCS 451 or grade of C or better in an equivalent course in C++.

MCS 563
Analytic Symbolic Computation 4 hrs.
Analytic computation, including integration algorithms, differential equations, perturbation theory, mixed symbolic-numeric algorithms, and other related topics. **Prerequisite(s):** Grade of C or better in MCS 460 or the equivalent, and MATH 480 or consent of the instructor.

MCS 565
Mathematical Theory of Databases 4 hrs.
Abstract systems for databases, syntax, and semantics of operational languages, dependencies and normal forms, axiomatizations, queries and query optimization, null values, algebraic interpretations.

MCS 571
Numerical Methods for Partial Differential Equations 4 hrs.
Finite difference methods for parabolic, elliptic, and hyperbolic differential equations: explicit, Crank-Nicolson implicit, alternating directions implicit, Jacobi, Gauss-Seidel, successive over-relaxation, conjugate gradient, Lax-Wendroff, Fourier stability. **Prerequisite(s):** MATH 481 and MCS 471 or consent of the instructor.

MCS 572
Introduction to Supercomputing 4 hrs.
Introduction to supercomputing on vector and parallel processors; architectural comparisons, parallel algorithms, vectorization techniques, parallelization techniques, actual implementation on real machines. **Prerequisite(s):** MCS 471 or MCS 571 or consent of the instructor.

MCS 575
Computer Performance Evaluation 4 hrs.
Modeling of computer systems, basic queues, central server models, Little's law, operational analysis, Markovian networks, Jackson and BCMP networks, product form solutions, computational algorithms, mean-value analysis, approximation methods. **Prerequisite(s):** STAT 401 and MCS 412 or consent of the instructor.

MCS 590
Advanced Topics in Computer Science 4 hrs.
Topics in areas such as: mathematical aspects of artificial intelligence, symbolic methods in mathematics, mathematical cryptography, automated reasoning. Topics may vary from term to term. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

MCS 591
Advanced Topics in Combinatorial Theory 4 hrs.
Some of the following topics: combinatorial enumeration, designs, graph theory, matroid theory, combinatorial matrix theory, Ramsey theory. Contents vary from year to year. May be repeated. **Prerequisite(s):** MCS 423.

MCS 592
Advanced Topics in Error-Correcting Codes 4 hrs.
Topics of current interest in coding theory including codes which are of practical value and which shed light on various mathematical areas. **Prerequisite(s):** MCS 531 or consent of the instructor.

MCS 593
Graduate Student Seminar 1 hour.
For graduate students who wish to receive credit for participating in a learning seminar whose weekly time commitment is not sufficient for a reading course. This seminar must be sponsored by a faculty member. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

MCS 595
Graduate Seminar 1 hour.
Current developments in research with presentations by faculty, students, and visitors. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

MCS 596
Independent Study 1 TO 4 hrs.
Reading course supervised by a faculty member. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the instructor and the department.

MCS 597
MISI Master's Project 2 TO 4 hrs.
Specialized project under close faculty supervision to satisfy the project requirement for the MS in Mathematics and Information Science for Industry degree. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 4 hours. **Prerequisite(s):** MCS 504 and approval of the department.

MCS 598
Master's Thesis 0 TO 16 hrs.
Research work under the supervision of a faculty member leading to the completion of a master's thesis. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Approval of the department.

MCS 599
Thesis Research 0 TO 16 hrs.
Research work under the supervision of a faculty member leading to the completion of a doctoral thesis. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

Mathematics

MATH 410
Advanced Calculus I 3 OR 4 hrs.
Functions of several variables, differentials, theorems of partial differentiation. Calculus of vector fields, line and surface integrals, conservative fields, Stokes' and divergence theorems. Cartesian tensors. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 210.

MATH 411
Advanced Calculus II 3 OR 4 hrs.
Implicit and inverse function theorems, transformations, Jacobians. Point-set theory. Sequences, infinite series, convergence tests, uniform convergence. Improper integrals, gamma and beta functions, Laplace transform. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 410.

MATH 414
Analysis II 3 OR 4 hrs.
Sequences and series of functions. Uniform convergence. Taylor's theorem. Topology of metric spaces, with emphasis on the real numbers. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 313.

MATH 417
Complex Analysis with Applications 3 OR 4 hrs.
Complex numbers, analytic functions, complex integration, Taylor and Laurent series, residue calculus, branch cuts, conformal mapping, argument principle, Rouche's theorem, Poisson integral formula, analytic continuation. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 210.

MATH 419
Models in Applied Mathematics 3 OR 4 hrs.
Introduction to mathematical modeling; scaling, graphical methods, optimization, computer simulation, stability, differential equation models, elementary numerical methods, applications in biology, chemistry, engineering, and physics. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 220 and grade of C or better in MCS 260.

MATH 425
Linear Algebra II 3 OR 4 hrs.
Canonical forms of a linear transformation, inner product spaces, spectral theorem, principal axis theorem, quadratic forms, special topics such as linear programming. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 320.

MATH 430
Formal Logic I 3 OR 4 hrs.
First-order logic, syntax, and semantics, completeness-incompleteness. 3 undergraduate hours. 4 graduate hours. Credit is not given for MATH 430 if the student has credit for PHIL 416. **Prerequisite(s):** Grade of C or better in CS 202 or grade of C or better in MCS 261 or grade of C or better in MATH 215.

MATH 431
Abstract Algebra II 3 OR 4 hrs.
Further topics in abstract algebra: Sylow theorems, Galois theory, finitely generated modules over a principal ideal domain. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 320 and grade of C or better in MATH 330.

MATH 435
Foundations of Number Theory 3 OR 4 hrs.
Primes, divisibility, congruences, Chinese remainder theorem, primitive roots, quadratic residues, quadratic reciprocity, and Jacobi symbols. The Euclidean algorithm and strategies of computer programming. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 215.

MATH 436
Number Theory for Applications 3 OR 4 hrs.
Primality testing methods of Lehmer, Rumely, Cohen-Lenstra, Atkin. Factorization methods of Gauss, Pollard, Shanks, Lenstra, and quadratic sieve. Computer algorithms involving libraries and nested subroutines. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 435.

MATH 442
Differential Geometry of Curves and Surfaces 3 OR 4 hrs.
Frenet formulas, isoperimetric inequality, local theory of surfaces, Gaussian and mean curvature, geodesics, parallelism, and the Gauss-Bonnet theorem. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 320.

MATH 445
Introduction to Topology I 3 OR 4 hrs.
Elements of metric spaces and topological spaces including product and quotient spaces, compactness, connectedness, and completeness. Examples from Euclidean space and function spaces. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 313.

MATH 446
Introduction to Topology II 3 OR 4 hrs.
Topics in topology chosen from the following: advanced point-set topology, piecewise linear topology, fundamental group and knots, differential topology, applications to physics and biology. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 445.

MATH 480
Applied Differential Equations 3 OR 4 hrs.
Linear first-order systems. Numerical methods. Nonlinear differential equations and stability. Introduction to partial differential equations. Sturm-Liouville theory. Boundary value problems and Green's functions. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 220.

MATH 481
Applied Partial Differential Equations 3 OR 4 hrs.
Initial value and boundary value problems for second-order linear equations. Eigenfunction expansions and Sturm-Liouville theory. Green's functions. Fourier transform. Characteristics. Laplace transform. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 220.

MATH 494
Special Topics in Mathematics 3 OR 4 hrs.
Course content is announced prior to each term in which it is given. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

MATH 496
Independent Study 1 TO 4 hrs.
Reading course supervised by a faculty member. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the instructor and the department.

MATH 502
Metamathematics I 4 hrs.
First-order logic, completeness theorem, and model theory. **Same as** PHIL 562. **Prerequisite(s):** MATH 430 or consent of the instructor.

MATH 503
Metamathematics II 4 hrs.
Incompleteness theorems, elementary recursion theory and proof theory: first- and second-order arithmetic. **Same as** PHIL 563. **Prerequisite(s):** MATH 502 or PHIL 562.

MATH 504
Set Theory I 4 hrs.
Naive and axiomatic set theory. Independence of the continuum hypothesis and the axiom of choice. **Same as** PHIL 565. **Prerequisite(s):** MATH 430 or MATH 502 or PHIL 562.

MATH 506
Model Theory I 4 hrs.
Introduction to stability theory: categoricity, stability, forking, finite equivalence relation theorem, indiscernibles, orthogonality. **Same as** PHIL 567. **Prerequisite(s):** MATH 502 or PHIL 562.

MATH 507
Model Theory II 4 hrs.
Intermediate stability theory: dependence, prime models, isolation, regular types, dimension, weight. **Same as** PHIL 568. **Prerequisite(s):** MATH 506 or PHIL 567.

MATH 509
Universal Algebra I 4 hrs.
Algebraic systems, homomorphisms, congruences, subalgebras, direct and subdirect products. Equational classes, free algebras, Birkhoff's theorem. Malcev conditions, congruence distributive equational classes. **Prerequisite(s):** MATH 330 and MATH 425.

MATH 510
Universal Algebra II 4 hrs.
Discriminator and directly representable varieties, ultraproducts and quasi-varieties, finitely based equational theories, commutator and center. **Prerequisite(s):** MATH 509.

MATH 512
Advanced Topics in Logic 4 hrs.
Advanced topics in modern logic; e.g., descriptive set theory, model theory of fields, theory of hierarchies, stable groups. **Same as** PHIL 569. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

MATH 513
Advanced Topics in Universal Algebra and Lattice Theory 4 hrs.
Special topics. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

MATH 514
Number Theory I 4 hrs.
Introduction to classical, algebraic, and analytic, number theory. Euclid's algorithm, unique factorization, quadratic reciprocity, and Gauss sums, quadratic forms, real approximations, arithmetic functions, Diophantine equations.

MATH 515
Number Theory II 4 hrs.
Introduction to classical, algebraic, and analytic number theory. Algebraic number fields, units, ideals, and P-adic theory. Riemann zeta function, Dirichlet's theorem, prime number theorem. **Prerequisite(s):** MATH 514.

MATH 516
Second Course in Abstract Algebra I 4 hrs.
Structure of groups, Sylow theorems, solvable groups; structure of rings, polynomial rings, projective and injective modules, finitely generated modules over a PID. **Prerequisite(s):** MATH 330 and MATH 425.

MATH 517
Second Course in Abstract Algebra II 4 hrs.
Rings and algebras, polynomials in several variables, power series rings, tensor products, field extensions, Galois theory, Wedderburn theorems. **Prerequisite(s):** MATH 516.

MATH 518
Representation Theory 4 hrs.
Major areas of representation theory, including structure of group algebras, Wedderburn theorems, characters and orthogonality relations, idempotents, and blocks. **Prerequisite(s):** MATH 517.

MATH 519
Algebraic Groups 4 hrs.
Classical groups as examples; necessary results from algebraic geometry; structure and classification of semisimple algebraic groups. **Prerequisite(s):** MATH 517.

MATH 531
Advanced Topics in Algebra 4 hrs.
Research-level topics such as groups and geometries, equivalencies of module categories, representations of Lie-type groups. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

MATH 533
Real Analysis I 4 hrs.
Introduction to real analysis. Lebesgue measure and integration, differentiation, Lp classes, abstract integration. **Prerequisite(s):** MATH 411 or MATH 414 or the equivalent.

MATH 534
Real Analysis II 4 hrs.
Continuation of MATH 533. **Prerequisite(s):** MATH 417.

MATH 535
Complex Analysis I 4 hrs.
Analytic functions as mappings. Cauchy theory. Power series. Partial fractions. Infinite products. **Prerequisite(s):** MATH 411 or MATH 427.

MATH 536
Complex Analysis II 4 hrs.
Normal families, Riemann mapping theorem. Analytic continuation, harmonic and subharmonic functions, Picard theorem, selected topics. **Prerequisite(s):** MATH 535.

MATH 537
Introduction to Harmonic Analysis I 4 hrs.
Fourier transform on Lp spaces, Wiener's Tauberian theorem, Hilbert transform, Paley-Wiener theory. **Prerequisite(s):** MATH 533; and MATH 417 or MATH 535.

MATH 539
Functional Analysis I 4 hrs.
Topological vector spaces, Hilbert spaces, Hahn-Banach theorem, open mapping, uniform boundedness principle, linear operators in a Banach space, compact operators. **Prerequisite(s):** MATH 533.

MATH 541
Partial Differential Equations I 4 hrs.
Theory of distributions; fundamental solutions of the heat equation, wave equation, and Laplace equation. Harmonic functions. Cauchy problem for the wave equation. **Prerequisite(s):** MATH 417.

MATH 542
Partial Differential Equations II 4 hrs.
Cauchy problem for hyperbolic equations. Propagation of singularities. Boundary value problems for elliptic equations. **Prerequisite(s):** MATH 541.

MATH 546
Advanced Topics in Analysis 4 hrs.
Subject may vary from semester to semester. Topics include partial differential equations, several complex variables, harmonic analysis and ergodic theory. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

MATH 547
Algebraic Topology I 4 hrs.
The fundamental group and its applications, covering spaces, classification of compact surfaces, introduction to homology, development of singular homology theory, applications of homology. **Prerequisite(s):** MATH 330 and MATH 445.

MATH 548
Algebraic Topology II 4 hrs.
Cohomology theory, universal coefficient theorems, cohomology products and their applications, orientation and duality for manifolds, homotopy groups and fibrations, the Hurewicz theorem, selected topics. **Prerequisite(s):** MATH 547.

MATH 549
Differentiable Manifolds I 4 hrs.
Smooth manifolds and maps, tangent and normal bundles, Sard's theorem and transversality, embedding, differential forms, Stokes' theorem, degree theory, vector fields. **Prerequisite(s):** MATH 445.

MATH 550
Differentiable Manifolds II 4 hrs.
Vector bundles and classifying spaces, Lie groups and Lie algebras, tensors, Hodge theory, Poincare duality. Topics from elliptic operators, Morse theory, cobordism theory, de Rahm theory, characteristic classes. **Prerequisite(s):** MATH 549.

MATH 551
Riemannian Geometry 4 hrs.
Riemannian metrics and Levi-Civita connections, geodesics and completeness, curvature, first and second variation of arc length, comparison theorems. **Prerequisite(s):** MATH 442 and MATH 549.

MATH 552
Algebraic Geometry I 4 hrs.
Basic commutative algebra, affine and projective varieties, regular and rational maps, function fields, dimension and smoothness, projective curves, schemes, sheaves, and cohomology, positive characteristic.

MATH 553
Algebraic Geometry II 4 hrs.
Divisors and linear systems, differentials, Riemann-Roch theorem for curves, elliptic curves, geometry of curves and surfaces. **Prerequisite(s):** MATH 552.

MATH 554
Complex Manifolds I 4 hrs.
Holomorphic functions in several variables, Riemann surfaces, Sheaf theory, vector bundles, Stein manifolds, Cartan theorem A and B, Grauert direct-image theorem. **Prerequisite(s):** MATH 517 and MATH 535.

MATH 555
Complex Manifolds II 4 hrs.
Dolbeault cohomology, Serre duality, Hodge theory, Kodaira vanishing and embedding theorem, Lefschitz theorem, complex tori, Kahler manifolds. **Prerequisite(s):** MATH 517 and MATH 535.

MATH 568
Topics in Algebraic Topology 4 hrs.
Homotopy groups and fibrations. The Serre spectral sequence and its applications. Classifying spaces of classical groups. Characteristic classes of vector bundles. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** MATH 548 or consent of the instructor.

MATH 569
Advanced Topics in Geometric and Differential Topology 4 hrs.
Topics from areas such as index theory, Lefschetz theory, cyclic theory, KK-theory, noncommutative geometry, 3-manifold topology, hyperbolic manifolds, geometric group theory, and knot theory. **Prerequisite(s):** Approval of the department.

MATH 570
Advanced Topics in Differential Geometry 4 hrs.
Subject may vary from semester to semester. Topics may include eigenvalues in Riemannian geometry, curvature and homology, partial differential relations, harmonic mappings between Riemannian manifolds hyperbolic geometry, arrangement of hyperplanes. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

MATH 571
Advanced Topics in Algebraic Geometry 4 hrs.
Various topics such as algebraic curves, surfaces, higher dimensional geometry, singularities theory, moduli problems, vector bundles, intersection theory, arithemetical algebraic geometry, and topologies of algebraic varieties. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

MATH 574
Applied Optimal Control 4 hrs.
Introduction to optimal control theory; calculus of variations, maximum principle, dynamic programming, feedback control, linear systems with quadratic criteria, singular control, optimal filtering, stochastic control. **Prerequisite(s):** MATH 411 or MATH 427 or consent of the instructor.

MATH 575
Integral Equations and Applications 4 hrs.
Fredholm and Volterra equations, Fredholm determinants, separable and symmetric kernels, Neumann series, transform methods, Wiener-Hopf method, Cauchy kernels, nonlinear equations, perturbation methods. **Prerequisite(s):** MATH 411 and MATH 417 and MATH 481; or consent of instructor.

MATH 576
Boundary Value Problems 4 hrs.
Distributions, Green's functions, alternative theorem, regular and singular Sturm-Liouville problems, spectral theory, potential theory, method of images, complex variable methods, equations of evolution. **Prerequisite(s):** MATH 320 and MATH 417 and MATH 481; or consent of instructor.

MATH 577
Advanced Applied Partial Differential Equations 4 hrs.
Quasi-linear and nonlinear first-order PDE's, shock solutions, second order equations, cylinder and sphere problems, wave, Laplace and diffusion equations, maximum principles, nonlinear wave motion. **Prerequisite(s):** MATH 410 and MATH 417 and MATH 481.

MATH 578
Asymptotic Methods 4 hrs.
Asymptotic series, Laplace's method, stationary phase, steepest descent method, Stokes phenomena, uniform expansions, multidimensional Laplace integrals, Euler-MacLaurin formula, irregular singular points, WKBJ method. **Prerequisite(s):** MATH 417 and MATH 481; or consent of instructor.

MATH 579
Singular Perturbations 4 hrs.
Algebraic and transcendental equations, regular perturbation expansions of differential equations, matched asymptotic expansions, boundary layer theory, Poincare-Lindstedt, multiple scales, bifurcation theory, homogenization. **Prerequisite(s):** MATH 481 or consent of the instructor.

MATH 580
Mathematics of Fluid Mechanics 4 hrs.
Development of concepts and techniques used in mathematical models of fluid motions. Euler and Navier-Stokes equations. Vorticity and vortex motion. Waves and instabilities. Viscous fluids and boundary layers. Asymptotic methods. **Prerequisite(s):** Grade of C or better in MATH 410 and grade of C or better in MATH 417 and grade of C or better in MATH 481.

MATH 581
Special Topics in Fluid Mechanics 4 hrs.
Geophysical fluids with applications to oceanography and meteorology, astrophysical fluids, magnetohydrodynamics, and plasmas. **Prerequisite(s):** Grade of C or better in MATH 580.

MATH 582
Wave Propagation and Scattering I 4 hrs.
Solutions of wave equations in multiple dimensions, vector, and dyadic waves; separable and nonseparable problems. Representations: Green's function integrals, complex integrals, spectral representations. Approximate solutions. **Prerequisite(s):** MATH 417 and MATH 481; or consent of the instructor.

MATH 583
Wave Propagation and Scattering II 4 hrs.
Solutions of reduced wave equations for scattering of scalar, vector, and dyadic waves; separable and nonseparable problems. Representations: Green's function integrals, complex integrals. Various approximations. **Prerequisite(s):** MATH 582.

MATH 584
Applied Stochastic Models 4 hrs.
Applications of stochastic models in chemistry, physics, biology, queuing, filtering, and stochastic control, diffusion approximations, Brownian motion, stochastic calculus, stochastically perturbed dynamical systems, first passage times. **Prerequisite(s):** MATH 417 and MATH 481 and STAT 401, or consent of the instructor.

MATH 586
Computational Finance 4 hrs.
Introduction to the mathematics of financial derivatives; options, asset price random walks, Black-Scholes model; partial differential techniques for option valuation, binomial models, numerical methods; exotic options, interest-rate derivatives. **Prerequisite(s):** Grade of C or better in MATH 220 and grade of C or better in STAT 381; or consent of the instructor.

MATH 589
Teaching and Presentation of Mathematics 2 hrs.
Strategies and techniques for effective teaching in college and for mathematical consulting. Observation and evaluation, classroom management, presenting mathematics in multidisciplinary research teams. Required for teaching assistants in MSCS. No graduation credit awarded for students enrolled in the Master of Science in the Teaching of Mathematics degree program.

MATH 590
Advanced Topics in Applied Mathematics 4 hrs.
Topics from areas such as: elastic scattering, nonlinear problems in chemistry and physics, mathematical biology, stochastic optimal control, geophysical fluid dynamics, stability theory, queuing theory. **Prerequisite(s):** Approval of the department.

MATH 591
Seminar on Mathematics Curricula 4 hrs.
Examination of research and reports on mathematics curricula. Analysis of research in teaching and learning mathematics. Developments in using technology in mathematics teaching. **Prerequisite(s):** Enrollment in the Doctor of Arts program in Mathematics or consent of the instructor.

MATH 592
Seminar on Mathematics: Philosophy and Methodology 4 hrs.
Problems related to teaching and learning mathematics. Analysis of work of Piaget, Gagne, Bruner, Ausabel, Freudenthal, and others and their relation to mathematics teaching. **Prerequisite(s):** Enrollment in the Doctor of Arts program in Mathematics or consent of instructor.

MATH 593
Graduate Student Seminar 1 hour.
For graduate students who wish to receive credit for participating in a learning seminar whose weekly time commitment is not sufficient for a reading course. This seminar must be sponsored by a faculty member. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

MATH 594
Internship in Mathematics 0 TO 8 hrs.
Under the direction of a faculty advisor, students work in government or industry on problems related to their major field of interest. At the end of internship, the student must present a seminar on the internship experiences. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 8 hours. Only 4 credit hours count toward the 32 credit hours required for the MS in MISE degree. Does not count toward the 12 credit hours of 500-level courses requirement. **Prerequisite(s):** Completion of the core courses in the degree program in which the student is enrolled and approval of the internship program by the graduate advisor and the Graduate Studies Committee.

MATH 595
Research Seminar 1 hour.
Current developments in research with presentations by faculty, students, and visitors. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

MATH 596
Independent Study 1 TO 4 hrs.
Reading course supervised by a faculty member. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the instructor and the department.

MATH 598
Master's Thesis 0 TO 16 hrs.
Research work under the supervision of a faculty member leading to the completion of a master's thesis. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Approval of the department.

MATH 599
Thesis Research 0 TO 16 hrs.
Research work under the supervision of a faculty member. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

Mathematics Teaching

MTHT 400
Methods of Teaching Secondary Mathematics I 3 OR 4 hrs.
Philosophies, issues, techniques, and styles of teaching high school mathematics. Implications of psychological models. Mathematics in the evolving curriculum. Preparation of lessons. 3 undergraduate hours. 4 graduate hours. To be taken in the year prior to student teaching. **Prerequisite(s):** Grade of C or better in MTHT 410, enrollment in BS or MS in the Teaching of Mathematics program in Secondary Mathematics Education, and a 2.50 grade point average in mathematics courses at the level of calculus or above.

MTHT 401
Methods of Teaching Secondary Mathematics II 3 OR 4 hrs.
Philosophies, issues, techniques and styles of teaching high school mathematics. Preparation of diverse lessons. Supervised teaching experience. 3 undergraduate hours. 4 graduate hours. To be taken in year prior to student teaching. **Prerequisite(s):** Grade of C or better in MATH 210 and enrollment in the BS or MS in the Teaching of Mathematics program in Secondary Mathematics Education; and a 2.50 grade point average in mathematics courses at the level of calculus or above.

MTHT 411
Advanced Euclidean Geometry 3 OR 4 hrs.
Axioms for Euclidean geometry are developed based upon reflections. Further concepts in Euclidean geometry which arise from these axioms are explored. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 215.

MTHT 420
Computers in Secondary School Mathematics 3 OR 4 hrs.
An overview of techniques, topics and tools for teaching secondary level mathematics using computers. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 210.

MTHT 430
Mathematical Analysis for Teachers I 3 OR 4 hrs.

Basic properties of numbers, functions, graphs, limits, differentiation, continuity, and completeness of the system of real numbers. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 210 and grade of C or better in MATH 215.

MTHT 435
Abstract Algebra 3 OR 4 hrs.
Sets, properties of integers, groups, rings, fields. Focus on concepts applicable to high school teaching. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** MATH 210 and MATH 215.

MTHT 438
Educational Practice with Seminar I 6 hrs.
The first half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** 2.50 grade point average in mathematics courses at the level of calculus or above, successful completion of 100 clock hours of pre-student-teaching field experiences, and approval of the department.

MTHT 439
Educational Practice with Seminar II 6 hrs.
The second half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** Credit or concurrent registration in MTHT 438; and approval of the department and a 2.50 grade point average in mathematics courses at the level of calculus or above and successful completion of 100 clock hours of pre-student teaching field experiences.

MTHT 450
Concepts and Methods in Elementary and Middle School Mathematics I 3 OR 4 hrs.
Advanced analysis of concept development and teaching methods. Sorting, classifying, counting, number tracks, addition, subtraction, group, place value, length, area, and alternative teaching strategies. 3 undergraduate hours. 4 graduate hours. For elementary school teachers. **Prerequisite(s):** Graduate standing and admission to the MS in the Teaching of Mathematics program (Option for Elementary School Teachers) or consent of the instructor.

MTHT 460
Geometric Measurement and Numerical Methods 3 OR 4 hrs.
Classical problems of length, area, and volume, including numerical trigonometry, are explored using a scientific calculator. 3 undergraduate hours. 4 graduate hours. Do not purchase a calculator for the course until after the first day of class. **Prerequisite(s):** Admission to the MS in the Teaching of Mathematics program (Option for Elementary School Teachers) or consent of the instructor.

MTHT 465
Teaching Algebra for Understanding 3 OR 4 hrs.
Manipulatives and other representations of mathematical concepts used for teaching algebra to middle grade students. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Admission to the MS in the Teaching of Mathematics program (Option for Elementary School Teachers) or consent of the instructor.

MTHT 466
Introduction to Calculus and the Graphing Calculator 4 hrs.
Problem solving using derivatives, differentials, and their applications followed by integrals and their applications. Maximum/minimum problems solved directly by graphing, then by derivatives. **Prerequisite(s):** Admission to the Mathematics Education Concentrators Program or consent of the instructor.

MTHT 467
Introduction to Number Theory with Application 4 hrs.
Classical topics of elementary number theory and how they pertain to teaching the upper grades. Primes, GCF, LCM, divisibility, floor and ceiling functions, Gaussian residue, lattices. **Prerequisite(s):** Admission to the Mathematics Education Concentrators Program or consent of the instructor.

MTHT 468
Geometry with Applications for Middle Grade Teachers 4 hrs.
Plane and solid figures and their properties. Polygons and polyhedra. Euler's formula. Volume versus surface area. Spatial visualization; two-dimensional representations of three-dimensional figures. **Prerequisite(s):** Admission to the Mathematics Education Concentrators Program or consent of the instructor.

MTHT 470
Teaching Mathematics with Activity: An Activity Approach I 3 OR 4 hrs.
Introduction to basic variables (length, area, volume, mass, time) and the scientific method (picture, table, graph, questions). Extensive use of TIMS project curriculum. 3 undergraduate hours. 4 graduate hours. For elementary school teachers. **Prerequisite(s):** Admission to the MS in the Teaching of Mathematics program (Option for Elementary School Teachers) or consent of the instructor.

MTHT 480
Microcomputers in Elementary School Mathematics I 3 OR 4 hrs.
Introduction to microcomputers and their use in elementary school mathematics. Basic microcomputer functions, educational software programs, pedagogical and curricular implications, and implementation questions. 3 undergraduate hours. 4 graduate hours. For elementary school teachers. **Prerequisite(s):** Admission to the MS in the Teaching of Mathematics program (Option for Elementary School Teachers) or consent of the instructor.

MTHT 490
Topics in Teaching Secondary Mathematics 1 TO 5 hrs.
Course content is announced prior to each term in which it is given. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Prerequisites may vary according to topic.

MTHT 491
Topics in Teaching Elementary/Junior High School Mathematics 1 TO 5 hrs.
Course content is announced prior to each term in which it is given. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Prerequisites may vary according to topic.

MTHT 496
Independent Study 1 TO 4 hrs.
Reading course supervised by a faculty member. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the instructor and the department.

MTHT 510
Introduction to Higher Geometry 4 hrs.
Projective geometry, as an extension of Euclidean geometry, treated synthetically and/or algebraically. Desargues' and Pappus' theorems, subgeometries, conics, and the underlying skew field. For graduate students in mathematics teacher education programs. Other students enroll in MATH 440. **Prerequisite(s):** Grade of C or better in MATH 330.

MTHT 530
Mathematical Analysis for Teachers II 4 hrs.
Derivatives, inverse functions, Riemann integral, trigonometric functions, logarithmic and exponential functions. **Prerequisite(s):** Grade of C or better in MTHT 430 or consent of the instructor.

MTHT 550
Concepts and Methods in Elementary School Mathematics II 4 hrs.
Methods of teaching middle school mathematics: concept development; focus on classroom materials to promote learning. Area, volume, rational numbers, decimals, function machines. **Prerequisite(s):** MTHT 450 or consent of the instructor.

MTHT 560
Introduction to Analytic Geometry and Calculus 4 hrs.
Programmable calculators used to investigate ideas and applications of analytic geometry, differential and integral calculus. Examples and ideas relevant to elementary mathematics and science curricula. For elementary school teachers. Do not purchase a calculator until after the first day of class. **Prerequisite(s):** MTHT 460 or consent of the instructor.

MTHT 565
Teaching Geometry: An Activity Approach 4 hrs.
Informal geometry using manipulatives, elementary topological concepts, polygons, polyhedra, metric geometry, motion geometry, geometric constructions, spherical geometry, introduction to research on the learning of geometry. For elementary school teachers. **Prerequisite(s):** Enrollment in the MS in the Teaching of Mathematics program (Option for Elementary School Teachers) or consent of the instructor.

MTHT 575
Principles of Probability and Statistics 4 hrs.
Probability, descriptive and inferential statistics, implications for teaching. Emphasis on collection and analysis of data, classroom activities, and software. For elementary school teachers. **Prerequisite(s):** Admission to the MS in the Teaching of Mathematics program (Option for Elementary School Teachers) or approval of the department.

MTHT 589
Practicum in Teaching Elementary School Mathematics 4 hrs.
Culminating experience for students in the MS in the Teaching of Mathematics program (Option for Elementary School Teachers). Major project is required. Supervised weekly seminars. **Prerequisite(s):** Admission to the MS in the Teaching of Mathematics program (Option for Elementary School Teachers) and consent of the instructor.

MTHT 590
Topics in Teaching Secondary Mathematics 1 TO 5 hrs.
Course content is announced prior to each term in which it is given. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Prerequisite may vary according to topic.

MTHT 591
Topics in Teaching Elementary/Junior High School Mathematics 1 TO 5 hrs.
Course content is announced prior to each term in which it is given. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Prerequisite may vary according to topic.

MTHT 592
Topics in Advanced Mathematics for Teachers 1 TO 5 hrs.
Course content is announced prior to each term in which it is given. May be repeated. Students may register in more than one section per term. For students in the MS in the Teaching of Mathematics program. **Prerequisite(s):** Prerequisite may vary according to topic.

MTHT 596
Independent Study 1 TO 4 hrs.
Reading course supervised by a faculty member. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the instructor and the department.

Mechanical Engineering

ME 401
Applied Stress Analysis I 3 OR 4 hrs.
Complex bending and torsion, curved flexural members, energy methods in design, theories of failure. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CME 203.

ME 408
Intermediate Vibration Theory 3 OR 4 hrs.
Free and forced vibrations of multidegree of freedom linear systems. Lagrangian dynamics, matrix, approximate and numerical methods. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ME 308.

ME 409
Advanced Kinematics I 3 OR 4 hrs.
Kinematic synthesis of planar linkages. Higher-order, precision-point and approximate synthesis. Unified treatment of position, function, and path-angle problems. Consideration of branching and rotatability. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ME 320.

ME 410
Automation and Robotics Applications 3 OR 4 hrs.
Basic pneumatic and hydraulic systems. Design of sequential control circuits and ladder diagrams. Robot kinematics and dynamics. Robot design. Trajectory planning. Applications and demonstrations. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ME 210.

ME 411
Mechatronics I 0 TO 4 hrs.
Elements of mechatronic systems, sensors, actuators, microcontrollers, modeling, hardware in the loop simulations, real-time software, electromechanical systems laboratory experiments. **Same as IE 411.** 3 undergraduate hours. 4 graduate hours. Extensive computer use required. **Prerequisite(s):** Senior standing or above; or approval of the department.

ME 412
Dynamic Systems Analysis I 3 OR 4 hrs.
Classical control theory, concept of feedback, Laplace transform, transfer functions, control system characteristics, root locus, frequency response, compensator design. **Same as IE 412.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ME 308.

ME 413
Dynamics of Mechanical Systems 3 OR 4 hrs.
Degrees of freedom, generalized coordinates, principle of virtual work. D'Alembert's principle, Lagrange's equation, Hamilton's principle. Equations of motion and Newton-Euler equations for rigid bodies. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ME 320.

ME 414
Theory of Gearing and Applications 3 OR 4 hrs.
Classification of gear drives. Geometry of plane and spatial gears. Analysis and synthesis of gears with approximate meshing. Applications to spur, helical, worm, and bevel gear drives. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ME 320.

ME 415
Propulsion Theory 3 OR 4 hrs.
Thermodynamics and fluid mechanics of air-breathing engines, performance of rockets; chemical and nuclear rockets. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ME 419 or the equivalent.

ME 417
Intermediate Fluid Mechanics 3 OR 4 hrs.
Development of conservation equations for Newtonian fluids; continuity, Navier-Stokes, and energy equations. Some exact and approximate solutions of highly viscous, viscous, and inviscid flows. Boundary layer flows, jets, and wakes. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ME 321.

ME 419
Compressible Flow Theory 3 OR 4 hrs.
Conservation laws, one-dimensional flows. Normal and oblique shock waves, Prandtl-Meyer expansion, flow over airfoils. Applications to nozzles, shock tubes, wind tunnels. Flow with friction and heat addition or loss. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ME 321.

ME 421
Intermediate Heat Transfer 3 OR 4 hrs.
Topics in conduction, convection, and radiation with emphasis on exact solutions: extended surfaces, internal and external flows, surface radiation, combined modes of heat transfer, and selected topics. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ME 321 or consent of the instructor.

ME 422
Heating, Ventilation, and Air-Conditioning 3 OR 4 hrs.
Refrigeration systems and heat-pump, mass transfer in humidification, solar heat transfer in buildings, heating and cooling loads, air-conditioning computer project. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ME 321.

ME 423
Heat Exchangers 3 OR 4 hrs.
Classification; heat transfer and pressure drop analysis, flow distribution, transient performance, surface selection and geometrical properties, codes and standards. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ME 211 and ME 321.

ME 424
Energy Management Solutions for Industry: Theory and Practice 3 OR 4 hrs.
Emphasis on real-world applications including: understanding utility billing and identifying costs; identifying and quantifying energy savings opportunities at industrial facilities; determining investment payback scenarios and considerations. 3 undergraduate hours. 4 graduate hours. Extensive computer use required. Fieldwork required. Extensive use of Microsoft Excel. **Prerequisite(s):** Junior standing or above.

ME 425
Second Law Analysis in Energy Engineering 3 OR 4 hrs.
Fundamentals: lost available work. Entropy generation minimization, optimal thermal design of: heat transfer augmentation devices, thermal energy storage, cryogenics, heat exchangers, thermal insulations, solar collectors. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ME 321.

ME 426
Applied Combustion 3 OR 4 hrs.
Topics in combustion, providing both a theoretical and applied understanding of combustion processes as they relate to furnaces. Internal and external combustion engines; pollutant formation. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ME 325.

ME 427
Solar Engineering 3 OR 4 hrs.
Applications; solar geometry and intensities; applied heat transfer topics; flat plate and concentrating collectors; energy storage; analysis of heating and cooling systems. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ME 321 or consent of the instructor.

ME 428 Numerical Methods in Mechanical Engineering 3 OR 4 hrs.
Introduction to numerical solution methods for problems in mechanical engineering. Example problems include heat transfer, fluid mechanics, thermodynamics, mechanical vibrations, dynamics, stress analysis, and other related problems. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CS 108 and senior standing.

ME 429 Internal Combustion Engines 3 OR 4 hrs.
Introduction to engine types, characteristics, and performance. Combustion processes in spark and compression ignition engines; combustion abnormalities. Analysis of intake, exhaust, and fuel system. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ME 325.

ME 433 Nonequilibrium Thermal Processes 3 OR 4 hrs.
Molecular engineering. Nonequilibrium statistical mechanics. Distribution functions. Molecular excitation and de-excitation. Ionization and dissociation. Laser engineering. Nonequilibrium chemical kinetics. Surface processes. Chemisorption and physisorption. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ME 325 or consent of the instructor.

ME 441 Optical Methods in Mechanical Engineering 0 TO 4 hrs.
Optical measurement techniques in solid mechanics and thermal-fluid engineering. Fundamentals of optics. Use of holography, interferometry, LDV, lasers, light scattering, diffraction, and other relevant techniques. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Senior standing or consent of the instructor.

ME 444 Interdisciplinary Product Development I 3 OR 4 hrs.
Cross-functional teams (w/students from AD 420/423 and MKTG 594) research and develop new product concepts. Focus on the identification of technologically appropriate product design problems. **Same as** IE 444. 3 undergraduate hours. 4 graduate hours. Year-long (with IE/ME 445) project course. **Prerequisite(s):** Senior standing or above; and consent of the instructor.

ME 445 Interdisciplinary Product Development II 4 hrs.
Cross-functional teams (w/students from AD 420 and MKTG 594) research and develop new product concepts. Focus on solutions to the opportunities identified in IE/ME 444 to functional prototypes. Serves as a replacement for IE/ME 396. **Same as** IE 445. Year-long (with IE/ME 444) project course. **Prerequisite(s):** IE 444 or ME 444; and senior standing or above; and consent of the instructor.

ME 447 Introduction to Computer-Aided Design 0 TO 4 hrs.
Conventional and computer-assisted methods in design. Geometry manipulation. Computer-aided modeling with curves, surfaces, and solids. Design with finite-element analysis. PRO/Engineer and PRO/Mechanica. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** MATH 220 and ME 250.

ME 449 Microdevices and Micromachining Technology 0 TO 5 hrs.
Microfabrication techniques for microsensors, microstructures, and microdevices. Selected examples of physical/chemical sensors and actuators. Simulation experiments. Laboratory. **Same as** ECE 449. 4 undergraduate hours. 5 graduate hours. Previously listed as EEC5 449. **Prerequisite(s):** ECE 347.

ME 450 Air Pollution Engineering 4 hrs.
Environmental aspects of combustion processes, pollutant formation. Control of pollutants and particulates. Air quality control. Fundamentals of combustion. **Same as** CHE 450. **Prerequisite(s):** ME 321 or consent of the instructor.

ME 464 Virtual Automation 3 OR 4 hrs.
Fundamentals of manufacturing and automation modeling using CAD/CAM and computer-integrated manufacturing methods; concepts of virtual manufacturing; industrial robots and automated factory models within virtual environments. **Same as** IE 464. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** IE 201; and CS 107 or CS 108.

ME 468 Virtual Manufacturing 3 OR 4 hrs.
Virtual reality applications in manufacturing systems design, manufacturing applications of networked virtual reality, virtual reality modeling of occupational safety engineering. **Same as** IE 468. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CS 107 or CS 108.

ME 494 Special Topics in Mechanical Engineering 3 OR 4 hrs.
Particular topics vary from term to term depending on the interests of the students and the specialties of the instructor. 3 undergraduate hours. 4 graduate hours. May be repeated. **Prerequisite(s):** Consent of the instructor.

ME 499 Professional Development Seminar 0 hrs.
Students are provided general information about their role as UIC Mechanical Engineering alumni in society and the role of the University in their future careers. Students provide evaluations of their educational experience in the MIE department. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Open only to seniors; and approval of the department. Must be taken in the student's last semester of study.

ME 501 Advanced Thermodynamics 4 hrs.
Thermodynamic laws of closed and open systems; exergy destruction; property relations, single phase systems, Gibbs-Duhem relations, multiphase systems, equilibrium; engineering applications. **Prerequisite(s):** ME 325.

ME 502 Applied Stress Analysis II 4 hrs.
Concepts from theory of elasticity, stress-raisers, such as notches and holes, mechanical behavior of materials, including yielding and fractures, thick-walled cylinders and rotating disks, thermal stresses, and plastic behavior. **Prerequisite(s):** ME 401.

ME 504 Computer-Aided Analysis of Multibody Systems I 4 hrs.
Kinematics, dynamics, analysis of flexible mechanisms. Constrained mechanical systems with flexible components. Numerical methods. Computer-aided analysis. Applications. **Prerequisite(s):** ME 413 or consent of the instructor.

ME 505 Computer-Aided Analysis of Multibody Systems II 4 hrs.
Large-scale deformable bodies. Finite element method. Constrained motion of interconnected rigid and deformable bodies. Coordinate reduction. Computational methods. Applications. **Prerequisite(s):** ME 504.

ME 508 Engineering Acoustics 4 hrs.
Fundamentals of acoustic energy generation, radiation, and transmission (both aerodynamically and structurally). Theoretical, experimental, and numerical techniques. Applications spanning from 1-D plane waves to more complex 3-D problems. **Prerequisite(s):** ME 408 or CME 435; or approval of the department.

ME 509 Advanced Kinematics II 4 hrs.
Spatial transformation and displacements. Design for body guidance; applications to function-generators. Analyses utilizing various operators for closure; dualization; branching, rotatability; differential kinematics; numerical solutions. **Prerequisite(s):** ME 409.

ME 510 Robotic Manipulators 4 hrs.
Description of robotic manipulator; gripper trajectory execution; manipulator design, degree-of-freedom, mobility, workspace, special link positions; static and dynamic force transmission. **Prerequisite(s):** ME 409 or ME 410 or ME 413; or consent of the instructor.

ME 511 Mechatronics II 4 hrs.
Microcontrollers used in electromechanical systems for measurement and control purposes, interface hardware, real-time software and development tools, applications in robotic motion control and factory automation. **Same as** IE 511. **Prerequisite(s):** ME 411 and consent of the instructor.

ME 512 Automatic Control of Mechanical Systems I 4 hrs.
Modeling and analysis of mechanical systems. Performance specification and evaluation. Modern control system design and analysis techniques. Real-time computer control of engines, manufacturing processes, biomechanical systems. **Prerequisite(s):** ME 412 or consent of the instructor.

ME 514 Mechanics of Viscous Fluids 4 hrs.
Fundamentals of fluid mechanics. Streamline and vorticity. Boundary layer analysis. Similarity solutions, integral methods, and other techniques for treating laminar and turbulent flows. **Prerequisite(s):** ME 417.

**ME 518
Fundamentals of
Turbulence** 4 hrs.
Mathematical description of turbulence field; kinematics of homogeneous turbulence; correlation and spectrum tensor, dynamic behavior of isotropic turbulence, universal equilibrium theory; nonisotropic turbulence. **Prerequisite(s):** ME 417 and ME 418.

**ME 521
Heat
Conduction** 4 hrs.
Analysis of heat transfer in solids, including separation of variables, superpositions, Duhamel's theorem, integral transforms, similarity transformations, and approximate methods. **Prerequisite(s):** ME 321 or consent of the instructor.

**ME 522
Convective
Heat Transfer** 4 hrs.
Conservation equations. Momentum heat and mass transfer in laminar and turbulent boundary layers. Internal and external flows and heat transfer. Heat transfer with phase change. Special topics in convective heat transfer. **Prerequisite(s):** ME 321 or consent of the instructor.

**ME 524
Thermal
Radiation** 4 hrs.
Fundamentals of radiative transfer; energy exchange between surfaces and in enclosures; radiative transfer in the presence of an attenuating medium; combined radiation, conduction, convection problems. **Prerequisite(s):** ME 421 or consent of the instructor.

**ME 525
Boiling Heat Transfer
and Two-Phase Flow** 4 hrs.
Homogeneous and separated two-phase flow models for pressure drop and heat transfer. Pool boiling, nucleation and bubble dynamics, stability, condensation, and engineering application problems. **Prerequisite(s):** ME 421.

**ME 528
Numerical Heat
Transfer** 4 hrs.
Numerical methods for solving conduction, convection, and radiation problems in heat transfer. Iterative methods with shooting; local nonsimilarity methods perturbation methods; finite difference methods; grid generation. **Prerequisite(s):** CS 108 and ME 421 or consent of instructor.

**ME 529
Advanced
Internal Combustion
Engines** 4 hrs.
Fundamentals of internal combustion engines. Combustion in homogeneous charged and compression ignition engines. Emission formation. Effect of design and operating variables, control, and instrumentation. **Prerequisite(s):** ME 426 or ME 429.

**ME 531
Thermophysics of
Gas Flows** 4 hrs.
Kinetic theory of gases. Transport properties, quantum mechanical analysis of atomic and molecular structures, atomic scale collision phenomena, propagation, emission, and absorption of radiation.

**ME 533
Plasma
Engineering** 4 hrs.
Plasma-assisted applications. Kinetic theory of nonequilibrium processes. Plasma dynamics. Elementary processes-collisions. Diffusion and transport. Chemical reactions and surface treatment. Particle and energy balance in plasmas. **Prerequisite(s):** ME 433 or consent of the instructor.

**ME 534
Finite Element
Analysis II** 4 hrs.
Application of the finite element method to the analysis of complex continuum and structural linear systems. Introduction to error analysis and convergence of the finite element solutions. **Same as** CME 534. **Prerequisite(s):** CME 434.

**ME 535
Theory of
Vibrations II** 4 hrs.
Harmonic vibrations; vibrations of a string; vibrations of a beam; vibrations of a membrane; periodic systems; Floquet waves; nonlinear vibrations. **Same as** CME 535. **Prerequisite(s):** CME 435 or ME 408 or the equivalent.

**ME 536
Chemically
Reacting Flows** 4 hrs.
Nonequilibrium states; chemical thermodynamics and kinetics. Multicomponent continuum equations for flow of nonequilibrium fluids. Inversed nonequilibrium flows. Boundary layer flows with surface and gas-phase reactions. Frozen and equilibrium criteria. Waves in relaxing media. **Prerequisite(s):** ME 516; and ME 514 or ME 522.

**ME 540
Design, Modeling,
and Fabrication of
Microsystems** 4 hrs.
MEMS design approach, materials and mechanical properties, scaling laws, transduction methods, microfabrication techniques, modeling and simulation strategies, dynamics, domain-specific details-structures, fluids, dissipation, and system issues. **Prerequisite(s):** Consent of the instructor.

**ME 541
Microelectronic
Fabrication
Techniques** 4 hrs.
Current fabrication techniques of microelectronic technology; plasma and CVD processes; etching techniques; ion implantation; surface analytical methods. **Same as** ECE 541. Previously listed as EECS 541. **Prerequisite(s):** ECE 347 or ECE 449.

**ME 542
Advanced
Computational
Methods for Product
and Process Design** 4 hrs.
Deterministic and statistical methods for modeling and optimizing engineering systems, in the broad context of product design, manufacturing process development, and designing for life cycle issues. **Same as** IE 542. **Prerequisite(s):** Programming language experience.

**ME 547
Advanced Concepts
in ComputerAided Engineering** 4 hrs.
Useful concepts in motion simulation of complex rigid multibody systems. Interactive computer solutions. Recursive formulation of kinematical and dynamical equations of open and constrained multibody systems. **Prerequisite(s):** ME 413 and ME 447.

**ME 548
Advanced
Computer-Aided
Manufacturing** 4 hrs.
Analysis and design of computer-integrated systems for process planning, production planning and control of discrete part manufacturing activities. **Prerequisite(s):** ME 447.

**ME 550
Dynamics of
Floating Offshore
Structures** 4 hrs.
Covers environmental loads and dynamics of floating structures in fluid. **Same as** CME 550. **Prerequisite(s):** ME 210 and CME 211 and ME 211 and MATH 220; or consent of the instructor.

**ME 569
Advanced Virtual
Manufacturing** 4 hrs.
Manufacturing systems design optimization using virtual environments, optimization of manufacturing decision support using virtual reality interfaces, analysis and evaluation of virtual environments. **Same as** IE 569. **Prerequisite(s):** Consent of the instructor.

**ME 594
Current Topics
in Mechanical
Engineering** 4 hrs.
Particular topics vary from term to term depending on the interests of the students and the specialties of the instructor. May be repeated. **Prerequisite(s):** Consent of the instructor.

**ME 595
Seminar on
Mechanical
Engineering
Research** 1 hour.
Advances in mechanical engineering research will be discussed in a seminar setting. Students will be expected to make presentations in various areas, as well as invited faculty members. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Graduate standing in mechanical engineering.

**ME 596
Independent
Study** 1 TO 4 hrs.
Individual study under close supervision of a faculty member. May be repeated to a maximum of 4 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**ME 598
MS Thesis
Research** 0 TO 16 hrs.
Individual research in specialized problems under close faculty supervision. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

**ME 599
PhD Thesis
Research** 0 TO 16 hrs.
Individual research on specialized problems under close faculty supervision. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

Medical Biotechnology

**MBT 500
DNA and Proteins** 3 hrs.
DNA replication, transcription, translation and post-translational modifications. Genome structure. Viruses. Bioinformatics and microarrays. Protein structure. Enzyme mechanisms. Biochemical pathways, and regulation of biochemical pathways. Recommended background: Basic undergraduate general and organic chemistry, biology, physics, and math.

**MBT 501
Cell Biology
and Human
Physiology** 3 hrs.
Cellular organization and cell organelles; lipid membranes; the cytoskeleton; and cell interactions signaling and cycle control. Growth factors and neurochemistry. Mechanical and electrical phenomena. Synaptic transmission. Sensory and motor neurophysiology. Recommended background: Basic undergraduate general and organic chemistry, biology, physics, and math.

MBT 502 Immunotechnology, Microbiology, and Cellular Therapy 3 hrs.
Covers antibody production principals, clinical uses of antibodies, fermentation and bioremediation and protein production principals, cellular and stem cell therapies, bioterrorism control, containment, and eradication. **Prerequisite(s):** MBT 500 and MBT 501.

MBT 503 Pharmacology, Toxicology, and Clinical Trials 3 hrs.
Basic pharmacology, drug-receptor interactions. Basic toxicology. Drug development cycle (preclinical work, Phase I, II, III). Design, implementation, and evaluation of clinical trials. IRB issues. Ethical conduct of clinical trials. **Prerequisite(s):** MBT 500 and MBT 501.

MBT 510 Ethics in Medical Biotechnology 2 hrs.
Rationale for making ethical decisions, review of existing guidelines, considerations of the use of adult and embryonic stem cells, ethical issues on animal research, conflict of interest and misconduct in research and business. **Prerequisite(s):** MBT 500 and MBT 501 and MBT 502 and MBT 503; or consent of the instructor.

MBT 513 Research Planning, Design, and Execution 1 hour.
Presentation of the basics of planning, designing, and executing a research plan. Students prepare a project plan and defend the plan to a faculty panel and peers. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 2 hours.

MBT 520 Biotechnology Product Development: Concepts, Practice, and Regulatory Issues 2 hrs.
Product development and commercialization processes. Product life cycles, program management basics. Intellectual property. Regulatory affairs issues: GLP, product registration, GMP, documentation, validation, FDA inspections. **Prerequisite(s):** MBT 500 and MBT 501 and MBT 502 and MBT 503; or consent of the instructor.

MBT 521 Techniques and Processes in Biotechnology 3 hrs.
Preparation and isolation of antibodies, basics of cell culture, recombinant DNA techniques, techniques of protein production and engineering, and examples of cloning. Basics of GLP and practical experience in applications of GLP. **Prerequisite(s):** MBT 500 and MBT 501. Course schedule information: To be properly registered, students must enroll in one Discussion and one Laboratory.

MBT 522 Applied Medical Biotechnology 2 hrs.
The principles and methodologies used in commercial lab assays will be analyzed and their strengths and weaknesses discussed. An array of hospital/clinical techniques will be reviewed via lecture/demonstration in typical application venue. **Prerequisite(s):** MBT 500 and MBT 501 and MBT 520.

MBT 523 Biotechnology Engineering 2 hrs.
Engineering aspects of large-scale cell culture: methodologies, types of production equipment, process sensing and control, harvesting, separation and purification. Sterilization, aseptic processing, filling, and finishing steps. QA/QC. Field trips required. **Prerequisite(s):** Completion of the first year of the MS in Medical Biotechnology program.

MBT 591 Departmental Seminar in Medical Biotechnology 1 TO 4 hrs.
Lecture series by invited speaker or advanced students with lectures on topics of current or developing interest in medical biotechnology. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Approval of the department.

MBT 594 Special Topics in Medical Biotechnology 1 TO 4 hrs.
Lectures and demonstrations of new topics of significance in medical biotechnology that are not covered in existing courses. May be repeated. **Prerequisite(s):** Consent of the instructor.

MBT 595 Student Seminar in Medical Biotechnology 2 hrs.
Students write and present literature research/review papers on topics directly related to medical biotechnology. Satisfactory/Unsatisfactory grading only. May be repeated. Extensive computer use required. Coupled with departmental seminar.

MBT 596 Independent Study in Medical Biotechnology 1 TO 4 hrs.
Independent and individual study of a topic in medical biotechnology. Usually involves extensive literature research culminating in a review paper or hypothesis/conclusion argument paper. May be repeated to a maximum of 4 hours if topics vary. Students may register in more than one section per term. **Prerequisite(s):** Completion of the first year of the MS in Medical Biotechnology program, approval of the department, and approval of a faculty mentor. The student also should have completed core or elective courses in the degree sequence that introduce the topic of independent study or have verifiable outside knowledge.

MBT 597 Master's Project Research 0 TO 16 hrs.
A project-based internship at a biotechnology company or a research laboratory at the College of Medicine in Rockford. Students will gain on-the-job experience in designing and conducting experiments, evaluating results, and reporting to supervisors. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Student should have approval of the graduate committee to commence research and the agreement of faculty and industrial mentors along with a written agreement for research activity from the host company.

MBT 598 Master's Thesis Research 0 TO 16 hrs.
Master's thesis research conducted at the College of Medicine in Rockford under faculty supervision. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Completion of the first year of the program and consent of the instructor.

Medical Education

MHPE 433 Principles of Evidence-Based Healthcare 2 hrs.
Qualitative and quantitative assessment of human subject clinical research: locating, evaluating, and comparing scientific papers as bases for healthcare education and practice. **Same as** BHIS 433. **Prerequisite(s):** Graduate or professional standing and approval of the school.

MHPE 439 Writing for Scientific Publication 2 hrs.
Instruction and workshop explores the process of fully preparing and submitting a manuscript to a health professions journal. Students must bring analyzed data set. **Prerequisite(s):** Graduate or professional standing and consent of the instructor.

MHPE 441 Clinical Decision Making 2 hrs.
Introduction to descriptive and normative theories of decision making; interpretation of diagnostic tests; measuring patient preferences; decision analysis and cost-effectiveness analysis; psychology of judgment and choice. **Prerequisite(s):** Consent of the instructor.

MHPE 494 Special Topics in Health Professions Education 1 TO 4 hrs.
Selected topics of current interest in health professions education. May be repeated with approval. Students may register in more than one section per term. Approval to repeat course granted by the department. **Prerequisite(s):** Prerequisites may vary by section, depending upon topic.

MHPE 501 Scholarship in Health Professions Education 4 hrs.
Introduction to methods and evaluation of scholarship in health professions education. **Prerequisite(s):** Graduate or professional standing and consent of the instructor.

MHPE 502 Instruction and Assessment for Health Professionals 4 hrs.
Methods and issues of effective instruction and assessment in health professions education are presented, including how effective instruction and assessment support student learning and faculty decisions. **Prerequisite(s):** Consent of the instructor.

MHPE 503 Curriculum Planning and Program Evaluation for Health Professionals 4 hrs.
Methods and issues in planning and evaluating educational programs in the health professions are presented, including how institutional and social forces affect planning and evaluation. **Prerequisite(s):** Approval of the department.

MHPE 504 Leadership in Health Professions Education 4 hrs.
Focuses on problems, issues, and practices of leadership in health professions education.

MHPE 505 Introduction to Health Professions Education: Leadership, Scholarship, and Current Issues 2 hrs.
Serves the intertwined purposes of providing an orientation to the MHPE program's major goals and themes, its programmatic elements, and its prototypical instructional methods of active and collaborative learning. **Prerequisite(s):** Graduate or professional standing; and approval of the department.

MHPE 512
Ethics in Clinical Research 1 hour.
Survey of key ethical issues involved in conducting research with human subjects, including informed consent, confidentiality, access, and equity. **Same as** HPA 512. Extensive computer use required. Requires completion of an online course in human subjects research, to be supplemented by classroom discussion of the topics raised in that course and others. **Prerequisite(s):** Approval of the department. Students must be enrolled in the Master of Science in Public Health program.

MHPE 532
Qualitative Methods 2 hrs.
The course provides students with a broad overview of the epistemology, design, methods, data types, results, and reporting forms of qualitative research and helps students develop skills in qualitative data analysis. **Prerequisite(s):** Graduate or professional standing; and approval of the department.

MHPE 534
Research Design and Grant Writing 2 hrs.
Introduction to the skills necessary to plan a research project and write a research grant proposal using a systematic approach. **Same as** HPA 534. Previously listed as MHPE 431. **Prerequisite(s):** Graduate or professional standing; and approval of the department.

MHPE 535
Translating Research into Practice 3 hrs.
Current theory and practical reality related to the adoption and use of new scientific findings in patient care. The influence of research on public policy. **Same as** HPA 535. Extensive computer use required. **Prerequisite(s):** Graduate or professional standing; and approval of the department.

MHPE 537
Writing for Scientific Publication 2 hrs.
Students will have the opportunity to learn and practice both the skills needed to produce a research manuscript and a conceptual approach to writing that will carry over to future projects—research reports or other works of scholarship. **Prerequisite(s):** Graduate or professional standing; and approval of the department. Each student must bring to class a personal writing project based on a study with an already available data set that has been analyzed at least preliminarily. The topic of the study can be educational or clinical.

MHPE 596
Independent Study 1 TO 4 hrs.
Selected problems or issues in health professions education are investigated under the direction of a faculty member of the student's choice.

MHPE 597
Project Research 0 TO 6 hrs.
Selected problems or issues in health professions education are investigated under the direction of a committee of the student's choice. Satisfactory/Unsatisfactory grading only.

MHPE 598
Thesis Research 0 TO 16 hrs.
Selected problems or issues in health professions education are investigated under the direction of a committee of the student's choice. Satisfactory/Unsatisfactory grading only.

Medical Humanities

MHUM 494
Special Topics in Medical Humanities 1 TO 4 hrs.
Presents special topics in selected aspects of medical humanities for health professionals. May be repeated with approval. Students may register in more than one section per term. Approval to repeat course granted by the department. **Prerequisite(s):** May vary by section, depending upon topic.

MHUM 496
Independent Study 1 TO 4 hrs.
Students may arrange with any of the faculty to do independent study on some aspect of communication, history, literature, philosophy, or ethics as it relates to healthcare.

Medical Laboratory Sciences

MLS 527
Clinical Laboratory Method Evaluation 3 hrs.
Development and comparison of clinical laboratory methods; also, statistical methods of evaluating sensitivity, specificity, precision, accuracy, predictive value, and cost-effectiveness. **Same as** PATH 527. **Prerequisite(s):** Consent of the instructor.

MLS 560
Blood Groups: Systems and Serology 3 hrs.
Focus on human blood group systems; biochemistry, inheritance, serologic activity, clinical significance, and disease association. Fundamentals of immunology, molecular biology, and genetics. Extensive computer use required. Taught only online. A UIC netid is required. **Prerequisite(s):** General knowledge of immunohematology and consent of the instructor.

MLS 561
Clinical Immunoematology and Transfusion 3 hrs.
Transfusion medicine practice and therapy. The human circulatory system, effects of hemorrhagic shock, component therapy, hematopoietic transplantation, complications of transfusion, standards, regulations, and compliance. Extensive computer use required. Taught only online. A UIC netid is required. **Prerequisite(s):** MLS 560 and consent of the instructor.

MLS 562
Blood Procurement and Blood Product Manufacturing 0 TO 4 hrs.
Theoretical and practical concepts used in blood procurement and product manufacturing. Blood donor suitability, collection, testing, component preparation, labeling, storage, quality management systems. Extensive computer use required. Lecture-discussion taught only online. A UIC netid is required. Students requiring a clinical rotation component in order to meet certification requirements must register for 4 hours and participate in both laboratory and lecture-discussion; all others register for 3 hours and participate in lecture-discussion only. **Prerequisite(s):** Credit or concurrent registration in MLS 560 and consent of the instructor.

MLS 563
Blood Bank & Transfusion Service Management 0 TO 4 hrs.
Theoretical and practical concepts used in the organization and management of blood centers and transfusion services. Introduction to laboratory financial management, cost accounting, coding, staffing, ethics, and legal issues. Extensive computer use required. Lecture-discussion taught only online. A UIC netid is required. Students requiring a clinical rotation component in order to meet certification requirements must register for 4 hours and participate in both clinical practice and lecture-discussion; all others register for 3 hours and participate in lecture-discussion only. **Prerequisite(s):** MLS 562 and credit or concurrent registration in MLS 561 and consent of the instructor.

MLS 564
Current Trends in Immunoematology 1 hour.
Advanced studies of current trends; assigned topics in current literature read, evaluated, and discussed. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 2 hours. Extensive computer use required. Taught only online. A UIC netid is required. **Prerequisite(s):** General knowledge of immunohematology and consent of the instructor.

MLS 594
Special Topics in Medical Laboratory Sciences 1 TO 3 hrs.
Current theories and methods in medical laboratory sciences. Seminar, literature search, directed study, and discussion format. Topic areas include clinical chemistry, clinical microbiology, clinical immunology, immunohematology, and hematology. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

MLS 596
Independent Study 1 TO 4 hrs.
For graduate students who wish to pursue independent study not related to their project/thesis research. May be repeated. Students may register in more than one section per term.

MLS 597
Project Research in Medical Laboratory Sciences 0 TO 5 hrs.
Independent investigation that engenders the responsibilities of professionals to contribute to their field. Students investigate a topic/problem in their field, write an article, and deliver an oral presentation. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

MLS 598
Research in Medical Laboratory Sciences 0 TO 16 hrs.
Independent research in one area of medical laboratory sciences directed by a faculty member. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Foundation courses in research methods such as AHS 510, and statistics, or consent of the instructor.

Medical-Surgical Nursing

NUMS 510
Physiologic Basis of Nursing Practice Across the Life Span 4 hrs.
Advanced contemporary physiologic principles and their relevance to clinical practice. Content topics will include developmental (life span) physiologic changes. Previously listed as NUSC 530. **Prerequisite(s):** An undergraduate physiology course or consent of the instructor.

NUMS 515
Pathophysiological Basis of Disease 3 hrs.
Provides a foundation for clinical therapeutics through an understanding of mechanisms of disease. Basic concepts of pathological processes at the cellular, molecular, and systems level are examined with application of clinical disease in adults. Previously listed as NUMS 540. **Prerequisite(s):** NUSC 530; or the equivalent or consent of the instructor.

NUMS 520
Management of Health and Illness I: Advanced Practice in Adult Nursing 3 hrs.
Advanced medical-surgical nursing covering etiology, clinical evaluation, and management of specific health problems related to cardiovascular, pulmonary, and endocrine systems. **Prerequisite(s):** NUMS 510, and credit or concurrent registration in NUSC 531, and credit or concurrent registration in NUSC 532, and credit or concurrent registration in NUMS 515; and graduate standing.

NUMS 521
Management of Health and Illness II: Advanced Practice in Adult Nursing 3 hrs.
Advanced medical-surgical nursing covering etiology, clinical evaluation, and management of specific health problems related to neurological, gastrointestinal, immunologic, hematologic, renal, and liver systems. **Prerequisite(s):** NUMS 520; and graduate standing.

NUMS 522
Nurse Practitioner Practicum I: Management of Health and Illness in Adults 4 hrs.
Practicum emphasizing clinical evaluation, health promotion, differential diagnosis, symptom management, education, and case management of adults with complex health problems that may be acute, episodic, or chronic. **Prerequisite(s):** NUMS 520; and graduate standing.

NUMS 523
Clinical Nurse Specialist Practicum I: Adult Health and Illness 4 hrs.
Practicum emphasizing clinical practice, education, research, and consultation related to the care of adults with acute and chronic health problems. **Prerequisite(s):** NUMS 520; and graduate standing.

NUMS 524
Nurse Practitioner Practicum II: Management of Health and Illness in Adults 4 hrs.
Practicum emphasizing clinical evaluation, health promotion, differential diagnosis, symptom management, education, and case management of adults with complex health problems that may be acute, episodic, or chronic. **Prerequisite(s):** NUMS 521 and NUMS 522; and graduate standing.

NUMS 525
Clinical Nurse Specialist Practicum II: Adult Health and Illness 4 hrs.
Practicum emphasizing clinical practice, education, research, and consultation related to the care of adults with acute and chronic health problems. **Prerequisite(s):** NUMS 521 and NUMS 523; and graduate standing.

NUMS 526
Nurse Practitioner Practicum III: Management of Health and Illness in Adults 4 hrs.
Practicum emphasizing clinical evaluation, health promotion, differential diagnosis, symptom management, education, and case management of adults with complex health problems that may be acute, episodic, or chronic. **Prerequisite(s):** NUMS 524; and graduate standing.

NUMS 527
Clinical Nurse Specialist Practicum III: Adult Health and Illness 3 hrs.
Practicum emphasizing clinical practice, education, research and consultation related to the care of adults with acute and chronic health problems. **Prerequisite(s):** NUMS 523; and graduate standing.

NUMS 528
Nurse Practitioner Practicum IV: Management of Health and Illness in Adults 4 hrs.
Practicum emphasizing clinical evaluation, health promotion, differential diagnosis, symptom management, education, and case management of adults with complex health problems that may be acute, episodic, or chronic. **Prerequisite(s):** NUMS 526; and graduate standing.

NUMS 544
Management of Adult Health Problems Practicum 4 hrs.
Preparation for advanced practice evaluation and management of acute, episodic, and chronic care of adult health problems in the primary care setting. **Prerequisite(s):** NUSC 530 and NUMS 530 and NUMS 560 and NUMS 540 and NUSC 532 and NUMS 534.

NUMS 545
Biometrics and Applied Statistics 4 hrs.
Application of recent procedures in statistical analysis. Emphasis is on design of experiments and regression analysis; use of BMDP software on mainframe/VAX computers. **Prerequisite(s):** NUSC 525 or the equivalent or consent of the instructor.

NUMS 546
Multivariate Analysis for Health Sciences 3 hrs.
Practical applications of multivariate techniques in health sciences. Minimal involvement in mathematics provided one has basic understanding of multivariate analysis. **Prerequisite(s):** NUMS 545.

NUMS 548
Management of Chronic and Complex Adult Health Problems Practicum 4 hrs.
Preparation for advanced practice evaluation and management of chronic and complex care of adult health problems. **Prerequisite(s):** NUMS 544.

NUMS 549
Laboratory Techniques for Nursing Research 3 hrs.
Techniques in laboratory research for nursing science. Basic physiological and biochemical methods and equipment, animal models, human subjects, safe laboratory practice, development from conceptualization through execution. Animals used in instruction. **Prerequisite(s):** NUSC 530.

NUMS 562
Quality of Life Issues in Research and Clinical Practice 3 hrs.
Quality of life: construct definition, ethical issues in clinical practice of nurses and other health professionals, measurement and research regarding various illness and age groups. **Prerequisite(s):** Consent of the instructor.

Medicinal Chemistry

MDCH 412
Pharmaceutical Applications of Genomics and Bioinformatics 2 hrs.
Introduction to genomics and bioinformatics for advanced pharmacy students. Principles of gene expression, DNA sequencing in bacterial and human genomes, with emphasis on diagnostic and therapeutic applications. **Same as** PMMP 412. **Prerequisite(s):** PHAR 331 or consent of the instructor. For graduate students: One or two semesters of basic molecular biology and/or biochemistry with a grade of B or better.

MDCH 507
Drug Discovery, Design, and Development 3 hrs.
Overview of drug development process from target identification and screening through clinical trials and FDA evaluation. **Same as** BPS 507 and PMPG 507.

MDCH 516
Structure Elucidation of Natural Products II 3 hrs.
Employing modern computational methods in the structure elucidation and dereplication of a natural product by using real-life examples. **Same as** PMPG 516. May be repeated. **Prerequisite(s):** PMPG 515.

MDCH 553
Cancer Biology and Therapeutics 2 hrs.
Fundamentals of cancer biology with emphasis on biological, hormonal, and chemotherapeutic drug therapies currently used and in development. Specific treatment approaches to breast, ovarian, prostate, and colon cancers will be explored. **Same as** BPS 553 and PMPG 553. **Prerequisite(s):** Consent of the instructor. Recommended background: Molecular and cellular biology.

MDCH 560
Organic Medicinal Chemistry I 3 hrs.
Organic reactions are discussed in terms of their mechanisms and utility in the field of medicinal chemistry, particularly in the synthesis of medicinal agents. **Prerequisite(s):** One year of organic chemistry with laboratory.

MDCH 561
Principles of Medicinal Chemistry 4 hrs.
Concerns basic chemical and physical principles necessary for an understanding of drug action. These principles are applied in the design and discovery of medicinal agents. **Prerequisite(s):** One year each of undergraduate organic chemistry and biochemistry. Requires concurrent registration in MDCH 592.

MDCH 562
Spectroscopy in Medicinal Chemistry 3 hrs.
The fundamental principles used to determine structure and conformation in molecules, emphasizing spectroscopic methods useful in solving structural problems and in analyzing dynamic biological processes. **Prerequisite(s):** One year of physical chemistry or consent of the instructor.

MDCH 564
Physical Medicinal Chemistry 3 hrs.
Focuses on kinetics and thermodynamics in biological systems. Applications to drug action will be emphasized. **Prerequisite(s):** One year of physical chemistry.

MDCH 571
Organic Medicinal Chemistry II 3 hrs.
Heterocyclic chemistry foundation for bio-organic mechanisms of enzyme reactions. Enzymes involved in biosynthesis and metabolism, particularly those that are targets for drug action or involved in drug metabolism. **Prerequisite(s):** MDCH 460 and MDCH 561.

MDCH 572
Drug Design 2 hrs.
Quantitative structure-activity relationships, computer graphics, molecular modeling and simulation, and chemometrics as applied to drug design and discovery. **Prerequisite(s):** MDCH 561.

MDCH 573
Principles of Stereochemistry 1 hour.
Principles of molecular structure and stereochemistry for medicinal and natural products chemists focusing on stereochemical structures rather than synthesis. **Prerequisite(s):** Credit or concurrent registration in MDCH 560 and one year of organic chemistry with lab or consent of the instructor.

MDCH 585
Practical Liquid Chromatography-Mass Spectrometry 2 hrs.
Introductory-level course combining classroom discussions with laboratory demonstrations to provide basic practical knowledge and hands-on experience in the operation of liquid chromatography and mass spectrometry instrumentation. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** MDCH 562.

MDCH 592
Research Techniques in Medicinal Chemistry 2 hrs.
Provides an initial biweekly, informal seminar series with program faculty presenting a discussion of the ongoing research in her/his laboratory. May be repeated to a maximum of 6 hours. Lectures/discussions will be given for the first part of the semester and an intensive lab experience takes place for the remainder of the semester. To be taken fall and spring semesters of the first year of graduate study.

MDCH 594
Special Topics in Medicinal Chemistry 2 TO 4 hrs.
An advanced course covering selected topics which may include new spectroscopic, theoretical, chemometric, and synthetic approaches to biomolecular structure and function. May be repeated to a maximum of 4 hours. **Prerequisite(s):** MDCH 561 and MDCH 562 and one year of physical chemistry and one semester of biochemistry or consent of the instructor.

MDCH 595
Seminar in Medicinal Chemistry 1 hour.
Presentation on a current research topic. Satisfactory/Unsatisfactory grading only.

MDCH 598
Master's Research in Medicinal Chemistry 0 TO 16 hrs.
Thesis research to fulfill master's degree requirements. Satisfactory/Unsatisfactory grading only.

MDCH 599
Doctoral Research in Medicinal Chemistry 0 TO 16 hrs.
Research for doctoral students. Satisfactory/Unsatisfactory grading only.

Medicinal Chemistry and Pharmacognosy

PMMP 412
Pharmaceutical Applications of Genomics and Bioinformatics 2 hrs.

Introduction to genomics and bioinformatics for advanced pharmacy students. Principles of gene expression, DNA sequencing in bacterial and human genomes, with emphasis on diagnostic and therapeutic applications. **Same as MDCH 412. Prerequisite(s):** PHAR 331 or consent of the instructor. For graduate students: one or two semesters of basic molecular biology and/or biochemistry with a grade of B or better.

PMMP 460
Organic Medicinal Chemistry I 3 hrs.

Organic reactions in terms of their mechanisms and utility in the field of medicinal chemistry, particularly in the synthesis of medicinal agents. Upper-division elective taught simultaneously with MDCH 560, however, does not meet the prerequisite requirement of the medicinal chemistry graduate program. **Prerequisite(s):** One year of organic chemistry with laboratory.

Microbiology and Immunology

MIM 425
Fundamentals of Immunology and Microbiology 3 hrs.

Mechanisms of host defense; antigens, immunoglobulins and their reactions; antibody synthesis, regulation, and the cellular immune response; bacterial and viral structure and function; mechanisms of pathogenesis. **Prerequisite(s):** Consent of the instructor or registration in the College of Medicine.

MIM 426
Microorganisms as Agents of Human Disease 3 hrs.

Fundamental aspects of bacterial, fungal, and viral pathogenesis; therapy, control, and prevention of infectious diseases. **Prerequisite(s):** Consent of the instructor.

MIM 455
Microbiology Laboratory Rotation 3 hrs.

Course in basic and applied methods essential for the study of nucleic acids, immunoglobulins, gene transfer, cell fusion, and virological and immunological methods. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 6 hours. Students may register in more than one section per term. **Prerequisite(s):** Graduate standing.

MIM 513
Structure of Biopolymers 3 hrs.

Explores the relationship between structural stability, kinetic properties, and function of biopolymers, with particular emphasis on proteins and nucleic acids. **Same as BCMG 513 and PMPG 513. Prerequisite(s):** GCLS 501 and one year of physical chemistry, or consent of the instructor.

MIM 551
Advanced Immunology 2 hrs.

Concepts in immunochemistry, immunogenetics, molecular immunology, cellular immunology, and immunopathology at the intermediate level. **Prerequisite(s):** GCLS 501, GCLS 502, GCLS 503, and GCLS 510 or consent of the instructor.

MIM 553
Molecular Biology of Viruses 2 hrs.

Animal viruses, including basic structure and viral nucleic acids; emphasizes molecular organization of viral genomes; cellular and molecular events during virus replication and viral transformation. **Prerequisite(s):** GCLS 501, GCLS 502, GCLS 503, and GCLS 511 or consent of the instructor.

MIM 554
Molecular Aspects of Microbiology 3 hrs.

Basic concepts of prokaryotic and eukaryotic genetics; gene structure and function; gene expression; molecular aspects of mutation and recombination; chromosome structure and function. **Prerequisite(s):** BCHE 460.

MIM 560
Microbial Pathogenesis 2 hrs.

Genetics, molecular biology, and physiology of pathogenic bacteria, and host-pathogen interactions. Credit is not given for MIM 560 if the student has credit for MIM 552. **Prerequisite(s):** GCLS 501, GCLS 502, GCLS 503, and GCLS 511 or consent of the instructor.

MIM 585
Cell Biology 4 hrs.

Functional and structural organization of the cell with emphasis on the cellular basis of physiological activity. **Same as ANAT 585 and PHYB 585.**

MIM 594
Special Topics in Microbiology, Immunology, and Virology 1 TO 2 hrs.

Advanced topics are covered in depth. Topics vary yearly. **Prerequisite(s):** BCMG 460 and MIM 451 and MIM 455 and MIM 552 and MIM 553 and consent of the instructor.

MIM 595
Seminar in Microbiology and Immunology 1 hour.

Topics of current research interest are presented by guest lecturers from outside institutions in areas of molecular biology, bacteriology, virology, and immunology. Satisfactory/Unsatisfactory grading only.

MIM 598
Research in Molecular Biology and Immunology 0 TO 16 hrs.

MS thesis research on problems in microbiology, immunology, virology, and molecular biology. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Graduate standing in Microbiology and Immunology.

MIM 599
Research in Molecular Biology and Immunology 0 TO 16 hrs.

PhD thesis research on problems in microbiology, immunology, virology, and molecular biology. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Graduate standing in Microbiology and Immunology.

Movement Sciences

Note: Beginning with the Spring 2009 semester, the Movement Sciences (MVSC) rubric will change to Kinesiology (KN).

MVSC 400
Business Principles for the Fitness Professional 3 hrs.

Provides a survey of basic requisite business principles and the application of these principles for students pursuing careers in corporate and community fitness. Previously listed as KINE 406. **Prerequisite(s):** MVSC 100; and junior standing or above.

MVSC 410
Human Aging and Physical Performance 3 hrs.

Introduction to human aging focused on the impact of aging to physical structure and function. Investigate research-based evidence of the role of activity and exercise in altering physiology, life expectancy, disease, and disability prevention. Previously listed as KINE 404. **Prerequisite(s):** MVSC 252; and junior standing or above.

MVSC 435
Psychology and Physical Activity 3 hrs.
Analysis and application of psychological concepts related to process and outcomes of sport and exercise programs. Previously listed as KINE 412.

MVSC 438
Exercise Adherence 3 hrs.
Exercise behavior as it relates to habitual physical activity. Encompasses health outcomes, exercise adherence factors, intervention, strategies, and exercise settings. Previously listed as KINE 418.

MVSC 441
Muscle Physiology 3 hrs.
Examination of skeletal muscle function during physical activity and adaptations of skeletal muscle that occur with exercise training, inactivity and aging.
Prerequisite(s): MVSC 352 and junior standing or above; or consent of the instructor.

MVSC 442
Principles of ECG Interpretation 3 hrs.
Introduction to the basic principles and interpretation of the electrocardiogram (ECG) as it relates to fitness programs involving the apparently healthy as well as cardiac rehabilitation patients.
Prerequisite(s): Grade of C or better in MVSC 352; and junior standing or above; or consent of the instructor.

MVSC 452
Advanced Exercise Physiology 3 hrs.
Review of research in exercise physiology on topics currently addressed in the research literature. The first half of the semester will address factors affecting performance. The second half will address health and disease factors.
Prerequisite(s): MVSC 352; and junior standing or above and one college-level course in chemistry.

MVSC 460
Neuromechanical Basis of Human Movement 3 hrs.
Biomechanics of single- and multijoint systems, and its role in neural control of movement. Mechanisms of acute adaptations, including warm-up, fatigue and potentiation, and chronic adaptations arising from reduced use or training. Previously listed as KINE 428. **Prerequisite(s):** MVSC 160 and MVSC 252 and junior standing or above; or consent of the instructor.

MVSC 472
Movement Neuroscience 3 hrs.
Overview of the human nervous system. Emphasis is placed on the basic functional anatomical and physiological concepts relevant to the organization and execution of movement. Previously listed as KINE 472. **Prerequisite(s):** MVSC 251 and MVSC 252 and MVSC 352 and MVSC 372; and junior standing or above; or consent of the instructor.

MVSC 481
Workshop in Movement Sciences 1 TO 3 hrs.
Intensified study of selected activities, topics, processes, or areas in movement sciences. Topic will be announced. May be repeated if topics vary. Students may register in more than one section per term. Previously listed as KINE 481.

MVSC 489
Seminars in Movement Sciences 1 TO 3 hrs.
Weekly seminars devoted to research in movement sciences and related fields, followed by a one-hour discussion. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Junior standing or above.

MVSC 490
Educational Practice with Seminar I 6 hrs.
The first half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Previously listed as KINE 490. Graduate credit only with approval of the department.
Prerequisite(s): Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, and approval of the department.

MVSC 491
Educational Practice with Seminar II 6 hrs.
The second half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Previously listed as KINE 491. Graduate credit only with approval of the department.
Prerequisite(s): Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, credit or concurrent registration in MVSC 490, and approval of the department.

MVSC 496
Special Projects in Movement Sciences 1 TO 3 hrs.
Independent research on special projects. Previously listed as KINE 494. **Prerequisite(s):** Approval by graduate faculty member and graduate director.

MVSC 500
Research and Evidence-Based Practice in Movement Sciences 3 hrs.
Training in the research approaches pertaining to specific areas of study in the movement sciences. Special emphasis is placed on accessing, evaluating, and applying findings in the primary literature as critical steps in evidence-based practice. Previously listed as KINE 590.

MVSC 501
Current Research in Movement Sciences 1 hour.
In-depth analysis of current original research. May be repeated to a maximum of 10 hours with approval. Approval to repeat course granted by the department. Previously listed as KINE 521.
Prerequisite(s): Consent of the instructor.

MVSC 502
Movement Science 4 hrs.
Synthesis of the body of knowledge in kinesiology using various diseases as a teaching model. Previously listed as KINE 522.
Prerequisite(s): Consent of instructor.

MVSC 520
Disability and Physical Activity 3 hrs.
Examination of the foundations of physical activity for persons with disabilities. Emphasis on strategies for promoting physical activity among persons with disabilities in community settings. **Same as** DHD 520. Previously listed as KINE 540.

MVSC 523
Exercise Biology in Health and Disease 3 hrs.
Interrelationships between exercise and various pathological conditions. Current research focusing on molecular and cellular mechanisms in healthy and diseased states. **Same as** PHYB 523. Previously listed as KINE 523. **Prerequisite(s):** Consent of the instructor.

MVSC 527
Molecular Biology of Muscle Genes and Proteins 2 hrs.
Regulatory mechanisms that govern gene expression relevant to the function of skeletal and cardiac muscle. Previously listed as KINE 527. **Prerequisite(s):** BIOS 524 and BIOS 525 and consent of instructor.

MVSC 528
Cellular Response to Exercise 3 hrs.
Examines cellular structure/function relationships important for acute and chronic adaptations to exercise. Emphasis on understanding cellular basis of physiological response to exercise. Previously listed as KINE 528.
Prerequisite(s): BIOS 422 or consent of the instructor.

MVSC 529
Exercise Genomics 3 hrs.
Molecular mechanisms by which cells adapt to increases and decreases in physical activity. Emphasis on understanding genomic, transcriptional, translational, and post-translational sites of control. Previously listed as KINE 529. **Prerequisite(s):** BCHE 460 or consent of the instructor.

MVSC 535
Nutrition and Human Performance 2 hrs.
Nutrition which impacts on human performance; impaired performance due to nutritional problems; aspects relevant to the professional athlete. **Same as** HN 535. Previously listed as KINE 535. **Prerequisite(s):** HN 410; and PHYB 341 or MVSC 352; or consent of the instructor.

MVSC 545
Advanced Exercise Programming and Assessment 3 hrs.
Emphasis on current recommendations for exercise prescription and assessment methods for adult populations. Diagnostic and prescriptive procedures will be delineated. Previously listed as KINE 420.
Prerequisite(s): MVSC 452 or consent of the instructor.

MVSC 570
Neural Mechanisms Underlying Motor Control 4 hrs.
Neurophysiological mechanisms that underlie the control and regulation of movement. Previously listed as KINE 570.
Prerequisite(s): Consent of the instructor.

MVSC 571
Biomechanics of Normal and Abnormal Movement 3 hrs.
Principles of statics and dynamics exemplified by human movements. Examination of muscle mechanics, joint forces, stability. Redundancy and intersegmental interactions in multijoint movements. **Same as** PT 571. **Prerequisite(s):** Consent of the instructor.

MVSC 572
Psychology of Motor Control and Learning 3 hrs.
Advanced principles of the control and acquisition of complex, voluntary skills. **Same as** PT 572. Previously listed as KINE 572.
Prerequisite(s): MVSC 372; or consent of the instructor.

MVSC 573
Advanced Topics in Motor Control and Learning 3 hrs.
Contemporary theories and models in motor control and learning. Previously listed as KINE 573.

MVSC 574
Instrumentation for Motor Control Research 3 hrs.
Introduction to oscilloscopes, amplifiers, filters, and transducers. Origin and processing of electromyograms. Motion capture and processing techniques. **Same as PT 574. Prerequisite(s):** MVSC 571 or PT 571.

MVSC 581
Exercise Leadership Field Instruction 3 hrs.
Students are assigned to fitness classes where, under the supervision of a field instructor, they prepare lessons, give instruction, and administer written and physical fitness exams. Previously listed as KINE 520. **Prerequisite(s):** MVSC 545.

MVSC 590
Seminar in Movement Sciences 1 hour.
Final experience for 40-hour MS student. Student must demonstrate ability to synthesize material obtained in program and relate it to their area of concentration. Previously listed as KINE 589. **Prerequisite(s):** 32 semester hours of graduate credit and consent of major advisor.

MVSC 592
Clinical Rotations in Exercise Physiology 1 TO 4 hrs.
The clinical rotation serves as an avenue to introduce students to various experiences in clinical exercise physiology and as a precursor to a clinical internship. Fieldwork is required. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 4 hours. **Prerequisite(s):** Approval of the department.

MVSC 593
Internship in Movement Sciences 1 TO 12 hrs.
Supervised internship in a laboratory or field setting. A written report is required. Normally open only to candidates in the Applied Exercise Physiology MS area of concentration. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 12 hours. Credit is not given for MVSC 593 if the student has credit in MVSC 597 or MVSC 598. Fieldwork required. **Prerequisite(s):** Students must pass the comprehensive examination before placement at an internship site.

MVSC 594
Selected Topics in Movement Sciences 1 TO 3 hrs.
Topic to be announced. Analysis of selected problems and concerns in specified concentrations. Topics vary from semester to semester, depending on the needs and interests of the graduate students. May be repeated if topics vary. Previously listed as KINE 594. **Prerequisite(s):** Consent of the instructor.

MVSC 596
Independent Research in Movement Sciences 1 TO 4 hrs.
Topics vary. Students design, implement, and analyze a research problem in their individual area of concentration under the supervision of a faculty member. Previously listed as KINE 596. **Prerequisite(s):** MVSC 500.

MVSC 597
Project in Movement Sciences 0 TO 8 hrs.
Supervised practicum in laboratory or field setting in which recent research findings are applied, tested, and evaluated. Satisfactory/Unsatisfactory grading only. May be repeated. Previously listed as KINE 597. **Prerequisite(s):** MVSC 500 and consent of the advisor and director of graduate studies.

MVSC 598
Master's Thesis Research 0 TO 16 hrs.
Thesis work under the supervision of a graduate advisor. Satisfactory/Unsatisfactory grading only. May be repeated. Previously listed as KINE 598. **Prerequisite(s):** MVSC 500 and consent of the advisor and director of graduate studies.

MVSC 599
PhD Thesis Research 0 TO 16 hrs.
Independent research by the student under the supervision of the thesis advisor. Satisfactory/Unsatisfactory grading only. May be repeated. Previously listed as KINE 599. **Prerequisite(s):** Students must have passed the preliminary exam.

Music

MUS 490
Music Education: Special Topics 1 TO 4 hrs.
An investigation of various topics in music education pertinent to practicing music teachers. May be repeated. **Prerequisite(s):** Senior standing or above.

Native American Studies

NAST 415
American Indian Ethnohistory 3 OR 4 hrs.
Introduction to ethnohistory, an interdisciplinary approach to researching, conceptualizing, and writing American Indian history. The course is organized typically and centers on classic and current monographs and articles. **Same as HIST 415.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing or above and consent of the instructor. Recommended background: Courses in cultural anthropology, American Indian anthropology, American Indian literature.

NAST 471
Topics in Native American Literatures 3 OR 4 hrs.
The history and development of literature by and about American Indians. Content varies. **Same as ENGL 471.** 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** Senior standing or above and 6 hours of English, African American studies, or Latin American studies or consent of the instructor.

Natural Sciences

NATS 574
Advanced Study of Science Taught in Standard-Based Middle-Grade Science Curricula 3 hrs.
The advanced study of concepts underlying standards-based instruction in the natural sciences (chemistry, physics, earth science, and biology) in grades 5-8 is explored in a pedagogical context. **Prerequisite(s):** Consent of the instructor.

Neuroscience

NEUS 403
Human Neuroanatomy 3 hrs.
Morphological organization of the nervous system. Functional correlations of neural structures. **Same as ANAT 403.** Meets eight weeks of the semester. **Prerequisite(s):** Graduate standing and consent of the instructor. Must be in a degree program.

NEUS 483
Neuroanatomy 4 hrs.
Organization of the nervous system, with an emphasis on mammals. **Same as BIOS 483** and PSCH 483. Animals used in instruction. **Prerequisite(s):** BIOS 272 or BIOS 286 or BIOS 325 or PSCH 262; or consent of the instructor.

NEUS 501
Foundations of Neuroscience I 3 hrs.
Provides a core understanding of modern neuroscience. Focuses on topics in cell and molecular neuroscience. Taught by faculty from multiple units. **Same as BIOS 584.** Recommended background: Credit or concurrent registration in GCLS 503.

NEUS 502
Foundations of Neuroscience II 3 hrs.
A core understanding of modern neuroscience. Focus is on topics in systems, cognitive and behavioral neuroscience. Will be taught by faculty from multiple units. Continuation of NEUS 501. **Same as BIOS 585.** **Prerequisite(s):** NEUS 501 or BIOS 584. Recommended background: Credit or concurrent registration in NEUS 403.

NEUS 506
Research Rotations in Neuroscience 3 TO 6 hrs.
Research rotation course in which first-year students from the Neuroscience program will undertake research projects in laboratories affiliated with this program. May be repeated. Animals used in instruction. **Prerequisite(s):** Open only to PhD degree students.

NEUS 511
Biomedical Neuroscience I: Molecular Biology of Synapses 2 hrs.
Molecular mechanisms of synaptic transmission. Information on the principal neurotransmitter systems, structure of ionotropic and metatropic receptors, and their signal-transduction mechanisms. **Prerequisite(s):** NEUS 501.

NEUS 512
Biomedical Neuroscience II: Aspects of Brain Function in Health and Disease 2 hrs.
An integrated view of brain function in health and disease; the anatomical and functional pathophysiological aspects underpinning major neurological and psychiatric disorders. **Prerequisite(s):** NEUS 501; or consent of the instructor.

NEUS 525
Molecular and Cellular Mechanisms of Neurodegenerative Diseases 2 hrs.
Molecular, cellular, and physiological mechanisms underlying neuropathology in neurodegenerative diseases and trauma to the central and peripheral nervous system of humans. **Same as ANAT 525.** Recommended background: A basic course in neuroscience.

NEUS 561
Current Topics in Visual Neuroscience 2 hrs.
Discussion of current research and theoretical issues in visual neuroscience by staff, students, and guest lecturers. May be repeated. **Prerequisite(s):** Consent of the instructor.

NEUS 582
Methods in Modern Neuroscience 2 hrs.
Underlying principles and applications of techniques used to analyze nervous system organization and function. Behavioral, electrophysiological, anatomical, and biochemical approaches are considered. **Same as BIOS 582.** Animals used in instruction.

NEUS 588
**Human Neuroscience:
Functional Magnetic
Resonance Imaging** 3 hrs.
Lectures and demonstrations present the principles of magnetic resonance imaging for understanding cognitive, sensory, and motor function of the human brain in health and disease. Extensive computer use required. Laboratory work required. **Prerequisite(s):** Consent of the instructor. Recommended background: PHYS 142; and MATH 181 or equivalent classroom experience in college physics and math.

NEUS 589
**Human Neuroscience:
Sensory-Motor
and Cognitive
Systems** 3 hrs.
Lectures and demonstrations focus on investigations of sensory-motor and cognitive systems in the human brain using neuroimaging. Extensive computer use required. **Prerequisite(s):** Consent of the instructor. Recommended background: NEUS 588.

NEUS 595
**Seminar in
Neuroscience** 1 hour.
Oral presentations are made by students each session on timely journal articles, followed by in-depth discussions of the reported research. Presentation of research by invited lecturers. Satisfactory/Unsatisfactory grading only. May be repeated.

NEUS 596
**Independent
Study** 1 TO 4 hrs.
Independent study under the direction of a faculty member. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

NEUS 598
**Master's Thesis
Research in
Neuroscience** 0 TO 16 hrs.
Thesis research under the direction of a faculty member. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** NEUS 501 and NEUS 502 and NEUS 506; successful completion of first year core courses; and consent of the instructor. Open only to Master's degree students in neuroscience.

NEUS 599
**Doctoral
Research in
Neuroscience** 0 TO 16 hrs.
Independent research, directed by a faculty member. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** NEUS 501 and NEUS 502 and NEUS 506; successful completion of first-year core courses; and consent of the instructor. Open only to PhD degree students in Neuroscience.

Nursing Sciences
NUSC 420
**Pathophysiology and
Pharmacotherapeutics I** 3 hrs.

First of two courses that provide an understanding of responses to disease and pharmacological treatments. Included are the therapeutic and toxic effects for major drug classes and basic microbiology principles. **Prerequisite(s):** MVSC 251 and MVSC 252 and graduate standing. Must enroll concurrently in NUSC 421.

NUSC 421
**Integrated Healthcare:
Concepts and Skills** 8 hrs.
This course will provide the basis for understanding fundamental concepts to the practice of nursing across the life span. Theoretical concepts will be integrated with skills essential to practice. **Prerequisite(s):** Graduate standing. Must enroll concurrently in NUSC 420.

NUSC 422
**Integrated
Healthcare:
Community** 2 hrs.
Theories of community assessment, disease prevention, and health behavior are applied to promotion of health for communities and vulnerable populations. Understanding of systems and collaboration with the interdisciplinary team are emphasized. **Prerequisite(s):** NUSC 420 and NUSC 421; and graduate standing.

NUSC 423
**Pathophysiology and
Pharmacotherapeutics II** 4 hrs.

Second of two courses that provide an understanding of responses to disease and pharmacological treatments. Included are the therapeutic and toxic effects for major drug classes and basic microbiology principles. **Prerequisite(s):** Credit or concurrent registration in NUSC 420.

NUSC 424
**Integrated Healthcare:
Adult/Older Adult** 4 hrs.
This course focuses on clinical evaluation/management of common/complex problems in adults and older adults. Emphasizes pathophysiology and management strategies in context of culture and ethnicity. **Prerequisite(s):** NUSC 420 and NUSC 421; and graduate standing.

NUSC 425
**Integrated Healthcare:
Clinical Practice I** 7 hrs.
Provide students with experiences across all levels of prevention. Focus is on planning and implementing care for adults and older adults—individuals and populations. Students experience the systems of care from acute care to community. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** NUSC 420 and NUSC 421; and graduate standing. Must enroll concurrently in NUSC 422 and NUSC 424.

NUSC 426
**Cultural Fluency and
Communication Skills** 2 hrs.
Course provides a foundation of communication skills, teaching and learning theory, and cultural competence for provision of nursing care. **Prerequisite(s):** NUSC 420 and NUSC 421; and graduate standing.

NUSC 427
**Integrated Healthcare:
Clinical Practice II** 8 hrs.
Provide students with experiences across all levels of prevention. Focus is on planning and implementing care for women, children, and the mentally ill in a variety of settings. Students experience the systems of care from acute care to community. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** NUSC 425 and graduate standing. Concurrent registration in NUSC 428 and NUSC 430.

NUSC 428
**Integrated Healthcare:
Women, Children,
and Family** 4 hrs.
Care for women throughout the life span, including pregnancy, birth, the postpartum and interconceptional periods, and throughout the aging process. **Prerequisite(s):** NUSC 420 and NUSC 421 and graduate standing.

NUSC 429
**Integrated Healthcare:
Clinical Synthesis** 7 hrs.
Focus is on synthesis of nursing knowledge and skills and on implementation of leadership and management skills, including organizing care and delegation, in the provision of care. Clinical experiences occur in their area of concentration. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** NUSC 427 and graduate standing. Concurrent registration in NUSC 434.

NUSC 430
**Integrated Healthcare:
Mental Health** 2 hrs.
Application and integration of biopsychosocial concepts and principles to the mental healthcare of individuals and groups across the continuum of care, including health promotion and illness prevention, maintenance and rehabilitation. **Prerequisite(s):** NUSC 420 and NUSC 421 and graduate standing.

NUSC 432
Bioethics 2 hrs.
Examine ethical decision-making models as applied to nursing. Use ethics committees, resolution of conflict around ethical dilemmas, impact of cultural/gender influences on ethical decision-making, and nursing's role as patient advocate. **Prerequisite(s):** NUSC 420 and NUSC 421 and graduate standing.

NUSC 434
**Leadership in
Professional Practice** 3 hrs.
Theories of leadership/management are analyzed in relationship to the new healthcare delivery system, nursing role, evidence-based practice, future trends, and the professional education continuum. **Prerequisite(s):** NUSC 422 and NUSC 424 and NUSC 425 and NUSC 427 and NUSC 428 and NUSC 429 and graduate standing.

NUSC 438
**Infant Feeding:
Historical, Societal,
and Health
Policy Issues** 3 hrs.
Examines infant feeding practices from historical, contemporary, societal, and political dimensions. The importance of infant feeding in developing countries as well as legislation regarding infant feeding is also examined. **Prerequisite(s):** Consent of the instructor.

NUSC 440
**Wholistic Health:
Use of Self** 2 hrs.
Comprehensive mind, body, and spiritual healthcare. Spiritual assessment of self, individuals, and families. Self as a therapeutic agent/health provider for wholistic healthcare. **Prerequisite(s):** Graduate standing; or senior standing.

NUSC 441
**Wholistic Health:
Community Focus** 2 hrs.
Community and congregational assessment. Health beliefs and practices of faith communities and their impact on healthcare services, communities, and systems to foster planned change. **Prerequisite(s):** Graduate standing; or senior standing.

NUSC 450
**Women and Mental
Health Nursing** 3 hrs.
Theories of female psychology; women's daily lives and mental health; gender differences in mental illness; strategies for improving women's mental health. **Same as** GWS 450 and NUWH 450. **Prerequisite(s):** Consent of the instructor. Students enrolled in the College of Liberal Arts and Sciences must have credit in PSCH 100 and either PSCH 270 or PSCH 315 or GWS 315.

NUSC 455
Women's Health: A Primary Healthcare Approach 3 hrs.
Health promotion and disease prevention in women's health. Includes community experience with community women. Primary healthcare approaches examined. **Same as** CHSC 456 and NUWH 455. **Prerequisite(s):** Consent of the instructor.

NUSC 460
Individualized Internship 1 TO 5 hrs.
Intensive internship experience will consist of a practicum that will develop skills, competencies, and knowledge in a focused healthcare delivery setting. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

NUSC 494
Special Topics 1 TO 3 hrs.
Discusses selected topics of current interest. Offered according to sufficient student demand and instructor availability. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

NUSC 499
Urbana Nursing Registration 0 TO 16 hrs.
Special course created to accommodate College of Nursing students in Urbana. Represents UIUC registration for undergraduate and graduate nursing students. Satisfactory/Unsatisfactory grading only. No graduation credit.

NUSC 500
Introduction to the Clinical Nurse Specialist Role 1 hour.
Models and role competencies of the clinical nurse specialist. **Prerequisite(s):** NUSC 527.

NUSC 503
Evidence-Based Practice 3 hrs.
Application of evidence-based practice to healthcare delivery systems and clinical issues. Emphasizes the integration of retrieved evidence with client preferences in order to design and evaluate best practices. **Prerequisite(s):** Admission to the Doctor of Nursing Practice program. Credit or concurrent registration in NUSC 527 and EPID 400 and EPID 403 or the equivalent courses.

NUSC 505
Philosophy of Science for Health Research 3 hrs.
Traces the development of scientific reasoning and explanation from Aristotle to the present, focusing on the nature of knowledge and role of truth for health research. **Prerequisite(s):** Graduate-level research course or consent of the instructor.

NUSC 506
Theory and Theory Development for Nursing Research 3 hrs.
Methods of theory development and critical analysis of selected biological, behavioral, health service, and grand nursing theories which form the basis of nursing science are examined. **Prerequisite(s):** NUSC 505.

NUSC 507
Promoting Health: Translating Science to Practice 3 hrs.
Examine theories/models of health promotion, disease prevention, and teaching/learning for their application to direct care and systems-focused nursing practice. **Prerequisite(s):** Admission to the Doctor of Nursing Practice program. Credit or concurrent registration in NUSC 503.

NUSC 509
Advanced Nursing Leadership Concepts 3 hrs.
Emphasizes leadership in direct care and systems-focused advanced nursing practice roles. Focuses on synthesis of theoretical leadership concepts with personal/professional values and working with multiple disciplines and multiple constituencies. **Prerequisite(s):** Admission to the Doctor of Nursing Practice program. Credit or concurrent registration in NUSC 528 or the equivalent.

NUSC 511
Advanced Research Design 4 hrs.
In-depth analysis of research design, including such areas as design appropriateness and validity, sampling, research ethics, and interpretation. Application of the content to nursing and related fields. **Prerequisite(s):** Credit or concurrent registration in NUSC 505; and graduate-level statistics or consent of the instructor.

NUSC 515
Measurement in Health Research 4 hrs.
Qualitative and quantitative measurement theories; assessment of reliability, validity, and data quality. Critical analysis of measurement issues across the continuum of measures in health research. **Prerequisite(s):** Credit or concurrent registration in NUSC 506 and NUSC 511 or consent of the instructor and credit or concurrent registration in the second course in graduate-level statistics series.

NUSC 517
Advanced Research Practicum 1 TO 4 hrs.
An intensive guided research practicum in design, data collection, psychometric analysis, or specific analytic technique relevant to the student's research specialization. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 6 hours. Must be repeated for a minimum of 3 hours of credit. **Prerequisite(s):** NUSC 515 and two advanced statistics courses.

NUSC 520
Dying, Loss, and Grief 3 hrs.
Analysis of social, cultural, and psychological aspects of human grief, loss/death within families, and professional caregivers surrounding palliative and end-of-life care.

NUSC 522
Palliative Management of Pain and Common Symptoms 3 hrs.
Evidence base of biobehavioral strategies for palliative management of pain and common symptoms in life-limiting and chronic illness across the life span.

NUSC 524
Sociocultural and Ethical Issues in Palliative Care 3 hrs.
Using an ethics theoretical framework, this course explores social, cultural, and political factors that influence palliative care for clients and families across the life span.

NUSC 525
Intermediate Statistics 3 hrs.
Application and interpretation of statistical techniques appropriate for health sciences. Prepares students to think quantitatively, use computer to perform statistical analysis, and assess data critically. **Prerequisite(s):** An undergraduate statistics course.

NUSC 526
Nursing Inquiry I 2 hrs.
The first of a two-course sequence on the process and application of nursing inquiry; emphasizes approaches to inquiry, theory analysis, constructs, measurement, and theory generation. **Prerequisite(s):** Credit or concurrent registration in NUSC 525 or the equivalent.

NUSC 527
Nursing Inquiry II 2 hrs.
Continuation of NUSC 526, emphasizing the methods of theory development and theory testing in selected areas of nursing sciences. Ethical issues in research. **Prerequisite(s):** NUSC 526.

NUSC 528
Health, Environment, and Systems 2 hrs.
Examination of international, national, and local environments for health, health systems, health policy, and their outcomes. Influence of social, cultural, and ethical factors.

NUSC 529
Issues of Advanced Practice in Nursing 1 hour.
Examines advanced practice in nursing from historical, contemporary, and future dimensions. May be repeated. Students may register in more than one section per term. Only students enrolled in specific nursing concentrations are allowed to repeat course. **Prerequisite(s):** NUSC 528.

NUSC 531
Pharmacotherapeutics in Advanced Practice in Nursing 3 hrs.
Advanced principles of pharmacotherapeutics. Includes legal issues, client adherence, and medication selection factors. **Prerequisite(s):** Credit or concurrent registration in NUSC 530 or credit or concurrent registration in NUSC 535 or the equivalent or consent of the instructor.

NUSC 532
Comprehensive Health Assessment for Advanced Practice 0 TO 3 hrs.
Includes physical, psychosocial, developmental, occupational, sexual, and cultural assessments across the life spans, emphasizing differences between normal and abnormal. Students synthesize results in client's health status. Students register for either 2 or 3 credit hours. Students registering for three credit hours must register for two additional laboratory-discussion hours per week. **Prerequisite(s):** NUSC 210 or the equivalent or consent of the instructor.

NUSC 533
Applied Pharmacotherapeutics in Advanced Practice in Nursing 1 hour.
Application of pharmacology principles to sub-specialty populations. May be repeated to a maximum of 2 hours. **Prerequisite(s):** Credit or concurrent registration in NUSC 531.

NUSC 535
Biological Basis of Disease 4 hrs.
Provides a foundation for clinical therapeutics through an understanding of biophysical mechanisms of disease. Basic concepts of pathological processes are examined with application to organ systems and across the life span. **Prerequisite(s):** Undergraduate physiology and pathophysiology courses.

NUSC 536
Forensic Nursing Science 3 hrs.
Focuses on the background, development, and theoretical foundations of forensic nursing.

NUSC 537
Forensic Healthcare Documentation and Evidence Collection 3 hrs.
Focuses on the integration of the criminal justice, social service, and legal systems into the nursing care of people affected by violence. **Prerequisite(s):** NUSC 536.

NUSC 538
Forensic Healthcare for Vulnerable Populations 3 hrs.
Focus on the specific needs of vulnerable populations as victims of violence. **Prerequisite(s):** NUSC 537.

NUSC 539
Forensic Practicum 3 hrs.
Completion of a practicum in a specialty practice area focusing on victims, families, and alleged perpetrators. **Prerequisite(s):** NUSC 538.

NUSC 540
Instructional Design and Delivery in Nursing and Health Sciences 3 hrs.
Comprehensive introduction to teaching/learning theory, methods, and strategies for instruction and enhancement of learning in the classroom, clinical, and online. **Prerequisite(s):** Consent of the instructor.

NUSC 541
Teaching/Learning Synthesis in Nursing and Health Sciences 3 hrs.
Synthesis and application of teaching/learning theories, methods, and strategies for instructional design and delivery, learner/course/program evaluation and assessment, curricular processes in individualized settings and contexts. **Prerequisite(s):** Credit or concurrent registration in NUSC 540 and credit or concurrent registration in NUSC 542 and credit or concurrent registration in NUSC 545; and consent of the instructor.

NUSC 542
Curriculum Processes in Nursing and Health Sciences 3 hrs.
Comprehensive introduction to processes relevant to the design and implementation of a curriculum from foundational concepts through outcomes monitoring. **Prerequisite(s):** Consent of the instructor.

NUSC 544
Qualitative Research in Nursing 4 hrs.
Major approaches to qualitative research, including design, conduct, reporting, and firsthand experience in data collection and analysis. **Prerequisite(s):** Consent of the instructor.

NUSC 545
Evaluation and Assessment in Nursing and Health Sciences 3 hrs.
Evaluation theory and strategies for evaluating student learning, courses, and programs in multiple settings and contexts. **Prerequisite(s):** Consent of the instructor.

NUSC 547
Population-Focused Intervention in Primary Care 2 hrs.
Population-focused assessment, program planning, and evaluation of interventions for community-based healthcare providers. **Same as** NUPH 547. **Prerequisite(s):** EPID 400.

NUSC 548
Methodological Issues for Cross-Cultural Research 3 hrs.
Conceptual, methodological, and ethical issues for research with varied racial/ethnic backgrounds. Applies acculturation, translation, immigration, and health behavior issues to clinical, community, and international settings. **Prerequisite(s):** NUSC 511; and consent of the instructor.

NUSC 550
Issues for Research and Practice in Women's Health 3 hrs.
Analysis of gender-related definitions of health and illness in theory issues and research evaluation criteria for women's healthcare practice are developed as a basis for research. **Same as** NUWH 550. **Prerequisite(s):** Consent of the instructor.

NUSC 552
Responsible Conduct of Research 1 hour.
Overview of the major ethical issues in the conduct of research with human or animal subjects with strategies for resolving these issues. Course is required by National Institutes of Health for all students supported by a National Research Service Award. **Prerequisite(s):** Open only to PhD degree students or consent of the instructor.

NUSC 555
Theories and Methods in Women's Health Nursing Research 3 hrs.
Critical analysis of theoretical and methodological approaches in women's health nursing research. Emphasis on evaluation schema useful to researchers. **Same as** NUWH 555. **Prerequisite(s):** NUSC 550 or NUWH 550, and consent of the instructor.

NUSC 556
Developing Literature Reviews 3 hrs.
Prepares the student to conduct literature reviews in an area of interest and write a literature synthesis. May be repeated. **Prerequisite(s):** Open only to PhD degree students; or consent of the instructor.

NUSC 557
Intermediate Epidemiology for Advanced Nursing Practice 3 hrs.
Provides intermediate level knowledge and skills in epidemiology for nurses and other public health practitioners. Addresses threats to validity and other issues of interpretation of designs. **Same as** NUPH 557. **Prerequisite(s):** EPID 400 or an equivalent course.

NUSC 558
Grant Writing for the Nurse Scientist 3 hrs.
Prepares students to submit their first competitive grant application for National Research Service Awards (NRSA) for predoctoral (F31) and postdoctoral (F32) fellowships. This course emphasizes the practical aspects of writing the grant proposal. May be repeated. **Prerequisite(s):** Credit or concurrent registration in NUSC 511; or consent of the instructor. Students will be expected to work closely with their advisor during this course and are encouraged to register for at least 1 credit hour of NUSC 596 with their advisor.

NUSC 559
Grant Writing for Healthcare Services 3 hrs.
Focuses on developing knowledge and application skills needed for successful health service programmatic grant writing. **Same as** NUPH 559. **Prerequisite(s):** Credit or concurrent registration in NUPH 507 or credit or concurrent registration in NUSC 507; and credit or concurrent registration in NUAS 502 or credit or concurrent registration in NUPH 511; or consent of the instructor.

NUSC 560
Theoretical Basis for Primary Healthcare 3 hrs.
Students analyze the conceptual basis of primary healthcare applicable to diverse communities, and develop a primary healthcare model specific to a community of interest.

NUSC 561
Ethical Issues in Primary Healthcare 3 hrs.
Examination of the ethical components of primary healthcare as a philosophy, strategy, and level of care; and explication of personal framework for analysis of a specific health issue. **Prerequisite(s):** NUSC 560 or consent of the instructor.

NUSC 562
Primary Healthcare Research Methods 3 hrs.
Conceptual issues, advanced methodologies, and dissemination strategies for scientifically sound and policy-relevant global primary healthcare research. Building community relationships for primary healthcare research. **Prerequisite(s):** NUSC 511 and NUSC 560 or the equivalent or consent of the instructor.

NUSC 565
Advanced Research in Women's Health 1 TO 2 hrs.
Advanced seminar for doctoral students in graduate nursing concentration in women's health. Faculty and students present and critique on-going and developing research. **Same as** NUWH 565. **Prerequisite(s):** Consent of the instructor.

NUSC 566
Family-Focused Health Management in Primary Care 3 hrs.
Assessment and management of common behavioral, lifestyle, and life-cycle issues in primary care using a family-focused approach. **Same as** NUPH 566. **Prerequisite(s):** NUSC 532; or consent of the instructor.

NUSC 570
International Dimensions in Women's Health 3 hrs.
Critical examination of the health of women from a global perspective. Emphasizes resources and strategies nurse researchers use to monitor women's health across cultures and countries. **Same as** NUWH 570. **Prerequisite(s):** Consent of the instructor.

NUSC 571
Leadership in International Health 2 hrs.
Examines the trends and issues involved in leadership development of health professionals for global health and discusses strategies to make impact on healthcare outcomes in the global village. **Prerequisite(s):** NUSC 506 and NUSC 515.

NUSC 572
Synthesis Project Development 1 TO 4 hrs.
Students design a doctoral nursing practice project related to an aggregate of individuals/selected population of interest. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Admission to the Doctor of Nursing Practice program; consent of the instructor.

NUSC 574
Synthesis Project Implementation 1 TO 4 hrs.
Students implement a doctoral nursing practice project related to an aggregate of individuals/selected population of interest. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Admission to the Doctor of Nursing Practice program. NUSC 527 and consent of the instructor.

NUSC 575
Minority Women's Health Nursing 3 hrs.
Theoretic and descriptive overview of the health concerns and health conditions of women from ethnic/racial minority backgrounds with implications for nursing research and practice. **Same as** NUWH 575. **Prerequisite(s):** Consent of the instructor.

NUSC 576
Synthesis Project Evaluation and Dissemination 1 TO 4 hrs.
Students analyze and disseminate findings from the doctoral nursing practice project. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Admission to the Doctor of Nursing Practice program. NUSC 574 and consent of the instructor.

NUSC 580
Health Services and Health Behavior Research: Models and Frameworks 3 hrs.
Examines and critiques individual, systems, and community-level models and frameworks which guide health services delivery and health promotion behavior research. **Prerequisite(s):** NUSC 505 and NUSC 506; or consent of the instructor.

NUSC 581
Health Services and Health Behavior Research: Methods and Measurement 3 hrs.
Critically analyzes methodological and measurement issues which are important to advanced research in health services delivery and health promotion behavior. **Prerequisite(s):** NUSC 511 and NUSC 515 and NUSC 580; or consent of the instructor.

NUSC 582
DNP Residency I: Direct Care Role 2 TO 4 hrs.
Individualized residency experience that will expand clinical expertise and specialized knowledge in the selected direct care, advanced nursing practice specialty role. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Admission to the Doctor of Nursing Practice program; consent of the instructor.

NUSC 583
DNP Residency II: Direct Care Role 2 TO 4 hrs.
Individualized residency experience that will facilitate development of systems-level clinical expertise in the selected direct care advanced nursing practice specialty role. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Admission to the Doctor of Nursing Practice program; NUSC 582 and consent of the instructor.

NUSC 584
Conducting Human Subjects Research 1 TO 2 hrs.
Topics include ethical principles that guide research, federal regulations, IRB guidelines, issues of informed consent and vulnerable populations, and other topics based on student interest. **Prerequisite(s):** NUSC 511.

NUSC 585
Advanced Research Seminar 1 TO 2 hrs.
Integrates theory and methods for health research. Topics vary according to student interests and instructor availability. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. A minimum of 2 hours of credit is required; a maximum of 4 hours of credit may be applied toward the PhD. **Prerequisite(s):** Consent of the instructor. Open only to PhD degree students.

NUSC 586
DNP Residency I: Systems-Focused Role 2 TO 4 hrs.
Individualized residency experience that will expand expertise and specialized knowledge in the selected systems-focused advanced nursing practice specialty role. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Admission to the Doctor of Nursing Practice program; consent of the instructor.

NUSC 587
DNP Residency II: Systems-Focused Role 2 TO 4 hrs.
Individualized residency experience that will expand development of systems-level expertise in the selected systems-focused advanced nursing practice specialty role. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Admission to the Doctor of Nursing Practice program; NUSC 586 and consent of the instructor.

NUSC 590
Leadership in Scientific Careers 1 hour.
Analyzes components of leadership in science at the national and global levels. Analyzes factors and issues of the discipline affecting a research career. Analyzes the interdependency of the science to policy cycles of influence. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** NUSC 517. Open only to PhD degree students.

NUSC 592
Preliminary Exam Preparation 1 TO 12 hrs.
Literature review, reading, and writing in preparation for the preliminary examination supervised by faculty research advisor. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 24 hours. **Prerequisite(s):** Completion of core courses and consent of the instructor.

NUSC 594
Special Topics: Advanced 1 TO 3 hrs.
Discusses selected topics of current interest. Offered according to sufficient student demand and instructor availability. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

NUSC 595
Seminar in Nursing 1 TO 3 hrs.
Identifies and analyzes a broad range of issues related to modern nursing and nursing research. Topics vary according to student interests and instructor availability. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

NUSC 596
Independent Study: Graduate 1 TO 4 hrs.
Selected problems in nursing are investigated under the direction of a graduate faculty member. Modes of investigation are determined by the nature of the nursing problem selected. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

NUSC 597
Master's Project 0 TO 16 hrs.
Master's student project research. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

NUSC 598
Master's Thesis Research 0 TO 16 hrs.
Master's student thesis research. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

NUSC 599
PhD Thesis Research 0 TO 16 hrs.
Doctoral student thesis research. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

Occupational Therapy

OT 401
Occupational Performance in Adults and Adolescents 4 hrs.
Reviews the primary developmental aspects and roles of adolescence and adulthood. Personal and environmental factors that influence occupational performance and prevention and wellness models to facilitate occupational functioning. **Prerequisite(s):** Admission to the Master of Science in Occupational Therapy program.

OT 406
Development of a Therapeutic Self 3 hrs.
Emphasizes understanding and developing foundational skills in therapeutic use of self and forms of therapeutic reasoning. Group theory and process is introduced and group leadership skills developed. **Prerequisite(s):** Admission to the Master of Science in Occupational Therapy program.

OT 407
Introduction to Occupational Therapy Practice 2 hrs.
Overview of the role of the therapist and aspects of occupational therapy practice in multiple settings. The basics of assessment, treatment planning, intervention, and documentation; as well as service delivery systems and current issues. **Prerequisite(s):** Admission to the Master of Science in Occupational Therapy program.

OT 411
Occupational Performance in Children 4 hrs.
Developmental theories concerning factors influencing the development of occupational performance in infancy, childhood, and early adolescence. Developmental assessment methods and tools. **Prerequisite(s):** Grade of C or better in OT 401 and grade of C or better in OT 407; and graduate standing; and consent of the instructor.

OT 412
Human Structure and Function 5 hrs.
Anatomical and physiological basis for occupational performance. Features structure and function of musculoskeletal, cardiovascular, and nervous systems and application of biomechanical principles. **Prerequisite(s):** Admission to the Master of Science in Occupational Therapy program.

OT 416
Occupational Therapy Practice: Psychosocial Aspects of Occupational Performance 3 hrs.
Occupational therapy practices relevant to psychosocial intervention, related bodies of knowledge influencing practice, psychological process affecting occupational functioning, and assessment and treatment related to psychosocial problems. **Prerequisite(s):** Grade of C or better in OT 401 and grade of C or better in OT 407; and graduate standing; and consent of the instructor.

OT 420
Community Practicum 1 hour.
Field experience in a community agency serving an urban population. Emphasis is on service learning in context and the development of professional behaviors. Satisfactory/Unsatisfactory grading only. May be repeated. Fieldwork required. **Prerequisite(s):** Admission to the Master of Science in Occupational Therapy program.

OT 422
Medical Conditions 1 hour.
This self-paced course reviews etiology, clinical manifestation, clinical course, and general medical and rehabilitative management of common medical conditions; emphasis on musculoskeletal, neurologic, cardiopulmonary, and psychiatric disorders. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Admission to the Master of Science in Occupational Therapy program.

OT 424
Contexts of Occupational Therapy Practice 2 hrs.

Trends in healthcare, reimbursement, legislation, and disability policy and how they affect occupational therapy. The policy process and development of an advocacy role. Exposure to community-based practice and consultation roles. **Prerequisite(s):** Grade of C or better in OT 407; and graduate standing.

OT 428
Fieldwork Level I 3 hrs.

Application of occupational therapy theory and therapeutic reasoning in a forty-hour/week fieldwork experience with the opportunity to develop beginning therapeutic skills and professional behavior. Fieldwork required. **Prerequisite(s):** Grade of C or better in OT 411 and grade of C or better in OT 412 and grade of C or better in OT 416; and satisfactory completion of OT 422 and graduate standing; and consent of the instructor.

OT 436
Occupational Therapy Practice: Functional Movement and Mobility 5 hrs.

Application of occupational therapy evaluation and intervention skills to children and adults with occupational performance deficits resulting from mobility and movement dysfunction. **Prerequisite(s):** Grade of C or better in OT 411 and grade of C or better in OT 412 and grade of C or better in OT 416; and satisfactory completion of OT 422 and graduate standing.

OT 437
Occupational Therapy Practice: Cognition and Perception in Action 4 hrs.

The impact of impaired cognitive and perceptual processes on occupational performance of children and adults with neurological conditions, cognitive and intellectual disabilities, and psychiatric disabilities. **Prerequisite(s):** Grade of C or better in OT 411 and grade of C or better in OT 412 and grade of C or better in OT 416; and satisfactory completion of OT 422 and graduate standing.

OT 448
Fieldwork Level IIA 8 hrs.

First of two supervised, full-time, twelve-week practica with emphasis on application of OT theory, development of psychomotor skills, reasoning client-related problems, and professional socialization as an entry-level occupational therapist. Satisfactory/Unsatisfactory grading only. Fieldwork required. **Prerequisite(s):** Grade of C or better in OT 428 and grade of C or better in OT 436 and grade of C or better in OT 437; and graduate standing; and consent of the instructor.

OT 449
Fieldwork Level IIB 4 hrs.

Second of two supervised, full-time practica with emphasis on application of OT theory, development of psychomotor skills, reasoning client-related problems, and professional socialization as an entry-level occupational therapist. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. Fieldwork required. Scheduled full time for a six-week period. **Prerequisite(s):** Grade of C or better in OT 428 and grade of C or better in OT 436 and grade of C or better in OT 437; and graduate standing; and consent of the instructor.

OT 500
Theories of Occupational Therapy 4 hrs.

Develops an understanding of the theoretical basis of occupational therapy and the impact of theory on clinical practice. Covers the history of knowledge and practice development in the field. Focuses on specific practice models developed as guides to clinical reasoning. **Prerequisite(s):** Consent of instructor.

OT 510
Research in Occupational Therapy 3 hrs.

Introduction to basic elements of research design relevant to occupational therapy practice. Prepares student to become critical consumer of research in occupational therapy and related fields. Quantitative and qualitative approaches to research. **Prerequisite(s):** Admission to the Master of Science in Occupational Therapy program, or consent of the instructor. Recommended background: Statistics and research methods background.

OT 515
Synthesis I 1 hour.

Integrating theory, practice, and research knowledge and skills across courses using case studies and small-group learning activities. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Grade of C or better in OT 401 and grade of C or better in OT 406 and grade of C or better in OT 407 and grade of C or better in OT 500 and grade of C or better in AHS 510.

OT 526
Assistive Technology and the Environment 3 hrs.

Assessing the need for, delivering, and evaluating the outcomes of occupationally based technology and environmental interventions with people with disabilities within the home, school, workplace, and community. **Prerequisite(s):** Grade of C or better in OT 411 and grade of C or better in OT 412 and grade of C or better in OT 416 and grade of C or better in AHS 510.

OT 530
Advanced Field Experience: Clinical Specialization in Occupational Therapy 1 TO 12 hrs.

Provides opportunity for the student interested in advanced occupational therapy practice to observe a master clinician and participate in treatment and/or clinical research in a specialty area. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register for more than one section per term. **Prerequisite(s):** Consent of the instructor.

OT 531
Advanced Field Experience in Occupational Therapy Management 1 TO 12 hrs.

Practicum experience working with an experienced professional to develop projects or programs in student's area of interest such as administration, middle management, consultation, program evaluation, grantsmanship, or others. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register for more than one section per term. **Prerequisite(s):** Consent of the instructor.

OT 532
Advanced Field Experience: Occupational Therapy Education 1 TO 12 hrs.

Provides opportunity to observe, prepare, and present lectures/labs to occupational therapy students in technical or professional curricula or to develop skills as a clinical educator. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register for more than one section per term. **Prerequisite(s):** Consent of the instructor.

OT 533
Advanced Field Experience: Occupational Therapy Scholarship 1 TO 12 hrs.

Practicum experience working with an experienced scholar to observe and participate in activities that generated evidence about practice, disseminate such evidence, and/or develop practice materials based on evidence. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register for more than one section per term. Fieldwork required.

OT 534
Sociocultural Aspects of Occupational Therapy 3 hrs.

Addresses social and cultural contexts in which chronic illness and disability are experienced; contexts which impact that experience, and broad contexts in which recovery/accommodation and occupational therapy treatment occur. **Prerequisite(s):** Grade of C or better in OT 424 and grade of C or better in OT 428 and grade of C or better in OT 526.

OT 535
Synthesis II 2 hrs.

Integrating advanced theory, practice, and research knowledge and skills across courses using complex individual and programmatic case studies and small and large-group intervention planning activities. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Grade of C or better in OT 424 and grade of C or better in OT 428 and grade of C or better in OT 526 and satisfactory completion of OT 422.

OT 536
Fatiguing Conditions and Disability 3 hrs.

Empirically supported concepts related to assessment and management of fatiguing conditions. Course also explores the relationship between fatigue and disability from social, psychological, and community-based perspectives. Recommended background: Health or behavioral sciences.

OT 540
Advanced Topics in Occupational Therapy Research and Evaluation 4 hrs.

In-depth presentation of selected research/measurement strategies. Specific topics vary and include single-system design, survey research, ethnography, evaluation of clinical effectiveness. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

OT 541
Advanced Human Occupation Theory and Application 4 hrs.

Provides an advanced understanding of evaluation, intervention, program development, and research based on the model of human occupation. Focuses on use of the model to address psychosocial problems in a range of disabled persons. **Prerequisite(s):** OT 400 or consent of the instructor.

**OT 542
Advanced Clinical Reasoning and Therapeutic Use of Self in Occupational Therapy 2 TO 4 hrs.**

Teaches occupational therapy students advanced skills in forming and maintaining ethical, empathic, and successful treatment relationships with their clients.

**OT 544
Cognitive Behavioral Therapy for Persons with Chronic Illness and Disability 4 hrs.**

Core concepts of cognitive behavioral therapy for individuals with chronic illnesses and disabilities from practice and theoretical perspectives. Recommended Background: Exposure to course work in therapeutic use of self, psychopathology, or in psychosocial aspects of occupational therapy.

**OT 550
Disability in the Urban Environment 4 hrs.**

Features of urban contexts that influence experiences of persons with disabilities are examined as they exacerbate problems or enhance resources in low-income communities.

**OT 551
Computers, Communication, and Controls in Rehabilitation Technology 3 hrs.**

Provides information on operation and use of alternative controls for computers, augmentative communication devices, and powered mobility. Emphasis on matching consumer's need and assistive technology. Same as DHD 551. Recommended background: Speech language pathology, occupational therapy, special education.

**OT 552
Community-Based Interventions with Underserved Populations 4 hrs.**

Addresses theories, ethics, and strategies of developing and providing outcomes-based clinical interventions in underserved communities. Students collaborate with a community population to implement course concepts. **Prerequisite(s):** Level II fieldwork or prior work experience or consent of the instructor. Recommended Background: OT 550.

**OT 553
Program Evaluation: Documenting the Impact of Human Services 3 hrs.**

Examines methods in program evaluation with emphasis on empowerment and participatory evaluation. Students will study quantitative and qualitative strategies, how to communicate information to stakeholders, and how to design evaluations. Recommended background: Interest in research, health, or behavioral sciences, and implementation and evaluation of community initiatives and community-based organizations.

**OT 554
Applied Professional Ethics in Occupational Therapy 2 hrs.**

Integrates advanced theory, practice, and research knowledge and skills from fieldwork and course work to identify and mitigate ethical dilemmas, legal concerns, and/or complex intervention problems encountered in occupational therapy practice. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Grade of C or better in OT 500 and grade of C or better in OT 510.

**OT 555
Synthesis III 2 hrs.**

Integrating advanced theory, practice, and research knowledge and skills from advanced fieldwork and course work using complex case studies and small-group assessment and intervention planning activities from students' fieldwork experiences. Satisfactory/Unsatisfactory grading only. Fieldwork required. **Prerequisite(s):** OT 448.

**OT 556
Theory and Methods of Needs Assessment in Aging and Disability 4 hrs.**

Introduces theories of need, models of the needs assessment process, and reviews research methods typically used in conducting needs assessments. Emphasis will be on needs assessments in health-related community agencies. **Prerequisite(s):** A 400- or 500-level research course such as OT 510, DHD 415, CHSC 446, or SOC 500. The prerequisite research course needs to provide students with an understanding of basic research design, sampling strategies, and an introduction to methods such as surveys and focus groups. Recommended background: Health or behavioral sciences, research methods.

**OT 557
Acting on Needs Assessment Findings 3 hrs.**

Follows OT 556, focusing on the translation of needs assessment findings into solution strategies. Addresses setting needs-based priorities, developing solutions, setting action plans, and working with communities to enact those plans. **Prerequisite(s):** Grade of C or better in OT 500 and grade of C or better in OT 510 and grade of C or better in 556; or consent of the instructor.

**OT 558
Writing for Professional Publications in Occupational Therapy 1 TO 3 hrs.**

Addresses processes and issues related to writing for publication in occupational therapy and related journals and magazines, including preparation and submission processes, IRB, receiving critiques, and communicating with reviewers and editors. May be repeated to a maximum of 3 hours. **Prerequisite(s):** Grade of C or better in OT 500 and grade of C or better in OT 510.

**OT 561
Disability and Community Participation: Policy, Systems Change, and Action Research 4 hrs.**

Focuses on the critical examination of disability policy, activism, and research. Emphasis on conducting participatory action research in collaboration with constituents with disabilities, community organizations, and policy makers. Depending on the research project, students may or may not need to complete IRB training. More information on the IRB process will be available at the start of the project. To be properly registered, students must enroll in one lecture/discussion and one practice. **Prerequisite(s):** Consent of the instructor. Recommended background: Previous course work in disability policy, disability empowerment research, and qualitative research.

**OT 564
Administration and Management in Occupational Therapy 3 hrs.**

Overview of issues related to administration and management in varied settings in which occupational therapists practice. Topics include management functions, service planning, quality improvement, financial management, and accreditation. **Prerequisite(s):** OT 428 or approval of the department.

**OT 565
Research Methodology and Outcomes Measures in Rehabilitation Technology 3 hrs.**

Analyzes the research process in rehabilitation technology and assistive technology and how such analysis leads to the development of a research proposal. Outcome measures related to assistive technology will be evaluated for their applicability. Same as DHD 565. Recommended background: Engineering, occupational therapy, physical therapy, special education, and speech and language pathology.

**OT 567
Professional Leadership in Occupational Therapy 3 hrs.**

Focuses on application of theory and evidence in administrative, managerial, and educational leadership. Examines roles and functions of leaders and application of problem solving, change management, and quality improvement in a variety of settings. **Prerequisite(s):** Grade of C or better in OT 564; or consent of the instructor.

**OT 568
Occupational Therapy Professional Curriculum Design, Implementation, and Evaluation 4 hrs.**

Didactic material and experiential learning as students explore design and implementation of a professional curriculum. Students will be exposed to student admissions, advising, student life, and accreditation. **Prerequisite(s):** Consent of the instructor.

**OT 590
Proseminar in Occupational Therapy 1 hour.**

Topics related to leadership/management, education, and advanced practice in occupational therapy. Satisfactory/Unsatisfactory grading only. May be repeated.

**OT 592
Doctoral Project Research 1 TO 20 hrs.**

Applied scholarship involving planning and implementation of one or more action projects based on theory and evidence, evaluation, writing a comprehensive report, dissemination, and oral presentation. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 20 hours. **Prerequisite(s):** Consent of the instructor.

**OT 594
Special Topics
in Occupational
Therapy**

1 TO 4 hrs.

New course under development and selected seminar topics of current interests to faculty and students. **Prerequisite(s):** Consent of the instructor.

**OT 595
Seminar in
Occupational
Therapy**

1 hour.

Pre-thesis seminar. Students participate in faculty-student discussion and activities related to individual areas of research/thesis. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

**OT 596
Independent
Study**

1 TO 4 hrs.

This course is for graduate students who wish to pursue independent study not related to their project/thesis research. **Prerequisite(s):** Consent of the instructor.

**OT 597
Project
Research**

0 TO 8 hrs.

Independent scholarship focusing on problems of application in field. Students undertake an action project, create a method for dissemination, and orally present the project. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 8 hours. **Prerequisite(s):** Graduate standing in the Master of Science in Occupational Therapy program and consent of the instructor.

**OT 598
Research in
Occupational
Therapy**

0 TO 16 hrs.

Independent research in occupational therapy, directed by a faculty member. MS students that elect to do the thesis option must take a minimum of 8 credit hours. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Foundation courses in research methods, such as OT 510, and statistics, or consent of the instructor.

**Oral and
Maxillofacial Surgery**

**OSUR 510
Conscious Sedation and
General Anesthesia**

3 hrs.

Didactic lectures in all phases of pain and anxiety control supplemented with clinical experience in administration of general anesthetic and inhalation and intravenous sedatives. Satisfactory/Unsatisfactory grading only. May be repeated.

**OSUR 511
Oral Surgery
Seminar**

2 hrs.

Lecture, seminars, conferences, and journal clubs dealing with current topics of clinical and research interest. Satisfactory/Unsatisfactory grading only.

**OSUR 513
Craniofacial
Deformity Seminar**

1 hour.

Discusses the investigation, evaluation, treatment planning, and follow-up monitoring of patients with dentofacial deformities. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Admission to oral and maxillofacial surgery residency or orthodontics graduate program.

**OSUR 530
Oral and
Maxillofacial Surgery
Diagnostic Seminar**

2 hrs.

A series of seminars dealing with differential diagnosis and treatment of oral lesions. Satisfactory/Unsatisfactory grading only.

**OSUR 532
Diagnosis and
Treatment Planning in
Orthognathic Surgery**

2 hrs.

Nonorthognathic surgical topics of practical interest to orthodontists and their professional interrelationships with oral and maxillofacial surgeons.

**OSUR 533
Oral and
Maxillofacial
Surgery Literature
Review**

2 hrs.

The methodology for critical review of medical literature and discuss key articles appearing in appropriate medical journals. Satisfactory/Unsatisfactory grading only.

**OSUR 561
Physical Diagnosis**

4 hrs.

In-depth methods of obtaining a history and performing physical diagnosis of the entire body through theoretical and practical lesions.

**Oral Medicine and
Diagnostic Sciences**

**OMDS 424
Oral Pathology**

4 hrs.

Diseases of teeth, periodontium, facial bones, muscles, nerves, and mucous membranes of the oral region, and salivary glands. Introduction to clinical differential diagnosis. **Prerequisite(s):** ANAT 312 and BCMG 411 and HSTL 451 and PHYB 321 and PATH 421.

**OMDS 503
Graduate
Oral Pathology**

2 hrs.

Oral pathology for postgraduate students will cover the clinical and microscopic features of pathologic changes linked to oral-dental and systemic diseases. **Prerequisite(s):** OMDS 424 or the equivalent. Recommended background: Prior academic course work including biology, histology, and other related sciences.

**OMDS 519
Electron
Microscopy
Seminar**

1 hour.

A student speaker makes a seminar-type presentation about a topic and follows this with a discussion involving electron microscopy. **Prerequisite(s):** Consent of the instructor.

**OMDS 527
Oral
Biology
Seminar**

1 hour.

Invited speakers present the progress of current research work in their field of interest related to oral tissues. **Same as** HSTL 514. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

**OMDS 529
Electron
Microscopy
in Dentistry**

1 hour.

Principles, theory, and practice of transmission and scanning electron microscopy, and energy dispersive X-ray microanalysis. Processing, sectioning, staining, and examination of tissues. **Same as** HSTL 515. **Prerequisite(s):** Consent of the instructor.

**OMDS 595
Seminar in
Oral Pathology**

2 hrs.

Reviews, reports, and discussion topics are drawn from the literature and material of surgical oral pathology. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

**OMDS 598
Research in
Oral Pathology**

0 TO 16 hrs.

Independent thesis research on basic biomedical phenomena or specific oral disease(s). Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the advisor.

Oral Sciences

**OSCI 451
Research
Methodology**

1 hour.

Designed to help the student understand, utilize, and appreciate the process of scientific inquiry. Primarily intended for students enrolled in the Master of Science in Oral Sciences degree program. **Prerequisite(s):** Matriculation into the Master of Science in Oral Sciences program, or courses in basic biological sciences or the equivalent background and consent of the instructor.

**OSCI 452
Biological
Basis of Oral
Diseases**

2 hrs.

Focuses on the biological basis of oral disease and modern concepts in the biomedical sciences. **Prerequisite(s):** BCMG 411 and HSTL 451 or the equivalent courses, or consent of the instructor.

**OSCI 534
Dental and Medical
Anthropology
Within Human
Evolution**

1 TO 3 hrs.

Studies the biological and physical anthropology of hominid teeth and the craniofacial complex with relevant medical anthropology, ethno-pharmacology, forensic sciences, and paleopathology topics. **Same as** ANTH 534 and PMPG 534. Fieldwork required. A lab experience, independent study, and a research paper is required for 3 hours of credit. **Prerequisite(s):** Graduate standing and consent of the instructor.

**OSCI 580
Advanced
Oral Sciences I**

2 hrs.

Discussion follows presentation of faculty research. Topics include developmental and molecular biology, tissue engineering, genetics, and structural biology in tandem with cutting-edge dental technology.

**OSCI 581
Advanced
Oral Sciences II**

2 hrs.

Continuation of OSCI 580. **Prerequisite(s):** OSCI 580.

**OSCI 583
Research
Laboratory
Rotation**

1 TO 4 hrs.

Students participate directly in laboratory research; learn to approach a scientific problem and to perform various experimental techniques to investigate the problem. May be repeated to a maximum of 6 hours.

**OSCI 590
Hominid Evolution,
Dental Anthropology,
and Human Variation**

1 hour.

Evolution; hominid origins; organization and development of human dentition, agenesis, metric and nonmetric variation in tooth form, human growth and maturation, variation, and adaptation. **Prerequisite(s):** Consent of the instructor.

OSCI 593
Independent Research in Oral Sciences 1 TO 8 hrs.
Faculty-supervised research projects. Research may not duplicate that being done in OSCI 598. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

OSCI 594
Special Topics in Oral Sciences 1 TO 4 hrs.
Content varies. Selected topics of current interest in oral sciences. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Graduate or postgraduate standing and consent of the instructor.

OSCI 596
Independent Study 1 TO 4 hrs.
Faculty-supervised independent study not included in regular course offerings. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

OSCI 598
Master's Thesis Research 0 TO 16 hrs.
Thesis research to fulfill master's degree requirements. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Matriculation into the Master of Science in Oral Sciences program and consent of the director of graduate studies.

OSCI 599
Doctoral Thesis Research 0 TO 16 hrs.
Independent investigation carried out by PhD candidates under supervision of the student's advisory committee. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Satisfactory completion of candidacy examination.

Orthodontics

ORTD 513
Craniofacial Growth and Development 4 hrs.
Physiology of the stomatognathic system, behavioral development, implications of craniofacial growth and development, reactions of periodontal tissues to applied force and prevalence; causes of malocclusion. **Prerequisite(s):** Matriculation into the Certificate Program in Orthodontics or MS in Oral Sciences program.

ORTD 521
Methodologies in Craniofacial Research 1 hour.
Demonstration and discussion of the techniques and methods employed in the study of the structure, growth, and function of the craniofacial region.

ORTD 524
Craniofacial Anomalies I 2 hrs.
Introduction to a variety of orofacial clefts, etiology, clinical presentation, growth and development, and habilitation via an interdisciplinary team approach. Longitudinal analysis of cases with cleft lip and palate.

ORTD 525
Craniofacial Anomalies II 1 hour.
Introduction to treatment aspects of patients with orofacial clefts and to a variety of craniofacial anomalies, their etiology, clinical presentation, growth and development, and habilitation through a team approach. Clinical rotations through the Center for Craniofacial Anomalies. **Prerequisite(s):** ORTD 524.

ORTD 537
Biostatistics Applied to Craniofacial Research 2 hrs.
Multivariate statistical techniques applied to craniofacial growth research. **Prerequisite(s):** ORTD 523 and a basic univariate statistics course.

ORTD 595
Seminar in Orthodontics 1 TO 2 hrs.
Presentations by selected guest lecturers on research or clinical material relating to matters of interest to the Department of Orthodontics. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 13 hours. **Prerequisite(s):** Enrollment in the Orthodontics postgraduate or Oral Sciences graduate program.

Pathology

PATH 421
General Pathology—Dental 3 hrs.
Basic principles of pathological processes. **Prerequisite(s):** ANAT 440 and PATH 407 and PHYB 401; or consent of instructor.

PATH 422
Systemic Pathology—Dentistry 3 hrs.
Disease process affecting specific organs. **Prerequisite(s):** PATH 421.

PATH 425
General Pathology 3 hrs.
Basic principles of pathological processes, including tissue injury and repair, inflammation, circulatory disturbances, retrograde processes, and tissue responses to specific infectious agents and neoplasms. **Prerequisite(s):** ANAT 425 or ANAT 440 or the equivalent, and PHYB 401 or the equivalent, or consent of the instructor.

PATH 426
Organ Pathology 5 hrs.
The disease processes affecting specific organs and anatomic systems. **Prerequisite(s):** PATH 425 or consent of the instructor.

PATH 427
Clinical Pathology 4 hrs.
Practical application of the clinical aspects of laboratory medicine. Emphasizes problem solving at the laboratory level and clinicopathological correlation. **Prerequisite(s):** PATH 425 and consent of the instructor.

PATH 506
Medical Immunology and Flow Cytometry 2 hrs.
This flow cytometry workshop has been designed to fill the needs of graduate students in the understanding of the basic principles of the flow cytometry. Extensive computer use required. **Prerequisite(s):** Graduate or professional standing and consent of the instructor.

PATH 507
Physiological Basis of Pathology 2 hrs.
Subject matter allied to general pathology but going deeper into physical chemistry and physiological principles, as set forth in N.R. Joseph's "Comparative Physical Biology." **Same as** HSTL 507. **Prerequisite(s):** HSTL 401; or PATH 421 and PATH 422.

PATH 510
General Pathology 3 hrs.
Introduction to the science of disease for graduate students in areas of biomedical research with a focus on the mechanisms of basic pathological processes at the molecular, cellular, tissue, and whole organism levels. **Prerequisite(s):** Approval of the department.

PATH 511
Pathobiology of Cancer 3 hrs.
Introduction to principles of carcinogenesis, tumor biology, and oncology, including cancer epidemiology, molecular-cellular basis of cancer, tumor progression, invasion and metastasis, and prevention, detection, diagnosis, and therapy of cancer. **Prerequisite(s):** Approval of the department.

PATH 512
Molecular Epidemiology and Biomarkers of Disease 3 hrs.
Major theoretical concepts and practical issues involved in research involving molecular biomarkers in human populations, emphasizing examples from the cancer research literature. **Prerequisite(s):** Approval of the department.

PATH 513
Special Topics in Pathology 1 TO 4 hrs.
Topics of current interest in the fields of experimental pathology, cancer biology, molecular epidemiology, experimental design and analysis, biomarker research, and cancer prevention. May be repeated. **Prerequisite(s):** Approval of the department.

PATH 527
Clinical Laboratory Method Evaluation 3 hrs.
Development and comparison of clinical laboratory methods; also, statistical methods of evaluating sensitivity, specificity, precision, accuracy, predictive value, and cost effectiveness. **Same as** MLS 527. **Prerequisite(s):** Consent of the instructor.

PATH 595
Pathology Seminar and Journal Club 2 hrs.
Weekly seminar and journal club covering selected fields of interest and research in pathology. Satisfactory/Unsatisfactory grading only.

PATH 598
Master's Thesis Research 0 TO 16 hrs.
Research in experimental pathology towards MS degree. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term.

PATH 599
PhD Thesis Research 0 TO 16 hrs.
Research in experimental pathology towards a PhD degree. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term.

Pediatric Dentistry

PEDD 410
Principles and Methods in Dental Research I 2 hrs.
Introduces students to several of the more commonly used statistical procedures for testing hypotheses; provides students with a beginner's set of tools for using statistics. **Prerequisite(s):** Enrollment in postgraduate or graduate program in pediatric dentistry.

PEDD 411
Principles and Methods in Dental Research II 2 hrs.
Designed to provide the student with an understanding of the scientific method. **Prerequisite(s):** PEDD 410.

PEDD 501
Dental Pediatrics I 2 hrs.
The pathophysiology and biologic basis of the neurologically, mentally, and medically compromised developing child and the implications to dental management and research.

PEDD 502
Dental Pediatrics II 2 hrs.
The pathophysiology and biologic basis of the neurologically, mentally, and medically compromised developing child and the implications to dental management and research. **Prerequisite(s):** PEDD 501.

PEDD 595
Pediatric Dentistry Seminar 2 hrs.
Presentation and discussion of current literature and research in pediatric dentistry, medical and dental aspects of pulpal therapy, traumatology, fluorides, and cariology. Provides behavior guidance and application of material from other areas. Satisfactory/Unsatisfactory grading only.

Pharmacognosy

PMPG 480
Biological Evaluation of Natural Products 3 hrs.
Short-term procedures useful for the discovery and characterization of natural product drugs, with related laboratory experiments, and principles of more advanced drug development. **Prerequisite(s):** Consent of the instructor.

PMPG 499
Special Projects in Pharmacognosy 1 TO 3 hrs.
Special topics in pharmacognosy dealing with isolation and characterization of natural products.

PMPG 507
Drug Discovery, Design, and Development 3 hrs.
Overview of drug development process from target identification and screening through clinical trials and FDA evaluation. **Same as** BPS 507 and MDCH 507.

PMPG 510
Research Techniques in Pharmacognosy 3 hrs.
Introduction to the techniques used in pharmacognosy.

PMPG 511
Advanced Pharmacognosy 4 hrs.
A theoretical and applied course designed to acquaint the student with the occurrence, isolation, characterization, identification, biosynthesis, and activity profile of biologically active natural products. **Prerequisite(s):** PMPG 510 or the equivalent or consent of the instructor.

PMPG 512
Microscopy of Natural Drug Products 3 hrs.
Use of microscopic methods in the identification of natural drugs and herbal products, with emphasis on the use of light and scanning electron microscopes. **Prerequisite(s):** PMPG 517 or consent of the instructor.

PMPG 513
Structure of Biopolymers 3 hrs.
Explores the relationship between structural stability, kinetic properties, and function of biopolymers, with particular emphasis on proteins and nucleic acids. **Same as** BCMG 513 and MIM 513. **Prerequisite(s):** GCLS 501 and one year of physical chemistry, or consent of the instructor.

PMPG 515
Structure Elucidation of Natural Products I 2 hrs.
Learn the basic skills needed to elucidate the structure of a natural product by spectroscopic methods by using real-life examples. May be repeated to a maximum of 6 hours. **Prerequisite(s):** Credit or concurrent registration in MDCH 562 and credit or concurrent registration in PMPG 511.

PMPG 516
Structure Elucidation of Natural Products II 3 hrs.
Employing modern computational methods in the structure, elucidation, and dereplication of a natural product by using real-life examples. **Same as** MDCH 516. May be repeated. **Prerequisite(s):** PMPG 515.

PMPG 517
Problem-Solving in Plant Taxonomy 4 hrs.
Principles and concepts in plant taxonomy, which include identification, classification, nomenclature, discussion of major recent/modern systems, family characterization, and fieldwork methods. **Prerequisite(s):** Consent of the instructor.

PMPG 518
Correlative Phytochemistry 2 hrs.
Distributional correlation of well-defined groups of secondary phytoconstituents with existing plant-classification systems as an aid in the search for biologically active natural products. **Prerequisite(s):** PMPG 517.

PMPG 520
Enthnopharmacology Fieldwork 4 hrs.
Studies of plants used by primitive peoples as medicinal agents, in defined geographic areas, primarily through interviews with medicine men and the populace. Plant material will be collected for subsequent study. Contingent on availability of funds for travel support. **Prerequisite(s):** PMPG 517 or consent of the instructor.

PMPG 521
Recent Advances in Pharmacognosy 2 hrs.
A review of recent progress in the chemistry, biosynthesis, and biological properties of natural products. **Prerequisite(s):** PMPG 511.

PMPG 522
Laboratory Techniques in Pharmaceutical Biotechnology I 3 hrs.
Students will perform laboratory research rotations as assigned by the biotechnology track faculty in the three laboratories of the Center for Pharmaceutical Biotechnology in the College of Pharmacy. **Prerequisite(s):** Credit or concurrent registration in BCMG 460; or consent of the instructor.

PMPG 523
Laboratory Techniques in Pharmaceutical Biotechnology II 3 hrs.
In a continuation of PMPG 522 students will perform laboratory research rotations as assigned by the biotechnology track faculty in the laboratories of the Center for Pharmaceutical Biotechnology in the College of Pharmacy. **Prerequisite(s):** PMPG 522; or consent of the instructor.

PMPG 534
Dental and Medical Anthropology Within Human Evolution 1 TO 3 hrs.
Studies the biological and physical anthropology of hominid teeth and the craniofacial complex with relevant medical anthropology, ethnopharmacology, forensic sciences, and paleopathology topics. **Same as** ANTH 534 and OSCI 534. Fieldwork required. A lab experience, independent study, and a research paper are required for 3 hours of credit. **Prerequisite(s):** Graduate standing and consent of the instructor.

PMPG 540
Marine Natural Products 2 hrs.
Expose graduate students to field of marine natural product chemistry. Course will include examples of marine antineoplastic agents, marine toxins, and other pharmaceutically relevant marine natural products from various marine organisms. May be repeated to a maximum of 6 hours.

PMPG 553
Cancer Biology and Therapeutics 2 hrs.
Fundamentals of cancer biology with emphasis on biological, hormonal, and chemotherapeutic drug therapies currently used and in development. Specific treatment approaches to breast, ovarian, prostate, and colon cancers will be explored. **Same as** BPS 553 and MDCH 553. **Prerequisite(s):** Consent of the instructor. Recommended background: Molecular and cellular biology.

PMPG 565
Special Projects in Pharmacognosy 1 TO 3 hrs.
Overview of current research topics of interest in pharmacognosy: potential areas—ethnomedicine, biological evaluation, dietary supplements, taxonomy, chemotaxonomy, organism propagation, and applications of contemporary analytical techniques. May be repeated up to 3 time(s). **Prerequisite(s):** Completion of the first year of the program.

PMPG 569
Predictive Strategies in Pharmacognosy 2 hrs.
Consideration of the methods employed for the selection of plants that are most likely to yield biologically active compounds. **Prerequisite(s):** Demonstration of competency in organic chemistry, botany, and pharmacology.

PMPG 590
Laboratory Techniques in Pharmacognosy I 2 hrs.
Perform laboratory research rotations as assigned by pharmacognosy drug discovery track faculty of Program for Collaborative Research in Pharmaceutical Sciences (PCRPS). **Prerequisite(s):** Credit or concurrent registration in PMPG 510 or consent of the instructor.

PMPG 592
Laboratory Techniques in Pharmacognosy II 2 hrs.
In continuation of PMPG 590, student will perform lab research rotations as assigned by pharmacognosy drug discovery track faculty of the Program for Collaborative Research in Pharmaceutical Sciences (PCRPS). **Prerequisite(s):** PMPG 590 or consent of the instructor.

PMPG 595
Seminar in Pharmacognosy 1 hour.
Presentation on a current research topic. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 2 hours.

PMPG 598
Master's Research in Pharmacognosy 0 TO 16 hrs.
Research for completion of master's degree. Satisfactory/Unsatisfactory grading only.

PMPG 599
Doctoral Research in Pharmacognosy 0 TO 16 hrs.
Research for students in the pharmacognosy doctoral program. Satisfactory/Unsatisfactory grading only. May be repeated.

Pharmacology

PCOL 430 Principles of Toxicology 2 hrs.
Examines the toxic effects of drugs and chemicals on organ systems. Lectures emphasize basic principles, effects on specific organ systems, major classes of toxic chemicals, and specialized topics, such as forensic and industrial toxicology. **Same as** BPS 430. Credit is not given for PCOL 430 if the student has credit for EOHHS 457.

PCOL 501 Medical Pharmacology I 3 hrs.
A lecture, conference, and laboratory course on human pharmacology. Drug mechanisms, toxicities, and kinetics are presented as a foundation to therapeutic application. This is a College of Medicine course that does not follow the regular academic calendar. Credit is not given for PCOL 501 if the student has credit for PCOL 425. **Prerequisite(s):** Grade of C or better in GCLS 501 and grade of C or better in GCLS 503; or consent of the instructor.

PCOL 502 Medical Pharmacology II 3 hrs.
Continues PCOL 501. A lecture, conference, and laboratory course on human pharmacology. Drug mechanisms, toxicities, and kinetics are presented as a foundation to therapeutic application. Credit is not given for PCOL 502 if the student has credit for PCOL 425. College of Medicine course that does not follow the regular academic calendar. **Prerequisite(s):** Grade of C or better in GCLS 501 and grade of C or better in GCLS 503; or consent of the instructor.

PCOL 510 Molecular Pharmacology of Platelets, Thrombosis, and Vascular System 2 hrs.
Molecular mechanism and therapeutic approaches to: platelet functions, thrombosis, hemostasis, and vascular biology. The platelet as a model cell for molecular mechanisms of intracellular signal transduction and cell adhesion. **Prerequisite(s):** Credit or concurrent registration in GCLS 501 and GCLS 503; or consent of the instructor.

PCOL 530 Pharmacology and Biology of the Vessel Wall 2 hrs.
Regulation of physiological and pathological processes in the cardiovascular system; e.g., endothelial barrier, cell adhesion, smooth muscle proliferation, angiogenesis, endothelial gene expression. Pharmacological treatment of cardiovascular diseases. **Prerequisite(s):** Credit or concurrent registration in GCLS 501 and GCLS 503; and consent of the instructor.

PCOL 540 Ion Channels: Structure, Function, Pharmacology, and Pathology 2 hrs.
The concept of ion channels is treated from the perspectives of their molecular structures and functions. Modulation, pathological conditions (channelopathies), and pharmacological intervention will also be treated. **Same as** PHYB 540. Recommended background: One undergraduate course in biochemistry and one in physiology, or consent of the instructor.

PCOL 550 The Biology and Pharmacology of the Lung 2 hrs.
Covers topics in lung biology and physiology. The importance of impaired lung function in inducing lung diseases and potential therapeutics will be discussed. **Prerequisite(s):** Credit or concurrent registration in GCLS 501; and credit or concurrent registration in GCLS 503; or consent of the instructor.

PCOL 594 Special Topics 1 hour.
Organized presentation and discussion of rapidly developing research areas in molecular, cellular, and systems pharmacology. May be repeated. **Prerequisite(s):** Consent of the instructor.

PCOL 595 Pharmacology Seminar 1 hour.
Presentation of research and/or current literature by invited lecturers and students. Satisfactory/Unsatisfactory grading only. May be repeated.

PCOL 598 MS Thesis Research 0 TO 16 hrs.
Thesis work under the supervision of a graduate advisor. Satisfactory/Unsatisfactory grading only.

PCOL 599 PhD Thesis Research 0 TO 16 hrs.
Thesis work under the supervision of a graduate advisor. Satisfactory/Unsatisfactory grading only.

Pharmacy

PHAR 400 Pharmacokinetics 3 hrs.
Concepts and principles in pharmacokinetics, including theories and basis for drug receptor actions, drug absorption, distribution, excretion, and biotransformation. **Prerequisite(s):** Credit or concurrent registration in PHAR 322 and credit or concurrent registration in PHAR 332 and credit or concurrent registration in PHYB 302.

PHAR 401 Principles of Drug Action and Therapeutics I 3 hrs.
Integration of medicinal chemistry, pharmacology, pharmacotherapeutics, pharmacokinetics, and toxicology in the drug actions related to the disease states associated with the endocrine, renal, optical, and auditory systems. **Prerequisite(s):** PHYB 302 and PHAR 342 and PHAR 400 and second year standing in the Doctor of Pharmacy program.

PHAR 402 Principles of Drug Action and Therapeutics II 4 hrs.
Integration of medicinal chemistry, pharmacology, pharmacotherapeutics, pharmacokinetics, and toxicology in the areas of the autonomic nervous system, cardiology, lipid disorders, and hypertension. **Prerequisite(s):** PHYB 302 and PHAR 342 and PHAR 400 and second year standing in the Doctor of Pharmacy program.

PHAR 403 Principles of Drug Action and Therapeutics III 3 hrs.
Integration of medicinal chemistry, pharmacology, pharmacotherapeutics, pharmacokinetics, and toxicology in the area of infectious disease. **Prerequisite(s):** PHAR 352 and PHAR 401 and PHAR 402 and second year standing in the Doctor of Pharmacy program or consent of the instructor.

PHAR 404 Principles of Drug Action and Therapeutics IV 3 hrs.
Integration of medicinal chemistry, pharmacology, pharmacotherapeutics, pharmacokinetics, and toxicology in the areas of women's and men's health, respiratory disorders, diabetes, and pediatrics. **Prerequisite(s):** PHAR 352 and PHAR 401 and PHAR 402 and second year standing in the Doctor of Pharmacy program or consent of the instructor.

PHAR 405 Principles of Drug Action and Therapeutics V 3 hrs.
Integration of medicinal chemistry, pharmacology, pharmacotherapeutics, pharmacokinetics, and toxicology in the areas of drug abuse, cerebrovascular diseases, Parkinson's and epilepsy. **Prerequisite(s):** PHAR 353 and PHAR 401 and PHAR 402 and third year standing in the Doctor of Pharmacy program or consent of the instructor.

PHAR 406 Principles of Drug Action and Therapeutics VI 3 hrs.
Integration of medicinal chemistry, pharmacology, pharmacotherapeutics, pharmacokinetics, and toxicology in the areas of pain management and psychiatric disorders. **Prerequisite(s):** PHAR 403 and PHAR 404 and third year standing in the Doctor of Pharmacy program or consent of the instructor.

PHAR 407 Principles of Drug Action and Therapeutics VII 4 hrs.
Integration of medicinal chemistry, pharmacology, pharmacotherapeutics, pharmacokinetics, and toxicology in the areas of transplants, gastrointestinal disorders, body fluids, nutrition, and the impact of drug therapies on a geriatric person. **Prerequisite(s):** PHAR 353 and PHAR 401 and PHAR 402 and third year standing in the Doctor of Pharmacy program or consent of the instructor.

PHAR 408 Principles of Drug Action and Therapeutics VIII 3 hrs.
Integration of medicinal chemistry, pharmacology, pharmacotherapeutics, pharmacokinetics, and toxicology in the areas of bones and joints, hematological disorders, and oncology. **Prerequisite(s):** PHAR 353 and PHAR 401 and PHAR 402 and third year standing in the Doctor of Pharmacy program or consent of the instructor.

PHAR 441 Roles, Environments, and Communications 3 hrs.
Selected factors that influence pharmacists' practice, societal, and professional expectations, and the importance of effective communications with a variety of patients and professional audiences. **Prerequisite(s):** Acceptance into the Doctor of Pharmacy program.

PHAR 445 Pharmacy Law 3 hrs.
Federal and state statutes and regulations pertaining to the licensing of pharmacists, the practice of pharmacy, and distribution of drugs. Case law and the ethical dilemmas relating to the pharmacists' standard of care are included. **Prerequisite(s):** PHAR 342.

PHAR 455 Drug Information and Statistics 4 hrs.
Overview of drug information, resources, and statistics used in healthcare research, including systematic approaches for critical evaluation of the literature and effective communication of information. **Prerequisite(s):** PHAR 341.

Pharmacy Administration

PMAD 421 Pharmaceutical Marketing 3 hrs.

Introduction to the field of marketing with specific emphasis on pharmaceuticals and the marketing of pharmacy services.

PMAD 470 Managed-Care Pharmacy 3 hrs.

Professional development in managed-care pharmacy to learn history, administrative, and policy aspects, network with operational managers and leaders in field, visit managed-care sites, and observe activities of managed-care pharmacists. **Prerequisite(s):** Third year standing in the Doctor of Pharmacy program or second year standing in the Doctor of Pharmacy program with consent of the instructor, or graduate standing in Pharmacy.

PMAD 482 Professional Practice Management 3 hrs.

Managerial functions of the pharmacist in all practice environments with emphasis on the planning, organizing, staffing, directing, and controlling of resources.

PMAD 484 Systematic Reviews and Meta-Analysis 3 hrs.

The course will discuss the concepts, process, and statistical methods required to perform a systematic review or meta-analysis of a large body of empirical findings. Extensive computer use required. **Prerequisite(s):** EPID 400 or BSTT 400 and PHAR 355 or PMAD 502 or graduate or professional standing or consent of the instructor.

PMAD 494 Special Topics in Pharmacy Administration 1 TO 3 hrs.

Topics will vary, including the ongoing analysis of contemporary issues associated with delivery, financing, and management of pharmaceutical products and professional services. May be repeated to a maximum of 6 hours.

PMAD 502 Research Methods in Pharmacy Administration 3 hrs.

Focuses on "how-to-do" a research project and "why-to-use" a particular technique including metanalysis, path analysis, conceptualization, measurements, and data processing. **Prerequisite(s):** SOC 500 and consent of the instructor.

PMAD 507 Pharmacy and Its Environment 2 hrs.

Factors directly influencing the practice of pharmacy. Roles of the pharmacist as affected by contemporary organizational, legislative, societal, and fiscal environments. **Prerequisite(s):** Admission into the MS or PhD in Pharmacy program.

PMAD 510 Problems in Pharmacy Management 3 hrs.

Selective managerial problems relative to pharmacy practice. Fieldwork involves data collection based on individual and group models of the managerial decision process. **Prerequisite(s):** PMAD 482 or the equivalent.

PMAD 525 Medication, Identity and Illness 3 hrs.

Examines the role of pharmaceutical care and medication-taking in the social context of chronic illness. **Prerequisite(s):** Credit or concurrent registration in PMAD 321 or consent of the instructor.

PMAD 535 Health Policy and Pharmaceutical Care 3 hrs.

History of the organization, financing, and delivery of American healthcare with regulatory controls and reform proposals covering drug approval, manufacturing, marketing, use, and safety.

PMAD 573 Principles of Economic Evaluations of Healthcare Interventions 3 hrs.

Principles, models, and practical methods for the economic evaluation of healthcare services with an emphasis on pharmaceutical care. **Same as** HPA 573. Previously listed as PMAD 571. **Prerequisite(s):** HPA 460; and graduate standing; and consent of the instructor.

PMAD 579 Advanced Methods in Outcomes Research and Grant Writing 3 hrs.

An advanced, graduate-level course focused on the grant-writing strategies with an emphasis on methodologies relevant to health services, economics, and outcomes research. **Prerequisite(s):** PMAD 502 and PMAD 573; or consent of the instructor.

PMAD 594 Special Topics in Pharmacy Administration 1 TO 3 hrs.

Topics vary. Intensive analysis of contemporary issue(s) associated with delivery and financing of pharmaceutical products and professional services. May be repeated to a maximum of 6 hours.

PMAD 595 Departmental Seminar 1 hour.

Presentation by students, faculty and visiting experts. Topics to be arranged. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

PMAD 596 Independent Study 1 TO 4 hrs.

Individual research under direction of a member of the faculty. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** PMAD 502 or consent of the instructor.

PMAD 598 Master's Thesis Research 0 TO 16 hrs.

Independent research on topic approved by student's graduate committee. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the committee. Open only to degree candidates.

PMAD 599 PhD Thesis Research 0 TO 16 hrs.

Independent research on topic approved by student's graduate committee. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the committee. Open only to degree candidates.

Pharmacy Practice

PMPR 430 Critical Care I 2 hrs.

Advanced pharmacotherapeutics course that will concentrate on the medical management and the pharmacist's role in the management of the critically ill patient. **Prerequisite(s):** PHAR 402 and PHAR 403 and PHAR 404 and PHAR 405 and PHAR 406; and completion of the second year of the program. Must enroll concurrently in PHAR 407 and PHAR 408.

PMPR 440 Applied Pharmacokinetics 2 hrs.

An elective course demonstrating practical application of pharmacokinetic principles. Previously listed as PMPR 340. Scientific calculator required. **Prerequisite(s):** PHAR 401, PHAR 402, PHAR 403, PHAR 404, PHAR 405, and PHAR 406 or consent of the instructor.

Philosophy

PHIL 400 Philosophical Writing 1 hour.

Philosophical issues covered will vary from semester to semester. Fulfills writing in the discipline requirement. Must be taken in conjunction with designated 400-level courses. See the undergraduate advisor for details. **Prerequisite(s):** Major in Philosophy and concurrent registration in a 400-level philosophy course as designated in the *Schedule of Classes*.

PHIL 401 Theory of Knowledge 3 OR 4 hrs.

Survey and analysis of key topics in epistemology, such as skepticism, the nature of propositional knowledge, justification, perception, memory, induction, other minds, naturalistic epistemology. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** PHIL 201 or consent of the instructor.

PHIL 403 Metaphysics 3 OR 4 hrs.

Intensive treatment of one or more topics, such as free will, personal identity, causation, existence, substance and attribute, the nature of the mind. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** PHIL 203 or PHIL 226 or PHIL 426 or consent of the instructor.

PHIL 404 Philosophy of Science 3 OR 4 hrs.

Selected works on the aims and methods of science; the status of scientific theories, natural laws and theoretical entities; the nature of scientific explanation. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** PHIL 102 or PHIL 210, and one 200-level course in philosophy; or consent of the instructor.

PHIL 406 Philosophy of Language 3 OR 4 hrs.

Intensive treatment of one or more topics, such as meaning and reference, communication, the structure of language, language and thought, and the relation of language to reality. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** PHIL 102 or one 200- or 400-level logic course or PHIL 226 or consent of the instructor.

PHIL 410 Introduction to Formal Logic 3 OR 4 hrs.

Review of predicate logic and of introductory set theory. The concept of a formal system. Notions of completeness and soundness. Introduction to Godel's first incompleteness theorem. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** PHIL 210 or consent of the instructor.

PHIL 416 Metalogic I 3 OR 4 hrs.

Metatheory for sentence and predicate logic. Completeness and compactness theorems and their applications. 3 undergraduate hours. 4 graduate hours. Students who have taken MATH 430 may not register for this course. Should be taken in sequence with PHIL 417. **Prerequisite(s):** PHIL 210 or consent of the instructor.

PHIL 417
Metalogic II 3 OR 4 hrs.
Effective computability and recursive functions. Peano arithmetic. Arithmetization of syntax. Incompleteness and undecidability: Godel's and Church's theorems. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** PHIL 416 or consent of the instructor.

PHIL 420
Plato 3 OR 4 hrs.
Careful reading of selected works. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s) with approval. Approval to repeat course granted by the department. **Prerequisite(s):** PHIL 220 or PHIL 221 or 3 courses in philosophy or consent of the instructor.

PHIL 421
Aristotle 3 OR 4 hrs.
Careful reading of selected works. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s) with approval. Approval to repeat course granted by the department. **Prerequisite(s):** PHIL 220 or PHIL 221 or 3 courses in philosophy or consent of the instructor.

PHIL 422
Medieval Philosophy 0 TO 4 hrs.
Study of selected philosophers such as Augustine, Boethius, Averroes, Maimonides, Aquinas, William of Ockham, Buridan, Suarez. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** PHIL 220 or PHIL 221 or PHIL 420 or PHIL 421 or consent of the instructor.

PHIL 423
Studies in Early Modern Philosophy 3 OR 4 hrs.
Careful reading of selected works of one or more philosophers, 1600 to 1750, such as Descartes, Hobbes, Spinoza, Leibniz, Locke, Berkeley, Hume, Reid, and Rousseau. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s) with approval. Approval to repeat course granted by the department. **Prerequisite(s):** PHIL 223 or PHIL 224 or three courses in philosophy or consent of the instructor.

PHIL 424
Kant 3 OR 4 hrs.
Intensive study of Kant's metaphysics and theory of knowledge with main reading drawn from the Critique of Pure Reason. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** PHIL 223 or PHIL 224 or 3 courses in philosophy or consent of the instructor.

PHIL 425
Studies in Nineteenth-Century Philosophy 3 OR 4 hrs.
Careful reading of one or more post-Kantian philosophers such as Hegel, Schelling, Fichte, Schopenhauer, Marx, J.S. Mill, Kierkegaard, and Nietzsche. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** One 200-level course in philosophy or consent of the instructor.

PHIL 426
Analysis and Logical Empiricism 3 OR 4 hrs.
Developments in twentieth-century philosophy with roots in the study of logic and language, such as logical atomism, logical empiricism, and contemporary analytic philosophy. Topics vary. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** PHIL 210 or PHIL 226 or consent of the instructor.

PHIL 427
Continental Philosophy II: European Thought Since 1960 3 OR 4 hrs.
European thought since 1960: existential Marxism; critical theory; structuralism, poststructuralism and deconstruction. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** PHIL 227 or consent of the instructor.

PHIL 429
Special Studies in the History of Philosophy 3 OR 4 hrs.
Advanced study of a historical school, period, or the development of a historical theme. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s) with approval. Approval to repeat course granted by the department. **Prerequisite(s):** One 200-level course in the history of philosophy or consent of the instructor.

PHIL 430
Ethics 3 OR 4 hrs.
Selected topics in moral philosophy, such as normative ethics, value theory, or meta-ethics. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s) with approval. Approval to repeat course granted by the department. **Prerequisite(s):** One 200-level course in philosophy or consent of the instructor. Recommended background: Credit in a course in moral, social, or political philosophy.

PHIL 431
Social/Political Philosophy 3 OR 4 hrs.
Selected topics in social and political philosophy. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s) with approval. Approval to repeat course granted by the department. **Prerequisite(s):** One 200-level course in philosophy or consent of the instructor. Recommended background: Credit in a course in moral, social, or political philosophy.

PHIL 432
Topics in Ethics 3 OR 4 hrs.
Selected topics in ethics. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s) with approval. Approval to repeat course granted by the department. **Prerequisite(s):** One 200-level course in philosophy or consent of the instructor. Recommended background: Credit in a course in moral, social, or political philosophy.

PHIL 433
Topics in Social/Political Philosophy 3 OR 4 hrs.
Selected topics in social and political philosophy. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s) with approval. Approval to repeat course granted by the department. **Prerequisite(s):** One 200-level course in philosophy or consent of the instructor. Recommended background: Credit in a course in moral, social, or political philosophy.

PHIL 441
Topics in Philosophy of Religion 0 TO 4 hrs.
Intensive study of one or more selected topics concerning the philosophical aspects of basic religious beliefs and concepts. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s) with approval. Approval to repeat course granted by the department. **Prerequisite(s):** One 200-level course in philosophy or consent of the instructor. Recommended background: PHIL 241.

PHIL 484
Neuroscience I 3 hrs.
Neuroscience as an integrative discipline. Neuroanatomy of vertebrates, neural development, cellular neurobiology, action potential mechanisms, synaptic transmission, and neuropharmacology. **Same as** BIOS 484 and PSCH 484. **Prerequisite(s):** BIOS 286 or PSCH 262.

PHIL 485
Neuroscience II 3 hrs.
Integrative neuroscience, continuation of BIOS/PSCH/PHIL 484. Sensory and motor systems; learning, memory, and language. Pathology of nervous systems. Philosophical perspectives, and modeling. **Same as** BIOS 485 and PSCH 485. **Prerequisite(s):** BIOS 484.

PHIL 500
Writing in Philosophy 4 hrs.
Practice in philosophical writing including finding a thesis. Judicious choice of reading on the topic, outlining, and composing drafts as well as style, paragraphing, and making sentences. Required of all first-year PhD students. **Prerequisite(s):** Graduate standing in philosophy.

PHIL 501
Seminar: Topics in Ancient Philosophy 4 hrs.
Intensive study of selected topics. May be repeated with approval. Approval to repeat course granted by the department. Students may register for more than one section per term when topics vary.

PHIL 503
Medieval Philosophy 4 hrs.
Intensive study of special topics in medieval philosophy. May be repeated with approval. Approval to repeat course granted by the department. Students may register for more than one section per term when topics vary.

PHIL 504
Theoretical Approaches to Policy and Governance 4 hrs.
Different theoretical approaches to the relationship between policy and governance and the philosophical foundations on which those approaches are based. **Same as** POLS 504. **Prerequisite(s):** Consent of the department required for nondegree graduate students.

PHIL 505
Seminar in Modern Philosophy 4 hrs.
Intensive analysis of the work of one important philosopher or philosophical movement between 1600 and 1900. May be repeated with approval. Approval to repeat course granted by the department. Students may register for more than one section per term when topics vary.

PHIL 508
Nineteenth-Century Philosophy 4 hrs.
Topics in nineteenth-century philosophy. May be repeated with approval. Students may register for more than one section per term. Approval to repeat course granted by the department.

PHIL 509
History of Analytic Philosophy 4 hrs.
Topics in late nineteenth- and early twentieth-century Anglo American philosophy. May be repeated with approval. Approval to repeat course granted by the department. Students may register for more than one section per term when topics vary.

PHIL 510
History of Ethics and Social/Political Philosophy 4 hrs.
Topics in the history of ethics or social-political philosophy. May be repeated with approval. Approval to repeat course granted by the department. Students may register for more than one section per term when topics vary.

PHIL 513
Topics in History of Philosophy 4 hrs.
Philosophers, philosophical schools, or intellectual trends other than those of the ancient and modern periods. May be repeated with approval. Approval to repeat course granted by the department. Students may register for more than one section per term when topics vary.

PHIL 520
Topics in Contemporary Philosophy 4 hrs.
Intensive analysis of the work of one important philosopher or philosophical movement of the twentieth century. May be repeated with approval. Approval to repeat course granted by the department. Students may register for more than one section per term when topics vary.

PHIL 522
Feminist Philosophy 4 hrs.
Topics in feminist philosophy. May be repeated with approval. Students may register for more than one section per term. Approval to repeat course granted by the department.

PHIL 524
Continental Philosophy 4 hrs.
Topics in continental philosophy. May be repeated with approval. Approval to repeat course granted by the department. Students may register for more than one section per term when topics vary.

PHIL 526
Ethics 4 hrs.
Intensive study of selected topics. May be repeated with approval. Approval to repeat course granted by the department. Students may register for more than one section per term when topics vary.

PHIL 528
Social/Political Philosophy 4 hrs.
Intensive study of selected topics. May be repeated with approval. Approval to repeat course granted by the department. Students may register for more than one section per term when topics vary.

PHIL 530
Aesthetics 4 hrs.
Intensive study of selected topics in aesthetics. May be repeated with approval. Approval to repeat course granted by the department. Students may register for more than one section per term when topics vary.

PHIL 532
Metaphysics 4 hrs.
Intensive study of selected topics. May be repeated with approval. Approval to repeat course granted by the department. Students may register for more than one section per term when topics vary.

PHIL 534
Philosophy of Mind 4 hrs.
Intensive study of selected topics. May be repeated with approval. Approval to repeat course granted by the department. Students may register for more than one section per term when topics vary.

PHIL 536
Epistemology 4 hrs.
Selected topics in the contemporary theory of knowledge. May be repeated with approval. Approval to repeat course granted by the department. Students may register for more than one section per term when topics vary.

PHIL 538
Philosophy of Language 4 hrs.
Intensive study of selected topics. May be repeated with approval. Approval to repeat course granted by the department. Students may register for more than one section per term when topics vary.

PHIL 540
Philosophy of Science 4 hrs.
Intensive study of selected topics. May be repeated with approval. Approval to repeat course granted by the department. Students may register for more than one section per term when topics vary.

PHIL 542
Philosophy of Special Sciences 4 hrs.
Intensive study of special topics in philosophy of physics, philosophy of biology, or other sciences. May be repeated with approval. Approval to repeat course granted by the department. Students may register for more than one section per term when topics vary.

PHIL 544
Philosophy of Logic 4 hrs.
Intensive study of selected topics. May be repeated with approval. Approval to repeat course granted by the department. Students may register for more than one section per term when topics vary.

PHIL 546
Philosophy of Mathematics 4 hrs.
Philosophical foundations of mathematics. May be repeated with approval. Approval to repeat course granted by the department.

PHIL 562
Metamathematics I 4 hrs.
First-order logic, completeness theorem, and model theory. **Same as MATH 502. Prerequisite(s):** MATH 430 or consent of the instructor.

PHIL 563
Metamathematics II 4 hrs.
Incompleteness theorems, elementary recursion theory and proof theory, and first- and second-order arithmetic. **Same as MATH 503. Prerequisite(s):** MATH 502 or PHIL 562.

PHIL 565
Set Theory I 4 hrs.
Naive and axiomatic set theory. Independence of the continuum hypothesis and the axiom of choice. **Same as MATH 504. Prerequisite(s):** MATH 430 or MATH 502 or PHIL 562.

PHIL 567
Model Theory I 4 hrs.
Introduction to stability theory: categoricity, stability, forking, finite equivalence relation theorem, indiscernibles, orthogonality. **Same as MATH 506. Prerequisite(s):** MATH 502 or PHIL 562.

PHIL 568
Model Theory II 4 hrs.
Intermediate stability theory: dependence, prime models, isolation, regular types, dimension, weight. **Same as MATH 507. Prerequisite(s):** MATH 506 or PHIL 567.

PHIL 569
Advanced Topics in Logic 4 hrs.
Advanced topics in modern logic; e.g., descriptive set theory, model theory of fields, theory of hierarchies, stable groups. **Same as MATH 512.** May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

PHIL 590
Research Seminar 4 hrs.
A work-in-progress seminar for graduate students at the topical, prospectus, or dissertation level. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Completion of 10 of the 14 required courses for the PhD in Philosophy.

PHIL 593
Independent Research 2 TO 8 hrs.
Topics and plan of study must be approved by the candidate's advisor and by the staff member who directs the work. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term.

PHIL 596
Independent Study 1 TO 4 hrs.
Topics and plan of study must be approved by the candidate's advisor and by the staff member who directs the work. May be repeated. Students may register in more than one section per term.

PHIL 599
Thesis Research 0 TO 16 hrs.
Research for the PhD thesis. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term.

Physical Therapy

PT 501
Science of Physical Therapy Practice 3 hrs.
Concepts of evidence-based physical therapy practice, including practice theory, measurement, outcomes assessment, and critical evaluation of bodies of literature in context of the healthcare system and health policy. **Prerequisite(s):** Consent of the instructor.

PT 502
Measuring Motor Development and Function 3 hrs.
Psychometric characteristics of standardized tests of motor development and function. Survey of tests, test evaluation, interpretation of test scores, and application to clinical practice. **Prerequisite(s):** Consent of the instructor and a graduate-level course in statistics.

PT 503
Analysis of Motor Development 3 hrs.
Sensorimotor development in children, relating changes to maturation, skill acquisition, motor learning, environmental influences, and individual differences. Includes critical review of current literature. **Prerequisite(s):** Consent of the instructor. Recommended background: Prior experience in or knowledge of child development.

PT 504
Assessment of Developmental Processes in Infancy 2 hrs.
Motor and behavioral competencies of the newborn, both term and preterm. Assessment of behavior and motor dysfunction in infants; analysis of the literature on intervention. **Prerequisite(s):** Consent of the instructor and credit or concurrent registration in a graduate-level course in statistics.

PT 510
Control of Posture and Locomotion 2 hrs.
Review and analysis of normal and developmental aspects, assessment, disorders, and rehabilitation of balance and gait disorders. **Prerequisite(s):** PT 562; and consent of the instructor.

PT 511
Therapeutic Intervention 3 hrs.
Provides clinicians with an approach to integrate research into practice. The goal is to acquire skills to evaluate therapeutic interventions in the literature and in practice. **Prerequisite(s):** Consent of the instructor.

PT 520
Mechanics of Joint Dysfunction 3 hrs.
Principles of mechanics applied to pathology of joint components; mechanical and neurological implications of extremity and spinal joint dysfunction; critical review of pertinent literature. **Prerequisite(s):** PT 519.

**PT 521
Biomechanics
of Locomotor
Dysfunction** 3 hrs.
Principles of mechanics applied to the study of walking pattern. Kinematic and kinetic analysis of normal and pathological deviations, and issues related to development from birth to adult and neuromuscular control.
Prerequisite(s): Consent of the instructor.

**PT 562
Neural Plasticity
and Pathophysiology** 3 hrs.
Neurologic concepts underlying PNS/CNS injury process and neural plasticity (nervous system remodeling and reorganization). Neuropathology of conditions producing movement dysfunction.
Prerequisite(s): Consent of the instructor.

**PT 563
Measurement in
Physical Therapy** 3 hrs.
Measurement theory and statistics underlying the development of standardized tests. Critique of physical therapy tests of strength, ROM, coordination, endurance, and activities of daily living.
Prerequisite(s): Consent of the instructor and any graduate-level statistics course.

**PT 570
Planning and
Evaluating Intervention
Programs in Various
Settings** 3 hrs.
Planning, implementation, and evaluation of services for children with special needs. Emphasis on conceptual frameworks in human development and family systems. Program planning and evaluation.
Prerequisite(s): Consent of the instructor. Recommended background: Prior experience or knowledge of child development.

**PT 571
Biomechanics
of Normal and
Abnormal Movement** 3 hrs.
Principles of statics and dynamics exemplified by human movements. Examination of muscle mechanics, joint forces, stability. Redundancy and intersegmental interactions in multijoint movements. **Same as MVSC 571.** **Prerequisite(s):** Consent of the instructor.

**PT 572
Psychology
of Motor Control
and Learning** 3 hrs.
Advanced principles of the control and acquisition of complex, voluntary skills. **Same as MVSC 572.** **Prerequisite(s):** MVSC 354; or consent of the instructor.

**PT 574
Instrumentation
for Motor Control
Research** 3 hrs.
Introduction to oscilloscopes, amplifiers, filters, and transducers. Origin and processing of electromyograms. Motion capture and processing techniques. **Same as MVSC 574.** **Prerequisite(s):** MVSC 571 or PT 571.

**PT 580
Advanced Clinical
Reasoning in
Orthopedic Manual
Physical Therapy I:
Extremities** 2 hrs.
Designed to promote clinical reasoning and understanding of the research literature for enhancement of evidence-based clinical practice with an emphasis on extremity-joint dysfunction.
Prerequisite(s): Must be a U.S. licensed physical therapist.

**PT 581
Advanced Clinical
Reasoning in
Orthopedic Manual
Physical Therapy II: Spine** 2 hrs.
Designed to promote clinical reasoning and understanding of the research literature for enhancement of evidence-based clinical practice with an emphasis on spinal-joint dysfunction.
Prerequisite(s): Must be a U.S. licensed physical therapist.

**PT 582
Advanced
Manipulation and
Orthopedic Manual
Physical Therapy I:
Extremities** 3 hrs.
Designed to provide an evidence-based approach toward evaluation and management of peripheral musculoskeletal disorders, including thrust and nonthrust manipulation. **Prerequisite(s):** Must be a U.S. licensed physical therapist.

**PT 583
Advanced
Manipulation and
Orthopedic Manual
Physical Therapy II:
Spine** 3 hrs.
Designed to provide an evidence-based approach toward evaluation and management of spinal musculoskeletal disorders, including thrust and nonthrust manipulation. **Prerequisite(s):** Must be a U.S. licensed physical therapist.

**PT 584
Clinical Mentorship I:
Extremities** 3 hrs.
Physical therapy practice under the tutelage of a mentor. Students will apply and master skills, techniques, and reasoning methods learned in the didactic course work. Emphasis is on peripheral musculoskeletal disorders. Satisfactory/Unsatisfactory grading only.
Prerequisite(s): Instructor approval required; must be a U.S. licensed physical therapist.

**PT 585
Clinical Mentorship II:
Spine** 3 hrs.
Physical therapy practice under the tutelage of a mentor. Students will apply and master skills, techniques, and reasoning methods learned in the didactic course work. Emphasis is on spinal musculoskeletal disorders. Satisfactory/Unsatisfactory grading only.
Prerequisite(s): Instructor approval required; must be a U.S. licensed physical therapist.

**PT 594
Special Topics
in Physical
Therapy** 1 TO 4 hrs.
Selected topics of interest within physical therapy specialty areas. Particular attention is given to topics of cross-cutting importance to these professions, especially applications in teaching, consultation, and administration. May be repeated to a maximum of 8 hours if topics vary. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**PT 595
Seminar in
Physical Therapy** 1 hour.
Topics of current interest in physical therapy. Includes discussions of current research and important new developments in the specific disciplines. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

**PT 596
Independent
Study** 1 TO 4 hrs.
For graduate students who wish to pursue independent study not related to their project/thesis research. May be repeated to a maximum of 8 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**PT 598
Research
in Physical
Therapy** 0 TO 16 hrs.
Independent research in one area of physical therapy directed by a faculty member. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Foundation courses in research methods and graduate-level statistics and consent of the instructor.

Physics

**PHYS 401
Electromagnetism I** 4 hrs.
Vector calculus; electrostatic fields in vacuum; solution of electrostatic boundary-value problems; electrostatic fields in material media; electrostatic energy; electric currents. **Prerequisite(s):** PHYS 142 and PHYS 215.

**PHYS 402
Electromagnetism II** 4 hrs.
Magnetic fields of steady currents and magnetic materials; electromagnetic induction; magnetic energy; slowly varying currents; A-C circuits; Maxwell's equations; electromagnetic waves; bounded regions; special relativity. **Prerequisite(s):** PHYS 401.

**PHYS 411
Quantum
Mechanics I** 4 hrs.
Wave particle duality; wave functions; Schrödinger equation; mathematical structure of quantum mechanics; operators and observables; matrix representation of operators; three-dimensional Schrödinger equation. **Prerequisite(s):** PHYS 215 and PHYS 244 and PHYS 245; or consent of the instructor.

**PHYS 412
Quantum
Mechanics II** 4 hrs.
This is the second semester of a two-semester undergraduate-level sequence on the concepts and methods of quantum mechanics and their applications.
Prerequisite(s): PHYS 411.

**PHYS 421
Modern Physics:
Atoms and Molecules** 4 hrs.
Hydrogenic atoms, electron spin, external fields, multi-electron atoms, diatomic molecules, line widths, photons, radiation from atoms and other electromagnetic processes, positrons, positronium, elastic electron scattering.
Prerequisite(s): Credit or concurrent registration in PHYS 411.

**PHYS 425
Modern
Optics** 5 hrs.
Review of electromagnetic wave theory; advanced geometrical optics; Fourier transforms and optics; interference and diffraction; laser cavities and gain media; introduction to nonlinear and fiber optics. **Prerequisite(s):** PHYS 244.

**PHYS 431
Modern Physics:
Condensed Matter** 4 hrs.
Crystal structures; interatomic binding; lattice vibrations; thermal and magnetic properties; quantum statistical mechanics; free electron theory of metals; electronic band theory; semiconductors and insulators; superconductivity. **Prerequisite(s):** PHYS 411 and PHYS 461; or consent of the instructor.

**PHYS 441
Theoretical
Mechanics** 4 hrs.
Covers variable motion, noninertial frames, oscillations, rigid body motion, three-dimensional motion, angular momentum, torque, orbits, Lagrange's equations.
Prerequisite(s): PHYS 142 and PHYS 215.

**PHYS 450
Molecular Biophysics
of the Cell** 4 hrs.
Introduction to force, time energies at nanometer scales; Boltzmann distribution; hydrodynamic drag; Brownian motions; DNA, RNA protein structure and function; sedimentation; chemical kinetics; general aspects of flexible polymers. **Same as BIOE 450.** **Prerequisite(s):** PHYS 245 or the equivalent.

**PHYS 451
Modern Physics:
Nuclei and
Elementary Particles** 4 hrs.
Accelerators, detectors, symmetries, conservation laws, leptons, weak interactions, electroweak theory, strong interactions, hadrons, nuclear forces, systematics and reactions, nuclear models, nuclear astrophysics, quarks, quantum chromodynamics. **Prerequisite(s):** PHYS 411.

PHYS 461
Thermal and Statistical Physics 4 hrs.
Thermal equilibrium (zeroth law); thermodynamic states (first law); irreversibility; entropy (second law); thermodynamic potentials and properties; phase transitions; kinetic theory of gases; classical statistical mechanics. **Prerequisite(s):** PHYS 245.

PHYS 470
Educational Practice with Seminar I 6 hrs.
The first half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, and approval of the department.

PHYS 471
Educational Practice with Seminar II 6 hrs.
The second half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, credit or concurrent registration in PHYS 470, and approval of the department.

PHYS 481
Modern Experimental Physics I 4 hrs.
Theory and experimental use of linear circuits, semiconductor devices, amplifiers, oscillators. Techniques and experiments in atomic, molecular, and solid-state physics. **Prerequisite(s):** PHYS 244.

PHYS 482
Modern Experimental Physics II 4 hrs.
Techniques and experiments in nuclear and particle physics. Gamma-gamma correlations, muon lifetime, Compton scattering, alpha particle scattering. Computer-based experimentation. **Prerequisite(s):** PHYS 481.

PHYS 491
Special Topics in Physics 1 TO 4 hrs.
Selected topics of current interest in physics. May be repeated. **Prerequisite(s):** PHYS 215 and sophomore standing or above; or approval of the department.

PHYS 494
Special Topics in Physics Teaching 2 TO 4 hrs.
Seminar on various topics related to the teaching of physics. Subjects are announced. May be repeated. Students may register in more than one section per term. Supervised teaching practice included. **Prerequisite(s):** Graduate standing or approval of the department.

PHYS 499
Survey of Physics Problems 1 hour.
Problem-solving techniques applied to the variety of undergraduate physics topics. May be repeated up to 1 time(s). No graduation credit for graduate students. Grade of C or better required to graduate with an undergraduate degree in Physics. **Prerequisite(s):** Credit or concurrent registration in PHYS 481.

PHYS 501
Electrodynamics I 4 hrs.
Maxwell's equations, static and time dependent fields in material media and in vacuo. Boundary value problems, wave propagation. Classical theory of radiation. **Prerequisite(s):** PHYS 402 or approval of the department.

PHYS 502
Electrodynamics II 4 hrs.
Special relativity in electrodynamics. Covariant form of Maxwell's equations. Lagrangian form of electrodynamics. Applications to modern physics problems. **Prerequisite(s):** PHYS 501 or consent of the department.

PHYS 511
Quantum Mechanics I 4 hrs.
Linear operators, vector spaces. Schrödinger equation. Heisenberg formalism. Multi-identical-particle systems, approximation methods, perturbation theory, symmetries and groups, conservation laws, angular momentum, spin. Wigner-Eckart theorem. **Prerequisite(s):** PHYS 412 or approval of the department.

PHYS 512
Quantum Mechanics II 4 hrs.
Scattering theory, partial waves, Born approximation, density matrix, interaction of radiation with matter; Klein-Gordon and Dirac equations, free-particle solutions, antiparticles, relativistic hydrogen atom. Second quantization. **Prerequisite(s):** PHYS 511 or approval of the department.

PHYS 513
Quantum Field Theory I 3 hrs.
Lagrangian formulation of relativistic wave equations. Quantum electrodynamics: Feynman rules, trace theorems, lowest-order calculations for several processes, self-energy, renormalization, higher-order diagrams. **Prerequisite(s):** PHYS 512.

PHYS 514
Quantum Field Theory II 3 hrs.
Path integrals, gauge theories, Weinberg-Salam model, electroweak processes, quantum chromodynamics, non perturbative methods, topological objects in field theories, instantons. **Prerequisite(s):** PHYS 513.

PHYS 515
Methods in Mathematical Physics 3 hrs.
Applications of mathematical methods to physics problems, linear operators, orthogonal functions, Green's functions, ordinary and partial differential equations, Sturm-Liouville problem, Hilbert space, group theory. **Prerequisite(s):** PHYS 215.

PHYS 521
Molecular Physics 3 hrs.
Rotational and vibrational energies of molecules, potential curves, electronic transitions, transition moments, intensity rules, thermodynamic properties. Applications. **Prerequisite(s):** PHYS 411 and PHYS 421; or approval of the department.

PHYS 522
Laser Physics/Quantum Electronics 3 hrs.
Laser physics; population inversion; quantum theoretical calculation; modern laser systems; coherence phenomena; applications of lasers. **Prerequisite(s):** PHYS 521 or approval of the department.

PHYS 524
Group Theory in Physics 3 hrs.
Applications of group theory and symmetry principles to problems in elementary particle, solid-state, atomic, and molecular physics. **Prerequisite(s):** PHYS 512 or approval of the department.

PHYS 531
Solid-State Physics I 3 hrs.
Crystal structure, reciprocal lattice, X-ray methods, crystal forces, phonons, heat capacity, thermal expansion. Classification of solids, band structure. Metals: free-electron model, band-structure effects, transport. **Prerequisite(s):** PHYS 412 AND PHYS 461.

PHYS 532
Solid-State Physics II 3 hrs.
Semiconductor physics, electron-electron and electron-phonon interactions, superconductivity, spin systems, diamagnetism, paramagnetism, ferromagnetism, and anti-ferromagnetism. **Prerequisite(s):** PHYS 531.

PHYS 533
Theory of Solids: Magnetism and Superconductivity 3 hrs.
The main body problem; many-particle states; functional integrals; Green's functions; Feynman diagrams; perturbation expansions; tree diagrams. **Prerequisite(s):** PHYS 512 and PHYS 532.

PHYS 534
Theory of Solids: Semiconductor Physics 3 hrs.
Spin systems; magnetism; equilibrium Green's functions; Landau theory of Fermi liquids; Hubbard model; Luttinger model, nonequilibrium Green's functions, Keldysh, Kadanoff-Baym approach. **Prerequisite(s):** PHYS 512 and PHYS 532.

PHYS 540
Physics of Semiconductor Devices 4 hrs.
Electrons in periodic lattice; equilibrium carrier distribution; energy band diagrams in junctions, in homogeneous semiconductors; recombination and generation; nonequilibrium processes, radiation and electric fields; diodes. **Same as** ECE 540. **Prerequisite(s):** ECE 346 or the equivalent.

PHYS 545
Introduction to General Relativity 3 hrs.
Principle of equivalence, the metric field and geodesics, tensor analysis and differential geometry, Einstein's equations and the action principle, gravitational fields and waves, black holes. **Prerequisite(s):** PHYS 502 and PHYS 541 or approval of the department.

PHYS 551
Elementary Particle Physics I 3 hrs.
Phenomenology and theories of modern-day particle physics. Classification of particles and their interactions. Survey of experimental techniques, accelerators, and detectors. **Prerequisite(s):** PHYS 512 or approval of the department.

PHYS 552
Elementary Particle Physics II 3 hrs.
Lagrangian formulation of electromagnetic, weak, and strong interactions. Transition rates. Unification of electroweak and strong interactions. Gauge theories. Modern topics. **Prerequisite(s):** PHYS 551 or approval of the department.

PHYS 561
Statistical Mechanics 3 hrs.
Density matrix. Information theory; Boltzmann-Gibbs distribution; the n-vector model; renormalization group theory; cellular automata. **Prerequisite(s):** PHYS 461 or approval of the department.

PHYS 581
Advanced Experimental Physics 2 hrs.
Experimental techniques in atomic, molecular, solid-cular, and solid-state physics. **Prerequisite(s):** PHYS 431 or consent of the instructor.

PHYS 594
Special Topics
in Modern
Physics 1 TO 4 hrs.
Lectures on topics of current interest. Subjects are announced in the previous semester. May be repeated. Students may register in more than one section per term.
Prerequisite(s): PHYS 512.

PHYS 595
Graduate
Seminar 1 hour.
Seminars in areas of research activity within the department covering recent contributions to the literature and research in progress. Presentations by students, faculty and scientists from other institutions. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 6 hours. Students may register in more than one section per term.

PHYS 596
Individual
Study 2 TO 4 hrs.
Special topics. Outside reading and a term paper are assigned by a special arrangement with the department and faculty. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

PHYS 598
Master's Thesis
Research 0 TO 16 hrs.
Student may elect to do thesis research to fulfill partial requirement for master's degree. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Approval of the department.

PHYS 599
Thesis
Research 0 TO 16 hrs.
PhD thesis research. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Approval of the department.

Physiology and Biophysics

PHYS 502
Physiology of
Reproduction 2 hrs.
The purpose of this course is to enable students to acquire a detailed and up-to-date understanding of the biology of reproduction at both the physiological and molecular levels.

PHYS 512
Gastrointestinal
Physiology 2 hrs.
Advanced study of the physiology of the gastrointestinal tract. Special emphasis will be placed on recent developments in cellular and molecular aspects and on how they relate to established concepts in the literature. **Prerequisite(s):** PHYS 402 or consent of the instructor.

PHYS 516
Physiology and
Biochemistry of
Muscle Contraction 2 hrs.
Structure and function of myosin, actin, tropomyosin, troponin, and the sarcoplasmic reticulum; control, energetics, and mechanism of muscle contraction; gene expression.

PHYS 518
Molecular, Cellular,
and Integrative
Cardiovascular
Physiology 3 hrs.
Advanced study of the cardiovascular system from molecule to organism. Emphasis on recent developments at the molecular/cellular level and their relationship to overall function. **Prerequisite(s):** PHYS 401 or consent of the instructor.

PHYS 523
Exercise Biology in
Health and Disease 3 hrs.
Interrelationships between exercise and various pathological conditions. Current research focusing on molecular and cellular mechanisms in healthy and diseased states. **Same as** MVSC 523. **Prerequisite(s):** Consent of the instructor.

PHYS 530
Stem Cells 2 hrs.
Discussion of stem cell development into different cell types that may offer a renewable source of replacement cells to treat diseases, conditions, and disabilities. Cells from adult tissue, fetal tissue, and embryonic sources are discussed. Recommended background: Knowledge of cell biology.

PHYS 540
Ion Channels:
Structure, Function,
Pharmacology, and
Pathology 2 hrs.
The concept of ion channels is treated from the perspectives of their molecular structures and functions. Modulation, pathological conditions (channelopathies), and pharmacological intervention will also be treated. **Same as** PCOL 540. Recommended background: One undergraduate course in biochemistry and one in physiology, or consent of the instructor.

PHYS 551
Human
Physiology I 5 hrs.
Lectures and conferences in human physiology. Emphasis is on cellular, nerve-muscle, cardiovascular, respiratory, and renal physiology. **Prerequisite(s):** Mathematics, undergraduate physics, and organic chemistry; or consent of instructor. Recommended background: Course work in biological sciences.

PHYS 552
Translational
and Applied
Physiology 3 hrs.
Continuation of GCLS 500—Physiology. Advanced physiological concepts emphasizing interactions of different organs and systems under normal and abnormal conditions. Review of compensatory mechanisms and clinical applications of physiology. **Prerequisite(s):** GCLS 500. Recommended background: Course work in biological sciences.

PHYS 569
Methods in
Experimental
Physiology 3 hrs.
Primarily for students in physiology. Registration limited to eight. A laboratory course designed to acquaint students with advanced techniques and methodology in physiologic investigations. **Prerequisite(s):** Enrollment in the MS or PhD in Physiology and Biophysics program, and credit or concurrent registration in PHYS 401 or the equivalent; or consent of the instructor.

PHYS 585
Cell Biology 4 hrs.
Functional and structural organization of the cell with emphasis on the cellular basis of physiological activity. **Same as** ANAT 585 and MIM 585.

PHYS 586
Cell Physiology 3 hrs.
Advanced functional and structural organization of the cell with emphasis on the cellular basis of physiological activity. **Prerequisite(s):** PHYS 552 and GCLS 501 and GCLS 503; or consent of the instructor.

PHYS 591
Departmental
Seminar 1 hour.
Weekly seminar by staff and invited speakers. Satisfactory/Unsatisfactory grading only. May be repeated. Required of all physiology and biophysics students each fall and spring semester while enrolled in the graduate program. **Prerequisite(s):** Graduate or professional standing.

PHYS 592
Tactics and
Strategy of
Research in
Physiology 2 hrs.
Course presents an analysis concerning various approaches in solving current physiology problems. Emphasizes critical reading of the literature. **Prerequisite(s):** PHYS 401.

PHYS 594
Special Topics
in Physiology
and Biophysics 1 TO 4 hrs.
Topics may include bioengineering, endocrinology, membrane biology, ion transport and its regulation, muscle physiology, neurophysiology, molecular neurobiology, and others of current significance in physiology and biophysics. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

PHYS 595
Journal Club
and Seminar in
Physiology 1 hour.
Student presentation and discussion of assigned topics of current importance in physiology and biophysics as well as related fields. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor. Limited to degree candidates in physiology and biophysics.

PHYS 596
Independent
Study 1 TO 4 hrs.
Individual study guided by a faculty member. The format of the course, examination, and grading to be established by the faculty member. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

PHYS 598
MS Thesis
Research 0 TO 16 hrs.
Thesis work under the supervision of a graduate advisor. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Graduate standing in physiology and biophysics.

PHYS 599
PhD Thesis
Research 0 TO 16 hrs.
Thesis work under the supervision of a graduate advisor. Satisfactory/Unsatisfactory grading only.

Polish

POL 401
Polish
Composition and
Conversation III 3 OR 4 hrs.
Development of oral and writing skills: expanding vocabulary and perfecting style. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** POL 302.

POL 402
Polish
Composition and
Conversation IV 3 OR 4 hrs.
Continues POL 401. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** POL 401 or the equivalent.

POL 410
Structure of Modern Polish 3 OR 4 hrs.

A synchronic linguistic analysis of Polish substantives, pronouns, verbs, deverbals, nouns, and minor parts of speech from a syntagmatic and paradigmatic point of view. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** POL 402 or the equivalent.

POL 450
Studies in Polish Drama 3 OR 4 hrs.

Main trends in Polish drama, leading playwrights, their aesthetics and philosophy in the context of European drama and from the Renaissance to the present. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). **Prerequisite(s):** Advanced undergraduate standing.

POL 460
Studies in Polish Literature 3 OR 4 hrs.

Literary trends in Polish poetry and prose; their poetics, aesthetics, and philosophy in their European context. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). **Prerequisite(s):** Advanced undergraduate standing.

POL 499
Independent Study 1 TO 4 hrs.

Investigation of special problems under the general direction of a staff member. May be repeated to a maximum of 8 hours. Graduate students may register for more than one section per term. **Prerequisite(s):** Senior or graduate standing, consent of the instructor, and consent of the head of the department.

POL 510
History of the Polish Language 4 hrs.

Phonological and morphological development; emphasis on lexical, syntactical, and stylistic problems. Linguistic analysis of selected texts. **Prerequisite(s):** POL 410 or the equivalent.

POL 515
Topics in Contemporary Polish Linguistics 4 hrs.

Variable content. May be repeated to a maximum of 12 hours.

POL 520
Topics in Historical Polish Linguistics 4 hrs.

Variable content. May be repeated to a maximum of 12 hours.

POL 545
Studies in Polish Medieval, Renaissance, and Baroque Literature 4 hrs.

Study of a topic, genre, author, or movement. Content varies. May be repeated to a maximum of 12 hours.

POL 550
Studies in Polish Enlightenment and Romanticism 4 hrs.

Study of an author, topic, genre, or movement. Content varies. May be repeated to a maximum of 12 hours.

POL 560
Studies in Polish Positivism and Symbolism 4 hrs.

Study of an author, topic, genre, or movement. Content varies. May be repeated to a maximum of 12 hours.

POL 565
Studies in Twentieth-Century Polish Literature 4 hrs.

Study of an author, topic, genre, or movement. Content varies. May be repeated up to 12 time(s).

POL 570
Studies in Polish Literary Criticism 4 hrs.

Literary criticism in the major epochs of Polish literary history. May be repeated to a maximum of 12 hours.

POL 596
Independent Study 1 TO 4 hrs.

Investigation of special problems under the general direction of a staff member. May be repeated to a maximum of 8 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor and consent of the head of the department.

Political Science

POLS 401
Data Analysis I 3 OR 4 hrs.

Statistical inference for the social sciences. Emphasis on univariate and bivariate statistics. **Same as** PPA 401. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** POLS 200 and POLS 201; or graduate standing.

POLS 405
The Problem of Justice 3 OR 4 hrs.

Premodern and modern views of justice and their practical utility in analyzing legislative, executive, and judicial programs for enhancing or restricting justice. **Same as** CLJ 405. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** CLJ 101, plus two 200-level courses in criminology, law, and justice or two 200-level courses in political science.

POLS 435
Special Topics in Bureaucracy 3 OR 4 hrs.

Consideration of timely or enduring issues in policy formation and bureaucracy not available in regularly offered courses. 3 undergraduate hours. 4 graduate hours. May be repeated to a maximum of 12 hours. **Prerequisite(s):** POLS 460 or consent of the instructor.

POLS 451
Law and Public Policy 3 OR 4 hrs.

The role of law and legal institutions in the development and implementation of public policies. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Graduate standing or consent of the instructor.

POLS 465
Topics in Sociology of Politics 3 OR 4 hrs.

Intensive examination of a specialized topic announced when the class is scheduled. **Same as** SOC 465. 3 undergraduate hours. 4 graduate hours. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** 6 hours of upper-division sociology or consent of the instructor.

POLS 467
Public Opinion and Political Communication 3 OR 4 hrs.

Nature of public opinion and political communication systems. Patterns of opinion distribution and its measurement. Forces shaping public opinion and its impact on public policy. **Same as** COMM 467. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** POLS 200 or the equivalent or consent of the instructor.

POLS 482
Democratic Theory 3 OR 4 hrs.

Democracy as a procedure of government and value commitments associated with this form of government. Special attention paid to classical and modern democracies. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** POLS 290 or POLS 291 or consent of the instructor.

POLS 485
Gender and Politics 3 OR 4 hrs.

Impact of gender on basic categories of western political thought. Distinctions between reason and emotion, public and private, among others, examined from feminist perspective. **Same as** GWS 485. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** POLS 190 and one 200-level course in political theory; or consent of the instructor.

POLS 494
Topics in Political Science 3 OR 4 hrs.

Selected topics in political science. Topics vary and may cover American politics, law, urban and global politics, cultural, ecological, or methodological issues. May be repeated up to 1 time(s). **Prerequisite(s):** POLS 190 and POLS 200; or consent of the instructor.

POLS 497
Directed Readings in Political Science 4 hrs.

Intensive readings on a topic not covered in regular curriculum. May be repeated with approval. Approval of the graduate director required to repeat course. **Prerequisite(s):** Graduate standing and consent of the instructor.

POLS 498
Independent Research in Political Science 2 TO 6 hrs.

Research on special problems not included in course offerings. May not duplicate work done in POLS 598 or POLS 599. May be repeated with approval. Approval of the graduate director required to repeat course. **Prerequisite(s):** Graduate standing and consent of the instructor.

POLS 500
Introduction to Policy and Governance 4 hrs.

Introduces the intellectual traditions and debates that have characterized the study of public policy and the social order. Society-centered and state-centered explanations for policy will be explored. **Same as** PPA 500. **Prerequisite(s):** Consent of the department required for nondegree graduate students.

POLS 501
Data Analysis II 4 hrs.

Interpretation and application of multivariate methods of analysis in the social sciences. Regression specification and diagnostics, limited dependent variable models, measurement issues. **Same as** PPA 501. **Prerequisite(s):** POLS 401 or PPA 401.

POLS 502
Time Series Analysis for Political Science 4 hrs.

Single series (ARIMA) models, event history analysis, vector autoregression (VAR), panel and pooled models. **Prerequisite(s):** POLS 402 or consent of the instructor.

POLS 504
Theoretical Approaches to Policy and Governance 4 hrs.

Different theoretical approaches to the relationship between policy and governance and the philosophical foundations on which those approaches are based. **Same as** PHIL 504. **Prerequisite(s):** Consent of the department required for nondegree graduate students.

POLS 505
Research Design and Methods 4 hrs.

Overview of the methods and conduct of research in political science. Issues of inference, measurements, data collection, hypothesis testing, and ethics.

POLS 506
The Profession of Political Science 2 hrs.

Introduces graduate students to the range of teaching, research, and service possibilities in the political science profession. Students are encouraged to take this course during their first year of graduate study.

POLS 507
Qualitative Research Methods 4 hrs.
Explores techniques, uses, strengths, and limitations of qualitative research methods, including case studies, fuzzy sets, boolean analysis, analytical narratives, and various other methods.

POLS 510
Seminar on Teaching Political Science 2 hrs.
Seminar on ethics and responsibilities of teaching political science in various academic settings. Teaching methods and technology applicable to community colleges and four-year colleges. Complements the Preparing Future Faculty program. The format will include guest speakers from area community and four-year colleges. Satisfactory/Unsatisfactory grading only.

POLS 541
Policy Formation, Implementation, and Evaluation 4 hrs.
Introduction to political science theories of how elections, interest groups, and state structure affect the formulation of public solutions to societal problems. **Same as** PPA 541. **Prerequisite(s):** Consent of the department required for nondegree graduate students.

POLS 542
Distributive/Redistributive Public Policy 4 hrs.
Seminar on the politics of enacting and maintaining distributive policies. Focus is on the parochial and community-wide efficiency of such policies.

POLS 544
Regulatory Public Policies 4 hrs.
Exploring the nature and determinants of public policy making with respect to the regulation of the economy.

POLS 549
Topics in Public Policy Analysis 4 hrs.
A research seminar on some aspects of public policy analysis not otherwise covered in the regular curriculum.

POLS 551
Seminar in Urban Politics 4 hrs.
Explores relationships between private economy and public policies in American cities; causes of urban decline and uneven development; and urban redevelopment and human capital policies. **Prerequisite(s):** POLS 500; and consent of the instructor.

POLS 553
Urban Public Policy 4 hrs.
Explores the problems of poverty, race, education, transportation policy, and housing in America's cities, with a special emphasis on Chicago.

POLS 557
Research Topics in Urban Politics 4 hrs.
Readings and original research on selected topics in urban politics. May be repeated.

POLS 558
Graduate Student Field Experience in Political Science 1 TO 8 hrs.
Graduate student intern experience. Placement with government agencies, community organizations, or civic organizations, in conjunction with a seminar class and directed readings. May be repeated up to 8 time(s). Students may register in more than one section per term. Fieldwork required. **Prerequisite(s):** POLS 402 and POLS 500.

POLS 559
Topics in State and Local Government 4 hrs.
Case analysis and research in selected problems dealing with structure, functions; and administrative processes of American state and local governments. **Prerequisite(s):** POLS 500 and POLS 541.

POLS 560
Seminar in American Politics 4 hrs.
Introduction to research literature on American policy-making institutions and processes. **Prerequisite(s):** POLS 500; and consent of the instructor.

POLS 562
Seminar on Legislation and Public Policy 4 hrs.
Review of recent theories and research on structure and policy formation in American legislatures. Emphasis on theoretical development in this field. **Prerequisite(s):** POLS 541.

POLS 563
Executive Process 4 hrs.
Presidential elections; presidential decision making; the powers of the president; presidential leadership; the distributive state; policy implementation; federalism and administration; the politics of budgeting. **Prerequisite(s):** Admission to the MA or PPA programs or consent of the instructor.

POLS 564
Seminar in Judicial Process 4 hrs.
The judicial process, as part of political and policy processes. Demands made by, and policy impacts on, individual and organizational litigants and other political actors. **Prerequisite(s):** POLS 460.

POLS 566
Interest Groups 4 hrs.
Pluralism: the distributive state; radical group theory, public-interest groups; collective actions; corporatism; statism; structural Marxism; social movements and interest groups.

POLS 567
Topics in Political Communication 4 hrs.
Intensive study of selected aspects; organizational communication in public institutions, urban political communication patterns, communication elites. Independent research using a variety of community research techniques. **Same as** COMM 567 and PA 567. **Prerequisite(s):** Consent of the instructor.

POLS 569
Research Topics in American Politics 4 hrs.
A research seminar on some aspect of American political process. Topics vary. May be repeated. **Prerequisite(s):** POLS 560.

POLS 570
Seminar in Comparative Politics 4 hrs.
Introduces students to the main tools of research and contours of debates in comparative politics. **Prerequisite(s):** POLS 500; and consent of the instructor.

POLS 571
Seminar in International Relations 4 hrs.
State-building and challenges to state authority, democratization and regime change, political economy, environment, war, regionalism and globalization, social movements, and international governance.

POLS 572
International Political Economy 4 hrs.
Exploration of competing perspectives on nation-states and economic systems. Previously listed as POLS 472.

POLS 573
Transitions to Democracy 4 hrs.
Game-theoretic view of democracy. Process and outcomes of transitions to democracy in capitalist and in communist countries. Civil-military relations in the process of transition. Case studies.

POLS 578
Research Topics in International Relations 4 hrs.
Advanced graduate seminar exploring international relations theory through readings, discussion, and original research. **Prerequisite(s):** POLS 571.

POLS 579
Research Topics in Comparative Politics 4 hrs.
Advanced seminar on selected topics in comparative politics. Topic(s) will vary from semester to semester. May be repeated. **Prerequisite(s):** POLS 570; and consent of the instructor.

POLS 582
The Philosophy of the Social Sciences 4 hrs.
The ontological and epistemological foundations of alternative approaches to the study of human beings. Naturalistic, hermeneutic, and critical approaches are addressed and assessed.

POLS 589
Research Topics in Political Theory 4 hrs.
Detailed analysis of a political theorist or type of political theory, especially designed to meet programmatic and graduate needs. May be repeated. **Prerequisite(s):** Consent of the instructor.

POLS 590
Advanced Public Policy Workshop 4 hrs.
Interdisciplinary workshop on preparing a dissertation proposal for public policy analysis students. **Same as** PPA 590. **Prerequisite(s):** Advanced standing in the PhD in PPA program and completion of PPA core courses.

POLS 591
Publishing Research in Political Science 4 hrs.
Interdisciplinary workshop on preparing manuscripts for submission to publishers. May be repeated. **Prerequisite(s):** Completion of the first year of the MA or PhD in Political Science; and consent of the instructor.

POLS 593
Independent Research for Master's Degree 2 hrs.
Under the supervision of two faculty members, students will complete a major research paper that combines a review of relevant literature of a political science topic with analysis of original data or research materials. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** POLS 401 and POLS 505 and POLS 506; and POLS 541 or POLS 504 or POLS 551 or POLS 570 or POLS 571. Open only to master's degree students; and approval of the department.

POLS 596
Advanced Readings in Political Science 1 TO 4 hrs.
Intensive readings on an advanced topic not covered in the regular curriculum. May be repeated with approval. Students may register in more than one section per term. Approval to repeat course granted by the graduate director. **Prerequisite(s):** POLS 401 and POLS 404 and consent of the instructor.

POLS 598
Thesis Research 0 TO 16 hrs.
Individual study required of all students pursuing advanced degree in Political Science under thesis option. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor. Open only to degree candidates.

POLS 599
Dissertation Research 0 TO 16 hrs.
Individual study required of all students pursuing PhD degree with specialization in Political Science. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor. Open only to degree candidates.

Prosthodontics

PROS 504
Advanced Dental Materials 3 hrs.
A seminar course designed to develop an advanced understanding of dental materials and a fundamental knowledge of materials science. Involves a critical evaluation of the literature. **Prerequisite(s):** REST 320, REST 321, REST 322, REST 323, REST 330 or the equivalent course work or matriculation into the Advanced Certificate in Advanced Prosthodontics program.

PROS 517
Advanced Occlusion/TMJ Disorders 2 hrs.
A lecture and seminar discussion of the advanced concepts of occlusion, articulation, occlusal analysis, diagnosis, and treatment of functional disturbances. **Prerequisite(s):** Matriculation into the Advanced Certificate in Advanced Prosthodontics program or the MS in Oral Sciences program and consent of the department head.

Psychiatric Nursing

NUPS 500
Group Dynamics, Behavior, and Intervention 2 TO 3 hrs.
Concepts, theories, and research pertaining to group dynamics and to interventions carried out in groups. Analysis of videotaped group experience. Previously listed as NUPS 400. Master of Science degree-seeking students in the Mental Health Nursing concentration must register for 3 hours of credit. **Prerequisite(s):** Consent of the instructor.

NUPS 515
Developmental, Behavioral Health and Interventions with Youth 3 hrs.
Normative and atypical developmental processes. Applications emphasize developmentally and culturally sensitive nursing assessment and intervention in children's lives to improve mental health outcomes. **Prerequisite(s):** NUSC 527 or consent of the instructor.

NUPS 516
Behavioral Healthcare I 3 hrs.
Common mental health problems presented in primary and community care settings. Focus on psychopathology, assessment and brief counseling interventions; crisis intervention and triage; emergency care. **Prerequisite(s):** Consent of the instructor.

NUPS 517
Behavioral Healthcare II 3 hrs.
Complex mental health problems experienced in psychiatric populations. Focus on stabilization and management of psychotic illnesses, dual diagnosis treatment models, psychoeducational models, and psychiatric rehabilitation. **Prerequisite(s):** NUPS 516.

NUPS 518
Family Behavioral Health 2 hrs.
Theories of family development and behavior; functional and dysfunctional communication and behavioral patterns. Theories and strategies for family assessment and intervention. **Prerequisite(s):** Consent of the instructor.

NUPS 521
Clinical Practicum in Behavioral Health I 3 TO 6 hrs.
Advanced nursing management of common mental health problems. Emphasis on primary care and community settings. Assessment, triage, case management, emergency care, and brief interventions. May be repeated. **Prerequisite(s):** Credit or concurrent registration in NUPS 517.

NUPS 522
Clinical Practicum in Behavioral Health II 3 TO 8 hrs.
Advanced psychiatric nursing with a selected caseload of clients with serious and complex problems. Emphasis on psychiatric rehabilitation, cognitive-behavioral methods, psychoeducation, and dual diagnosis. May be repeated. **Prerequisite(s):** NUPS 521.

NUPS 523
Clinical Practicum in Behavioral Health III 2 TO 5 hrs.
Development of mental health nurse practitioner role to deliver mental health services and impact policies affecting a selected population. May be repeated. **Prerequisite(s):** NUPS 522 or consent of the instructor.

NUPS 547
Substance Misuse and Dependence 2 hrs.
Theories, research trends, treatment perspectives, ethical and social issues related to alcohol, and other drug misuse and dependence. **Prerequisite(s):** Consent of the instructor.

Psychology

PSCH 411
Stereotyping, Prejudice, and Racism 3 hrs.
Psychological research and theory concerning stereotyping, prejudice, and racism. Historical conceptualization, development, causes, expression, and psychological consequences of prejudice, as well as theories of prejudice reduction. **Prerequisite(s):** Graduate standing in Psychology or consent of the instructor.

PSCH 415
Social Bases of Health Behavior 3 hrs.
Psychological theory and research concerning the coronary-prone personality, pain management, controlling adherence to medical regimens, biofeedback, smoking, and weight control. **Prerequisite(s):** PSCH 270 and consent of the instructor, or graduate standing.

PSCH 417
Psychology and Law 3 hrs.
Application of psychological theories to the development, operation and effects of law; evaluation of different and similar approaches of law and psychology. **Prerequisite(s):** PSCH 312 or consent of instructor.

PSCH 420
Social Development of Urban Children 3 OR 4 hrs.
General principles of social development and socialization during childhood and the factors common to urban children that illustrate and modify these principles. **Same as** EPSY 420. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Admission to a graduate program in Education or Psychology, or consent of the instructor.

PSCH 422
Advanced Developmental Psychology and Educational Processes 3 hrs.
Focuses on cognitive and social development from birth to adolescence. Examines relations between development, learning, and educational processes. **Same as** ED 422. **Prerequisite(s):** PSCH 100 and any one from ED 210, PSCH 259, PSCH 320; or graduate standing and consent of the instructor.

PSCH 423
Characteristics of Early Adolescence 3 hrs.
Physiological, social, emotional, and cognitive development of early adolescence. The relationship between these developmental characteristics and success in the middle grades. **Same as** EPSY 446. **Prerequisite(s):** ED 210 or ED 421 or ED 422 or PSCH 422 or the equivalent, and approval of the College of Education; or admission to the PhD in Psychology program; or consent of the instructor.

PSCH 429
Constructivist Approaches to Development: Piaget and Vygotsky 3 OR 4 hrs.
Piaget's and Vygotsky's theories of development of knowledge. Empirical and logico-mathematical forms of knowledge. Thought and action. Thought and language. **Same as** EPSY 429. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** ED 422 or PSCH 422 or the equivalent and graduate standing in Education or graduate standing in Psychology or consent of the instructor.

PSCH 443
Advanced Statistics 3 hrs.
Design and analysis of experiments: between, within factorial and mixed factorial designs and introduction to multiple regression. For students planning research careers or advanced degrees. **Prerequisite(s):** PSCH 343.

PSCH 452
Cognitive Psychology of Memory and Attention 3 hrs.
A survey of empirical research and theories concerning the human memory system and the encoding, retention, retrieval of information in that system and research and theories of attention. **Prerequisite(s):** Graduate standing; or PSCH 352 and consent of the instructor.

PSCH 454
Cognitive Psychology of Language 3 hrs.
Provides students with a survey of methods, theory and research in language and discourse processing. **Same as** COMM 454, and LING 474. **Prerequisite(s):** Graduate standing or consent of the instructor.

PSCH 455
Cognitive Psychology of Thinking 3 hrs.
Introduces students to research and theory concerning higher mental processes, including problem solving, reasoning, judgment, and decision making. **Prerequisite(s):** Graduate standing; or PSCH 352 and consent of the instructor.

PSCH 457
Cognitive Psychology of Skill and Knowledge Acquisition 3 hrs.
The course approaches learning from a variety of cognitive perspectives. The instruction is organized around discussions of original research articles. **Prerequisite(s):** Previous knowledge of cognitive psychology (with at least an undergraduate survey course) or admittance into the Cognitive Division graduate program.

PSCH 459
Cognitive Methods 3 hrs.
Hands-on training in the methods of cognitive psychology, especially computational modeling and the analysis of verbal protocols and other types of trace data.
Prerequisite(s): Graduate standing or consent of the instructor.

PSCH 460
Advanced Learning 3 hrs.
Methods, results, and interpretation of experimental studies of basic learning processes in animal and human subjects.
Prerequisite(s): Graduate standing; or PSCH 360 and PSCH 361 and consent of the instructor.

PSCH 462
Neural Basis of Learning and Memory 3 hrs.
Theory and research on the anatomical, electrophysiological, and chemical bases of learning and memory in humans and other animals. **Prerequisite(s):** Graduate standing; or PSCH 262 and consent of the instructor.

PSCH 465
Neural Basis of Perception 3 hrs.
Psychophysical and physiological studies of sensory systems and processes. Primary emphasis on the early processing of visual stimuli.
Prerequisite(s): Graduate standing; or PSCH 351 and consent of the instructor.

PSCH 466
Neural Basis of Motivation 3 hrs.
Review of empirical data and theories concerning the physiological basis of motivational processes in animals and humans.
Prerequisite(s): Graduate standing; or PSCH 262 and consent of the instructor.

PSCH 467
Fundamentals of Neuroscience 3 hrs.
Basic principles of neurophysiology and neuropharmacology, including logic bases of nerve action, chemistry of synapses, and actions of pharmacological agents.
Prerequisite(s): PSCH 262 or graduate standing.

PSCH 481
Interviewing 1 hour.
Lecture on the theory and practice of clinical interviewing with supervised experience. Satisfactory/Unsatisfactory grading only.
Prerequisite(s): Graduate standing in psychology or consent of the instructor.

PSCH 483
Neuroanatomy 4 hrs.
Organization of the nervous system, with an emphasis on mammals. **Same as** BIOS 483 and NEUS 483. Animals used in instruction. **Prerequisite(s):** BIOS 272 or BIOS 286 or BIOS 325 or PSCH 262; or consent of the instructor.

PSCH 484
Neuroscience I 3 hrs.
Neuroscience as an integrative discipline. Neuroanatomy of vertebrates, neural development, cellular neurobiology, action potential mechanisms, synaptic transmission, and neuropharmacology. **Same as** BIOS 484 and PHIL 484.
Prerequisite(s): BIOS 286 or PSCH 262.

PSCH 485
Neuroscience II 3 hrs.
Integrative neuroscience, continuation of BIOS/PSCH/PHIL 484. Sensory and motor systems; learning, memory, and language. Pathology of nervous systems. Philosophical perspectives, and modeling. **Same as** BIOS 485 and PHIL 485. **Prerequisite(s):** BIOS 484.

PSCH 494
Special Topics in Psychology 1 TO 4 hrs.
Advanced treatment of an announced topic. May be repeated. Students may register in more than one section per term.
Prerequisite(s): Graduate standing or consent of the instructor.

PSCH 495
Seminar in Psychology 1 TO 3 hrs.
Seminar devoted to special topics in psychology. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 9 hours. Students may register in more than one section per term.
Prerequisite(s): Graduate standing or consent of the instructor.

PSCH 504
Rating Scale and Questionnaire Design and Analysis 4 hrs.
Development and administration of rating scales and questionnaires, analysis of data, and reporting of results. The focus is on rating scales. **Same as** EPSY 504.
Prerequisite(s): ED 501, and ED 503 or EPSY 503 or the equivalents or consent of the instructor.

PSCH 505
Advanced History of Psychology 3 hrs.
The history of scientific psychology, with an emphasis on the forerunners of major contemporary research problems.
Prerequisite(s): Graduate standing.

PSCH 506
Item Response Theory/Rasch Measurement 4 hrs.
Statistical inference with item response theory models, useful to measure an individual's performance on a test or questionnaire. Models include parametric, nonparametric, unidimensional, multidimensional, and cognitive. **Same as** EPSY 506. May be repeated to a maximum of 8 hours. Extensive computer use required. **Prerequisite(s):** ED 501 and EPSY 503 and EPSY 546 or the equivalent. Appropriate score on the department placement test. Graduate or professional standing required or consent of the instructor.

PSCH 507
Emerging Research Issues 1 hour.
Weekly seminar that introduces PhD students in psychology to the current research of each faculty member in the department of psychology. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 2 hours. **Prerequisite(s):** Consent of the instructor.

PSCH 508
Colloquium on the Teaching of Psychology 1 hour.
Required training to prepare graduate students for contact teaching in the Department of Psychology. Satisfactory/Unsatisfactory grading only.
Prerequisite(s): Consent of the instructor.

PSCH 512
Attitudes and Social Cognition 3 hrs.
Survey of theory and research in social psychology, including attitudes and social cognition.
Prerequisite(s): Consent of the instructor.

PSCH 513
Interpersonal Relations and Group Processes 3 hrs.
Survey of theory and research in social psychology, including interpersonal relations and group processes. **Prerequisite(s):** Consent of the instructor.

PSCH 515
Psychology of Women and Gender 3 hrs.
Critical examination of psychological theories and research on women and gender, including biological, psychoanalytic, socialization, power, and social-constructionist perspectives. **Same as** GWS 515. **Prerequisite(s):** Graduate standing in psychology; or PSCH 315 or GWS 315, and consent of the instructor.

PSCH 516
Research Methods in Social Psychology 3 hrs.
Critical analysis of current theories in social psychology.
Prerequisite(s): PSCH 512 and PSCH 513 and PSCH 514; or consent of the instructor.

PSCH 517
Social Psychology of Education 4 hrs.
Social psychological factors influencing academic and social outcomes in schools. Achievement motivation, peer relations, social values in relation to student characteristics and school practice. **Same as** EPSY 502.
Prerequisite(s): Admission to the PhD in Education program or the PhD in Psychology program; or consent of the instructor.

PSCH 518
Seminar in Social and Personality Psychology 1 TO 4 hrs.
Critical discussion of selected topics, such as helping and altruism, social judgment, group processes, attitude formation and change. Content varies. May be repeated. Students may register in more than one section per term.
Prerequisite(s): Consent of the instructor.

PSCH 519
Current Topics in Social Psychology 1 hour.
Discussion of recently published research and ongoing research by department faculty and graduate students. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

PSCH 520
Development in Infancy and Early Childhood 4 hrs.
Consideration of development in the preschool years. Stress on theory, research, individual child study, and educational implications. **Same as** EPSY 526.
Prerequisite(s): ED 422 or PSCH 422 or the equivalent.

PSCH 521
Violence Against Women 4 hrs.
Examines the extent, causes, and consequences of sexual assault, intimate partner violence (e.g., domestic violence, dating violence), and sexual harassment, and considers the impact of culture and community on violence and its victims. **Same as** GWS 521.
Prerequisite(s): Consent of the instructor.

PSCH 525
Achievement Motivation 4 hrs.
The psychology of achievement motivation will be explored from the perspectives of personality, social, and educational psychology. **Same as** EPSY 530.
Prerequisite(s): Graduate standing in Education or Psychology or consent of the instructor.

PSCH 526
Developmental Psychopathology 3 hrs.
Major sources and manifestations of maladjustment in childhood with an emphasis on emotional and intellectual handicaps.
Prerequisite(s): Consent of the instructor.

PSCH 527 Seminar in Moral Development, Character Formation, and Education 4 hrs.
Philosophical assumptions, psychology research, and theory underlying current approaches to moral and character education. Cultural and developmental factors in value formation. **Same as** EPSY 527. **Prerequisite(s):** ED 422 or PSCH 422 or the equivalent, or admission to the PhD in Education program, PhD in Psychology program, or PhD in Social Work program, or consent of the instructor.

PSCH 531 Community Research 3 hrs.
Introduction to research design for community and action research; data-collection techniques; perspectives on the relationship between researchers and communities; ethical issues; and philosophies of science informing community-based research.

PSCH 532 Community Intervention 3 hrs.
Theory, research, and practice of community interventions in public, nonprofit, and voluntary settings, such as disability organizations; intervention types and effectiveness; role of community intervenor. **Same as** DHD 532. **Prerequisite(s):** Consent of the instructor.

PSCH 533 Advanced Community and Prevention Research 3 hrs.
Overview of community psychology theory and intervention research in areas like prevention, empowerment, diversity, ecology, competence enhancement, and social change from historical and contemporary perspectives. **Prerequisite(s):** Graduate standing in Psychology or consent of the instructor.

PSCH 534 Prevention Research, Theory, and Practice 3 hrs.
Emphasizes issues related to the conceptualization, design, implementation, and evaluation of prevention and competence-promotion programming. **Prerequisite(s):** Consent of the instructor.

PSCH 537 Seminar in Action Research 3 hrs.
Supervised action research in community settings, including entry, data collection, ethics, feedback, and report preparation. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Graduate standing in the Community and Prevention Research Specialization of the PhD in Psychology program or consent of the instructor.

PSCH 538 Seminar in Community and Prevention Research 1 TO 4 hrs.
Examination of a selected topic in community and prevention research. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

PSCH 539 Current Topics in Community and Prevention Research 1 hour.
Ongoing seminar with faculty and graduate students to discuss contemporary issues in community and prevention research. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

PSCH 540 Research with Diverse Groups 3 hrs.
Highlights some of the issues relevant to doing research with diverse groups, such as race/ethnicity, gender, social class, age, disability.

PSCH 541 Introduction to Computing in Psychology 1 hour.
An introduction to applications of computing in psychological research. Several projects are required. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

PSCH 543 Research Design and Analysis 4 hrs.
Experimental design, advanced analysis of variance (ANOVA), and statistical analyses for experimental and quasi-experimental designs, interpretation, and writing results in APA style, SPSS. **Prerequisite(s):** Graduate standing in psychology or consent of the instructor.

PSCH 544 Latent Variable Models 3 hrs.
Statistical methods and practical issues relevant to latent variable models with special emphasis on factor analysis and structural equation modeling. **Prerequisite(s):** PSCH 545.

PSCH 545 Multivariate Analysis 3 hrs.
The statistical analysis of functional relationships among two or more variables; multivariate regression, canonical correlation, discriminant analysis, multivariate analysis of variance, principal components, factor analysis, logistic regression, cluster analysis. **Prerequisite(s):** PSCH 543, and graduate standing in Psychology; or consent of the instructor.

PSCH 546 Theory and Practice in Program Evaluation 3 hrs.
Introduction to theory, design and practice of program evaluation. Emphasis will be on theories of social programming, selecting appropriate methods, and politics of evaluation. **Prerequisite(s):** PSCH 531 or the equivalent and PSCH 543 and PSCH 545; or consent of the instructor.

PSCH 548 Seminar in Methods and Measurement 1 TO 4 hrs.
Seminar on a preannounced topic in methodology, measurement, or mathematical psychology. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

PSCH 549 Current Topics in Psychology and Law 1 hour.
Discussion of recently published research and ongoing research in psychology and law by department faculty, graduate students, and outside speakers. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

PSCH 550 Proseminar in Educational Psychology 2 hrs.
Interdisciplinary colloquia on selected topics in educational psychology. Serves as introduction to faculty research foci. **Same as** EPSY 500. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Admission to the PhD in Education program or the PhD in Psychology program, or consent of the instructor.

PSCH 551 Cognition and Instruction 4 hrs.
Current research on relations among cognitive processes, learning, and instruction. **Same as** EPSY 501. **Prerequisite(s):** Admission to the PhD in Education program or the PhD in Psychology program, or consent of the instructor.

PSCH 552 Cognition and Instruction: Advanced Constructivist Approaches 4 hrs.
Piaget's and Vygotsky's theories of knowledge development. Emphasis on competing approaches concerning the relation of thought to action, to language, and to social relations. **Same as** EPSY 529. **Prerequisite(s):** EPSY 429 or PSCH 429 or the equivalent, and admission into a PhD program in the College of Education or Psychology or consent of instructor.

PSCH 558 Seminar in Cognitive Psychology 1 TO 4 hrs.
Detailed critical review of selected topics in cognitive psychology; emphasis on current research and theoretical developments. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

PSCH 559 Current Topics in Cognitive Psychology 1 hour.
Discussion of current research and theoretical issues in broad areas of cognitive psychology. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

PSCH 564 Clinical Psychopharmacology 3 hrs.
Behavioral, cognitive, and biological effects of psychotropic drugs in psychiatric populations. Theoretical, methodological, and empirical issues related to the pharmacological treatment of psychopathology. **Prerequisite(s):** Consent of the instructor.

PSCH 568 Seminar in Biopsychology 1 TO 4 hrs.
Current research issues and studies in biopsychology are discussed in terms of methodology and theory. Topic to be announced each semester. May be repeated. **Prerequisite(s):** Consent of the instructor.

PSCH 569 Current Topics in Biopsychology 1 hour.
Presentation of current research projects by staff and students. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

PSCH 570 Personality Psychology 3 hrs.
Contemporary research in personality psychology and a review of theoretical approaches to the study of personality structure and processes. **Prerequisite(s):** Consent of the instructor.

PSCH 571 Psychopathology 3 hrs.
Detailed consideration of disorders of behavior, including description, etiology, prognosis, and experimental and clinical research; consideration of development and functions of classification systems of abnormal behavior and their relation to clinical decision making. **Prerequisite(s):** PSCH 570 and consent of the instructor

**PSCH 573
Cognitive
and Behavioral
Assessment 3 hrs.**
Theory and research-based coverage of intellectual, neuropsychological, and behavioral assessment. Focus is on methods and interpretation of psychological testing, including both objective and projective methods.
Prerequisite(s): PSCH 572 and consent of the instructor.

**PSCH 574
Techniques of
Psychological
Intervention 3 hrs.**
Intervention skills, modalities, concepts, and techniques for different patient populations and presenting problems. Topics will vary each semester and include: cognitive-behavior therapy, psychodynamic therapy, group therapy, and family therapy. May be repeated. Students may register in more than one section per term.
Prerequisite(s): PSCH 571 and consent of the instructor.

**PSCH 575
Psychotherapy
Theory and Research 3 hrs.**
Research methods and theory related to psychotherapy and behavior change, with an emphasis on design, evaluation, and results of empirically based psychotherapy studies. **Prerequisite(s):** PSCH 571 and consent of the instructor.

**PSCH 577
Ethics and Professional
Development 3 hrs.**
Ethical dimensions of psychology, including clinical practice, research, and teaching; ethical codes, confidentiality, client rights, dual relationships, legal issues, competency, social responsibility, moral reasoning, values.
Prerequisite(s): Graduate standing in psychology or consent of the instructor.

**PSCH 578
Seminar in Clinical
Psychology 1 TO 4 hrs.**
In-depth coverage of selected current topics in clinical psychology. Emphasis is on current research. **Prerequisite(s):** Consent of the instructor.

**PSCH 579
Current Topics in
Clinical Psychology 1 hour.**
Research and case presentations in clinical psychology. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

**PSCH 581
Practicum in
Interviewing 1 hour.**
Interviewing practicum through the Office of Applied Psychological Services. Students observe and conduct clinical interviews under supervision. Satisfactory/Unsatisfactory grading only.
Prerequisite(s): PSCH 481 and consent of the instructor.

**PSCH 582
Practicum in
Psychological
Assessment 4 hrs.**
Supervised practice in psychodiagnostic testing in various facilities associated with the graduate training program in clinical psychology. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term.
Prerequisite(s): PSCH 573 and consent of the instructor.

**PSCH 583
Practicum in
Clinical Intervention 4 hrs.**
Instruction and supervision in the practice of psychological intervention, application of basic psychological principles to varied parent populations. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term.
Prerequisite(s): PSCH 574 and consent of the instructor.

**PSCH 584
Practicum for
Clinical Trainees
on Assessment,
Intervention, and
Research 0 TO 3 hrs.**
Presentation and discussion of trainee assessment, intervention, and research projects. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Acceptance into either an NIMH- or OAPS-sponsored training program.

**PSCH 587
Practicum in
Instruction in
Psychology 0 TO 9 hrs.**
Seminar on course planning and supervised teaching of an undergraduate course. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. Students register for 2 to 9 hours.
Prerequisite(s): Consent of the instructor.

**PSCH 591
Research
Apprenticeship 2 TO 3 hrs.**
Directed training in conducting research in specific areas of psychology, and in developing skills related to the research. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 5 hours.
Prerequisite(s): Consent of the instructor.

**PSCH 594
Advanced Special
Topics in
Psychology 1 TO 4 hrs.**
Advanced treatment of an announced topic. May be repeated. Students may register in more than one section per term.
Prerequisite(s): Consent of the instructor.

**PSCH 595
Methods and
Measurement in
Clinical Psychology 2 hrs.**
Provides students with an overview of research methods, process concerns, ethics, and issues that are relevant to the field of clinical psychology. May be repeated.
Prerequisite(s): Consent of the instructor.

**PSCH 596
Independent
Study 1 TO 12 hrs.**
Research on or study of topics not included in regular classes or thesis and dissertation research. Satisfactory/Unsatisfactory grading only. May be repeated.
Prerequisite(s): Consent of the instructor.

**PSCH 598
Thesis
Research 0 TO 16 hrs.**
Research on the topic of the master's thesis. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 12 hours. **Prerequisite(s):** Consent of the instructor.

**PSCH 599
Dissertation
Research 0 TO 16 hrs.**
Research on the topic of the doctoral dissertation. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Consent of the instructor.

Public Administration

**PA 400
Public
Administration
Theory 3 OR 4 hrs.**
PA as a professional and scholarly area of knowledge and practice focusing on administrative reform and its intellectual roots. Politics versus administration, efficiency, effectiveness, representative bureaucracy, and market versus bureaucratic alternatives. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Admission to the MPA program or consent of the instructor.

**PA 407
Data Analysis
for Public
Administration 4 hrs.**
Topics and methods of analyzing information relevant to the administration and management of public programs and organizations. Includes causation, univariate statistics, significance testing, correlation, and regression.
Prerequisite(s): Appropriate score on the department placement test; and graduate standing; or consent of the instructor. Admission to the MPA program or consent of the instructor.

**PA 410
Economics for Public
Administration
and Policy
Decisions 3 OR 4 hrs.**
Basic economic tools and methods relevant to public administration and current policy, including opportunity cost, competition versus monopoly, economic efficiency, equity, market failure, public goods, and externalities. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Appropriate score on the department placement test and graduate standing and admission to the MPA program; or consent of the instructor.

**PA 415
Organization
Theory and Public
Management 3 OR 4 hrs.**
Theories and concepts of organizational behavior and public management from economics, sociology, and political science. Organizational decision making, bureaucracy, organizational change and learning, public versus private organizations, leadership, and organizational culture. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Admission to the MPA program or consent of the instructor.

**PA 447
Survey Planning
and Design 3 hrs.**
Theory and applications of sample survey planning and design for conducting research in health sciences and related fields. Addresses three major topics: survey design and planning, sampling, and data collection procedures. **Same as** CHSC 447. **Prerequisite(s):** Graduate or professional standing and BSTT 400 or the equivalent. Recommended background: Credit in CHSC 446 or the equivalent.

**PA 460
Data Management 4 hrs.**
Database theory and constructing and managing databases relevant to the operation of government. Utilizes database software and allows students to gain practice with complex database programs and development of a database system. **Prerequisite(s):** Admission to the MPA program or consent of the instructor.

**PA 461
Management of
Information
Technology in
Government 4 hrs.**
Concepts and methods of planning, implementing, and managing new information technology or modifying existing technology. **Prerequisite(s):** Admission to the MPA program or consent of the instructor.

**PA 463
The Internet and Public
Administration 4 hrs.**

Application of the Internet for public management. Web-based service delivery, online governance, the technological divide, and the changing role of public managers. **Prerequisite(s):** Admission to the MPA program or consent of the instructor.

**PA 464
Technology and
Innovation Theory 4 hrs.**

The course focuses on theories surrounding the creation, development, transfer, and use of technology. **Prerequisite(s):** Admission to the PhD in Public Administration program or consent of the instructor.

**PA 466
Science, Technology
and Public Policy 4 hrs.**

This course addresses the relationships among public policy, science, and technology in the United States. **Prerequisite(s):** Admission to the PhD in Public Administration program or consent of the instructor.

**PA 490
Field Experience
in Public
Administration 4 hrs.**

Students work in an organization, such as a government agency, community group, or nonprofit organization. Students are required to submit written work and meet with professor on periodic basis to review work experience. Satisfactory/Unsatisfactory grading only. May be repeated. A maximum of 4 hours of credit may be applied to the Master of Public Administration program. Fieldwork required. Students who have no prior work experience in the public or nonprofit sectors are strongly recommended to register for this course. **Prerequisite(s):** Graduate standing required; and admission to the MPA program or consent of the instructor.

**PA 493
Topics in Urban
and Public Affairs
and Administration 3 hrs.**

In-depth study of selected issues on urban and public affairs. **Same as** UPA 493. May be repeated to a maximum of 6 hours. Students may register for more than one section per term. **Prerequisite(s):** Admission to the BA in Urban and Public Affairs program or consent of the instructor.

**PA 494
Special Topics
in Public
Administration 3 OR 4 hrs.**

Consideration of timely or enduring issues in public administration not available in regularly offered courses. 3 undergraduate hours. 4 graduate hours. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** Admission to the MPA program or consent of the instructor.

**PA 502
The Legal Context of
Public Administration 4 hrs.**

Legal basis and statutory framework for administrative agencies and actions in government. Relationship between courts and public agencies, rule making and adjudicative powers of public agencies, and impact of specific laws on government. **Prerequisite(s):** Admission to the MPA program or consent of the instructor.

**PA 503
Public Personnel
Management 4 hrs.**

History and current innovations in managing personnel and other areas of human resources. Compensation, classification, affirmative action, performance appraisal, labor relations, and unions. Statutory and court decisions affecting government personnel issues. **Prerequisite(s):** Admission to the MPA program or consent of the instructor.

**PA 504
Budgeting for Public
Administration 4 hrs.**

Processes and methods relevant to government finances and fiscal health: revenues, taxation, budget formulation, operating budgets, cost analysis, planning and performance, budget reforms, politics, capital budgeting, role of budgeting in management. **Prerequisite(s):** Admission to the MPA program or consent of the instructor.

**PA 506
Policy Development and
Analysis for Public
Administrators 4 hrs.**

Examines the process by which public policies are formulated, decided on, implemented, and evaluated. Techniques of analysis appropriate for various policy issues, and substantive policy issues facing us today. **Prerequisite(s):** Admission to the MPA program or consent of the instructor.

**PA 510
Organization Theory
and Behavior in
Public Administration
Research 4 hrs.**

Analysis of major analytical models of organizations; decision making; control and accountability; change and development; interorganizational relations; the organization-environment interface. **Prerequisite(s):** Admission to the PhD in Public Administration program or approval of the program director.

**PA 511
The History and Development
of Public Administration
Research and Theory 4 hrs.**

The history and development of modern public administration, with emphasis on the U.S. model. Major scholarly movements; institutional developments; other factors shaping the present state of the discipline. **Prerequisite(s):** Admission to the PhD in Public Administration program or approval of the program director.

**PA 515
The Bureaucracy
and the Policy
Process 4 hrs.**

Theories and research issues concerning the role of administrators in policy formation. Case studies and research on federal, state, and local agencies. **Prerequisite(s):** Admission to the PhD in Public Administration program or approval of the program director.

**PA 521
Strategic Management:
Planning and
Measurement 4 hrs.**

This course addresses strategies and issues relating to the strategic management of public and quasi-public organizations. It addresses strategic planning and performance measurement processes within organizations. **Prerequisite(s):** Admission to the MPA program or consent of the instructor.

**PA 522
Ethics and
Accountability 4 hrs.**

Better government through institutionalizing ethics and accountability. Effectiveness of boards of ethics, inspector general, codes of ethics, and educational programs. History of ethics within the Western intellectual tradition. **Prerequisite(s):** Admission to the MPA program or consent of the instructor.

**PA 523
Intergovernmental
Management 4 hrs.**

Relationships between federal, state, and local governments focusing on management of overlapping programmatic, regulatory, and fiscal responsibilities. **Prerequisite(s):** Admission to the MPA program or consent of the instructor.

**PA 524
Leadership in Public
Sector Organizations 4 hrs.**

Examines theories and practices of leadership in public sector organizations. Global, political, social, and organizational contexts of public sector leaders and interface among administrators, appointees, elected officials. **Prerequisite(s):** Admission to the MPA program or consent of the instructor.

**PA 526
Public Decision
Analysis 4 hrs.**

Provides an introductory treatment of decision analysis. The intended participants are students who want to learn more about decision making under uncertainty and tools that can be used to support it. **Prerequisite(s):** PA 407 or consent of the instructor.

**PA 527
Public Management
Theory 4 hrs.**

Addresses the development of the public management subfield within the field of public administration. It covers the development of public management theory from its early stages to current questions and theoretical approaches. **Prerequisite(s):** Admission to the PhD in Public Administration program or consent of the instructor.

**PA 528
Public Program
Evaluation 4 hrs.**

Theory and procedures for evaluating the effectiveness of programs administered by public and nonprofit organizations. Includes application of research design, quantitative, and qualitative methodologies. **Prerequisite(s):** PA 542 or equivalent; and admission to the PhD in Public Administration program or consent of the instructor.

**PA 529
Change and
Reform in Public
Organizations 4 hrs.**

Examines how large, bureaucratic organizations change how they do business. Can improved efficiency and effectiveness result from such change? What techniques are being applied by public organizations to achieve such change? **Prerequisite(s):** Admission to the MPA program or consent of the instructor.

**PA 532
Labor Management
Relations in the
Public Sector 4 hrs.**

Skills and knowledge to manage labor relations in government. Constitutional influences on public employment, rights of public employees, management, and labor unions; civil service laws, collective bargaining, nondiscrimination, and equal opportunity. **Prerequisite(s):** PA 503; and admission to the MPA program or consent of the instructor.

**PA 533
Managing
Workplace Diversity 4 hrs.**

Examines discrimination and diversity in public sector workplaces along several dimensions, including race, ethnicity, sex, age, sexual preference, and physical ability. **Prerequisite(s):** PA 503; and admission to the MPA program or consent of the instructor.

**PA 534
Human Resource
Development and
Management in Public
Administration 4 hrs.**

Topics in public personnel administration; work motivation, performance appraisal, high-performance work systems, equal employment opportunity, affirmative action, strategic human resource management, and representative bureaucracy. **Prerequisite(s):** Admission to a PhD program or consent of the instructor.

**PA 537
Local Government
Management 4 hrs.**

Issues in the management of local government, including the metropolitan and regional context, the evolving role of managers and special considerations in finance, reform, service delivery, economic development, and democracy at the local level. **Prerequisite(s):** Admission to the MPA program or consent of the instructor.

**PA 538
Nonprofit
Management 4 hrs.**

Examines management in nonprofit organizations: volunteer management, membership, fundraising, faith-based organizations, grant management, service delivery, philanthropies and missions, finance and reporting requirements, and performance. **Prerequisite(s):** Admission to the MPA program or consent of the instructor.

**PA 540
Research Design
for Public
Administration 4 hrs.**

Logic and methods of quantitative and nonquantitative research in public administration. Issues in measurement; causal inference; experimental and quasi-experimental designs; and methods of data collection. **Prerequisite(s):** Admission to the PhD in Public Administration program or approval of the program director.

**PA 541
Advanced
Data Analysis I 4 hrs.**

Elements of matrix theory; introduction to the theory of estimation; hypothesis testing; logit and probit models; factor analysis; and principal components analysis. Application of techniques to public administration research. **Prerequisite(s):** Graduate standing; and PA 540 or equivalent or approval of the instructor.

**PA 542
Advanced
Data Analysis II 4 hrs.**

For those likely to pursue careers in the more quantitative aspects of public administration research. Discrete multivariate analysis and regression; multivariate analysis of variance; other advanced techniques. **Prerequisite(s):** Graduate standing; and PA 541 or equivalent or approval of the instructor.

**PA 544
Qualitative Research
Methods in Public
Administration 4 hrs.**

The uses, strengths, and limitations of qualitative methods of research and analysis, including case studies, participant-observer, and ethnography will be explored. **Prerequisite(s):** Graduate or professional standing; PA 540 or equivalent; or consent of the instructor.

**PA 545
Research Topics
in Public
Administration I 2 hrs.**

Provides PhD students with a better understanding of current research topics in PA. Students will read current working papers and published articles so as to develop the tools needed for critical analysis of current research. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Admission to the PhD program in Public Administration and advanced standing or consent of the instructor.

**PA 546
Research Topics
in Public
Administration II 2 hrs.**

Continuation of PA 545. Students critically analyze current research and will develop a research topic of their own focusing on the elements needed to write a quality research paper. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** PA 545; and admission to the PhD program in Public Administration with advanced standing or consent of the instructor.

**PA 550
Financial
Management of
Government 4 hrs.**

Overview of issues and concepts important for administration and management of government's financial affairs: government accounting, purchasing, cash management and investment, risk management, pension and benefits administration, debt management, and capital financing. **Prerequisite(s):** PA 504; and admission to the MPA program or consent of the instructor.

**PA 551
Governmental
Accounting 4 hrs.**

Introduction to major concepts, principles, and objectives of governmental accounting (including fund accounting) and budgetary control systems for local and state government. Designed for students with little or no background in accounting. **Prerequisite(s):** PA 504; and admission to the MPA program or consent of the instructor.

**PA 552
Public Capital
Budgeting and
Finance 4 hrs.**

Examines governmental capital budgeting processes, linkages between the capital budget and capital improvement plan, and methods and techniques of financing capital projects, including debt financing. **Prerequisite(s):** PA 504; and admission to the MPA program or consent of the instructor.

**PA 553
State and Local
Public Finance 4 hrs.**

Analyzes expenditures and revenues of state and local governments and public sector responses to market failures. Examines state and local revenue sources and discusses governmental provision of services. **Prerequisite(s):** PA 504; and admission in the MPA program or consent of the instructor.

**PA 554
Financial
Management in
Public Administration 4 hrs.**

Principles of financial management and applications in various institutional and programmatic settings. Forecasting techniques, computer applications, innovations in public borrowing, and debt management. **Prerequisite(s):** Graduate or professional standing; and PA 410 and PA 504 or equivalents; or consent of the instructor.

**PA 567
Topics in Political
Communication 4 hrs.**

Intensive study of selected aspects; organizational communication in public institutions, urban political communication patterns, communication elites. Independent research using a variety of community research techniques. **Same as** COMM 567 and POLS 567. **Prerequisite(s):** Consent of the instructor.

**PA 577
Survey Questionnaire
Design 3 hrs.**

Concepts and strategies for developing survey questionnaires for various modes of survey data collection. Students develop and present questionnaires related to their individual interests. **Same as** CHSC 577. **Prerequisite(s):** CHSC 446 or CHSC 447; or consent of the instructor.

**PA 578
Surveys, Public
Opinion, and
Public Policy 4 hrs.**

Addresses the nature of the relationship between public policy and public opinion and the role that surveys play in that relationship. **Prerequisite(s):** Admission to the MPA or PhD in Public Administration program or consent of the instructor.

**PA 579
Practicum
in Survey
Methodology 2 TO 6 hrs.**

Students learn about survey research by participating in the process of conducting a survey or surveys. **Prerequisite(s):** Admission to the MPA or PhD in Public Administration program or consent of the instructor.

**PA 580
Survey
Nonresponse 2 hrs.**

Provides an overview of current problems in survey nonresponse and related questions of impact on data quality. **Prerequisite(s):** Admission to the MPA or PhD in Public Administration program or consent of the instructor.

**PA 581
Cross-Cultural
Survey Research
Methods 2 hrs.**

Provides graduate students with a clear understanding of the methodological issues involved in collecting survey data across multiple cultural groups and best practices when conducting cross-cultural research. Recommended background: Admission to the MPA or PhD in Public Administration program or consent of the instructor.

**PA 582
Survey Data
Collection Methods 2 hrs.**

This course will address the impact of data collection methods on survey responses and data quality. **Prerequisite(s):** Graduate or professional standing or consent of the instructor.

**PA 583
The Psychology
of Survey Measurement:
Cognitive and
Social Processes 2 hrs.**

Introduces students to one approach to survey methodology—the examination of the psychological processes through which survey respondents answer questions. **Prerequisite(s):** Admission to the MPA or PhD in Public Administration program or consent of the instructor.

**PA 584
Internet Surveys 2 hrs.**

Examines current developments in the collection of survey data via the Internet, including both the methodological strengths and weaknesses of this approach, as well as current standards for best practice. **Prerequisite(s):** Admission to the MPA or PhD in Public Administration program or consent of the instructor.

**PA 585
Survey
Research Ethics 2 hrs.**

Students will be exposed to survey research ethical issues. **Prerequisite(s):** Admission to the MPA or PhD in Public Administration program or consent of the instructor.

PA 586
The History of Survey Methodology 2 hrs.
Examines the history of surveys, their development and change over time. **Prerequisite(s):** Admission to the MPA or PhD in Public Administration program or consent of the instructor.

PA 587
Seminar on Special Topics in Survey Methodology 2 hrs.
This seminar is for special topics in survey methodology not covered in the other elective courses. **Prerequisite(s):** Admission to the MPA or PhD in Public Administration program or consent of the instructor.

PA 588
Survey Data Reduction and Analysis 2 hrs.
Provides an in-depth overview of available procedures and standards for survey data reduction and data analysis activities. **Prerequisite(s):** Admission to the MPA or PhD in Public Administration program or consent of the instructor.

PA 590
Public Administration Capstone 4 hrs.
Integration of classroom learning with practical experience. Students will work in groups to solve real problems for public and nonprofit organizations. Extensive collaboration required among group members outside of class time. Students should expect significant fieldwork at their assigned organizations. Students are responsible to the course professor and to the project supervisor in their assigned organizations. Because the course work is team-based, students are not allowed to drop this course once teams are created. **Prerequisite(s):** Consent of the instructor and enrollment in the MPA program. Course must be taken in the last two semesters in the MPA program or consent of the instructor.

PA 593
Independent Research in Public Administration 1 TO 8 hrs.
Advanced study and analysis of a topic selected by a student under the supervision of a faculty member. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the director of graduate studies and consent of the instructor.

PA 594
Special Topics in Public Administration 1 TO 4 hrs.
Advanced study of an announced topic. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Admission to the PhD in Public Administration program or consent of the instructor.

PA 596
Independent Study in Public Administration 1 TO 4 hrs.
Advanced study and analysis of a topic under guidance of select faculty. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the director of graduate studies and consent of the instructor.

PA 599
PhD Thesis Research 0 TO 16 hrs.
Individual study and research. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Open only to degree candidates, upon approval of topic by dissertation committee.

Public Health Nursing

NUPH 501
Education Perspectives in School Health 4 hrs.
The scientific knowledge base of child development and educational psychology. Will explore the implications for classroom practice. **Prerequisite(s):** Consent of the instructor.

NUPH 502
School Nursing Theory and Trends 3 hrs.
Explores population-focused frameworks, health needs, and legal mandates that impact school community. School nursing practice models are studied as relevant to developing leadership and management. **Prerequisite(s):** Consent of the instructor.

NUPH 504
Occupational Health Nursing 2 hrs.
Theoretical bases for application of public health nursing practice to working populations in occupational settings. Previously listed as NUPH 400. **Prerequisite(s):** Consent of the instructor.

NUPH 505
Nursing Systems Operations Management 3 hrs.
Nursing systems operations management of health services. Examines the managerial role at individual, program, work unit, department, and organizational levels. Includes focus on interaction of the organization and environment. **Same as** NUAS 505. **Prerequisite(s):** Consent of the instructor.

NUPH 507
Advanced Community Health Nursing: Introduction and Interventions 4 hrs.
Addresses application of evidence-based, population-focused interventions in healthcare organizations that promote wellness and improve community health status. Introduces leadership roles/concepts in advanced public health nursing practice.

NUPH 509
Population-Focused Assessment 3 hrs.
Explores population-focused assessment in community and integrated healthcare systems emphasizing the application of assessment models used in health service delivery and market analysis. **Prerequisite(s):** Credit or concurrent registration in EPID 400 and credit or concurrent registration in NUSC 525 and credit or concurrent registration in NUSC 526.

NUPH 511
Planning and Evaluation for Advanced Nursing Practice 3 hrs.
Explores strategic and program planning applications. Focuses on evaluation as a measurement of quality, performance, and impact of health services. Emphasizes interdisciplinary perspective and addresses integrated quality improvement systems. **Prerequisite(s):** NUPH 509 and NUSC 525 and NUSC 526. Requires concurrent registration in NUSC 527.

NUPH 512
Healthcare Human Resources Management 3 hrs.
Focuses on the development of a strategic human resource plan to support the mission of the healthcare organization. Current human resources management and organizational performance research findings are explored. **Same as** NUAS 512. **Prerequisite(s):** Consent of the instructor.

NUPH 517
Financial Resource Management for Nursing Decision Makers 3 hrs.
Provide the clinical decision maker with state-of-the-art tools to plan, implement, and evaluate the financial viability of healthcare programs and initiatives. **Same as** NUAS 517. **Prerequisite(s):** Consent of the instructor; knowledge of Excel is required.

NUPH 519
School Nursing Internship 1 TO 3 hrs.
Concepts and principles and best practices of school nursing applied within the school community. Clinical experience with an emphasis on development of a coordinated school health program. May be repeated. **Prerequisite(s):** Credit or concurrent registration in NUPH 502.

NUPH 520
Internship in Advanced Nursing 1 TO 3 hrs.
Intensive field study for advanced nursing practice with emphasis on integration of graduate course work. **Same as** NUAS 520. May be repeated. **Prerequisite(s):** Consent of the instructor.

NUPH 528
Advanced Clinical Practice in Primary Care Nursing 1 TO 5 hrs.
Healthcare issues, advanced clinical skills, and supervised practicum experiences specific to students' selected practice area or population groups in rural, urban, or international settings. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** NUPH 525.

NUPH 529
Advanced Clinical Practice in Occupational Health Nursing 1 TO 5 hrs.
Practicum emphasizing interdisciplinary experience in the identification of work-related health problems, their treatment, and follow-up. Learning activities are individualized to meet the student's learning needs. **Prerequisite(s):** NUPH 504 and credit or concurrent registration in EOHS 421 and credit or concurrent registration in EOHS 482 and credit or concurrent registration in EOHS 551. **Corequisite(s):** Must enroll concurrently in NUPH 545.

NUPH 535
Seminar in Advanced Public Health Nursing Leadership 3 hrs.
Focuses on development and application of advanced population-focused nursing leadership skills needed to successfully advocate for underserved, medically disadvantaged, and vulnerable populations. May be repeated.

NUPH 539
Health Management in Primary Care I 3 hrs.
First of a three-course sequence in evidence-based health promotion, health maintenance, and health restoration using a life span developmental framework. Emphasizes wellness care. **Prerequisite(s):** NUSC 532.

NUPH 540
Clinical Practice in Primary Care I 3 hrs.
Practicum emphasizing evidence-based clinical practice, including data gathering, differential diagnosis, health promotion, disease prevention, and management of common health problems across the life span. **Prerequisite(s):** NUSC 532 and credit or concurrent registration in NUPH 539.

NUPH 541
Clinical Practice in Primary Care II 2 hrs.
Practicum emphasizing evidence-based clinical practice, including data gathering, differential diagnosis, health promotion, disease prevention, and management of common health problems across the life span. **Prerequisite(s):** NUPH 539 and NUPH 540.

NUPH 542
Health Management in Primary Care II 3 hrs.
Second in a three-course sequence in evidence-based health promotion, health maintenance, and health restoration using a life span developmental framework. Emphasizes common acute and chronic health problems.
Prerequisite(s): NUPH 539.

NUPH 543
Advanced Clinical Practice in Primary Care I 4 hrs.
Practicum emphasizing evidence-based clinical evaluation, differential diagnosis, health promotion, disease prevention, and management of common to complex health problems across the life span. **Prerequisite(s):** NUPH 541 and credit or concurrent registration in NUPH 542.

NUPH 544
Health Management in Primary Care III 3 hrs.
Last in a three-course sequence in evidence-based health promotion, health maintenance, and health restoration using a life span developmental framework. Emphasizes common chronic health problems and co-morbidities. **Prerequisite(s):** NUPH 542.

NUPH 545
Advanced Clinical Practice in Primary Care II 2 TO 4 hrs.
Practicum emphasizing evidence-based clinical evaluation, differential diagnosis, health promotion, disease prevention, and management of common to complex health problems and co-morbidities across the life span. **Prerequisite(s):** NUPH 543 and credit or concurrent registration in NUPH 544.

NUPH 547
Population-Focused Interventions in Primary Care 2 hrs.
Population-focused assessment, program planning, and evaluation of interventions for community-based healthcare providers. **Same as** NUSC 547. **Prerequisite(s):** EPID 400.

NUPH 548
Practicum in Population-Focused Interventions in Primary Care 1 hour.
Supervised practicum experience in population-focused assessment, program planning, and evaluation. **Prerequisite(s):** Credit or concurrent registration in NUPH 547.

NUPH 557
Intermediate Epidemiology for Advanced Nursing Practice 3 hrs.
Provides intermediate-level knowledge and skills in epidemiology for nurses and other public health practitioners. Addresses threats to validity and other issues of interpretation of designs. **Same as** NUSC 557. **Prerequisite(s):** EPID 400 or an equivalent course.

NUPH 559
Grant Writing for Healthcare Services 3 hrs.
Focuses on developing knowledge and application skills needed for successful health service programmatic grant writing. **Same as** NUSC 559. **Prerequisite(s):** Credit or concurrent registration in NUPH 507 or credit or concurrent registration in NUSC 507; and credit or concurrent registration in NUAS 502 or credit or concurrent registration in NUPH 511; or consent of the instructor.

NUPH 566
Family-Focused Health Management in Primary Care 3 hrs.
Assessment and management of common behavioral, lifestyle, and life cycle issues in primary care using a family-focused approach. **Same as** NUSC 566. **Prerequisite(s):** NUSC 532; or consent of the instructor.

NUPH 567
Issues in Population-Focused Nursing 2 hrs.
Provides introduction to leadership in population-focused nursing: philosophy, theory, roles, competencies, and interventions.

NUPH 568
Practicum in Population-Focused Nursing Interventions 2 hrs.
Advanced nursing practice experiences to develop beginning competency in the design and implementation of evidence-based interventions with populations and aggregates. **Prerequisite(s):** Credit or concurrent registration in NUSC 507.

Public Policy Analysis

PPA 401
Data Analysis I 3 OR 4 hrs.
Statistical inference for the social sciences. Emphasis on univariate and bivariate statistics. **Same as** POLS 401. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** POLS 200 and POLS 201; or graduate standing.

PPA 500
Intermediate Policy and Governance 4 hrs.
Introduces the intellectual traditions and debates that have characterized the study of public policy and the social order. Society-centered and state-centered explanations for policy will be explored. **Same as** POLS 500. Consent of the department required for nondegree graduate students.

PPA 501
Data Analysis II 4 hrs.
Interpretation and application of multivariate methods of analysis in the social sciences. Regression specification and diagnostics, limited dependent variable models, measurement issues. **Same as** POLS 501. **Prerequisite(s):** POLS 401 or PPA 401.

PPA 541
Policy Formation, Implementation, and Evaluation 4 hrs.
Introduction to political science theories of how elections, interest groups, and state structure affect the formulation of public solutions to societal problems. **Same as** POLS 541. **Prerequisite(s):** Consent of the department required for nondegree graduate students.

PPA 584
Methods of Policy Analysis 4 hrs.
Analytic, allocative, and evaluative techniques in public policy analysis. Preparation of case studies in problem analysis and policy recommendation. **Same as** UPP 584. **Prerequisite(s):** Consent of the instructor.

PPA 590
Advanced Public Policy Workshop 4 hrs.
Interdisciplinary workshop on preparing a dissertation proposal for public policy analysis students. **Same as** POLS 590. **Prerequisite(s):** Advanced standing in the PhD in Public Policy Analysis program and completion of core PPA courses.

Religious Studies

RELS 446
Race, Ethnicity, and Gender in American Religion 3 OR 4 hrs.
Religious institutions in the U.S. as a crucible for racial, ethnic, and gender identities, group formation, and intergroup relations; major world religions represented in the U.S. **Same as** SOC 446. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SOC 100 and junior standing or above; or consent of instructor.

RELS 478
The Bible as Literature 3 OR 4 hrs.
Literary analysis of the English Bible (including the Apocrypha) in its historical and religious contexts; study of the King James Version and successive revisions of it. **Same as** ENGL 478 and JST 478. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in ENGL 240; and grade of C or better in ENGL 241 or grade of C or better in ENGL 242 or grade of C or better in ENGL 243; or consent of the instructor.

RELS 495
Topics in Religious History 3 OR 4 hrs.
Specific topics are announced each term. **Same as** HIST 495. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of history or consent of the instructor.

Russian

RUSS 401
Russian Composition and Conversation III 3 OR 4 hrs.
Oral presentations, compositions, conversation: daily life and current events. Problems of grammar and syntax. Improving pronunciation and intonation. Reading. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** RUSS 302 or the equivalent.

RUSS 402
Russian Composition and Conversation IV 3 OR 4 hrs.
Continuation of RUSS 401. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** RUSS 401 or the equivalent.

RUSS 410
Structure of Modern Russian 3 OR 4 hrs.
A synchronic linguistic analysis of Russian substantives, adjectives, pronouns, verbs, deverbial nouns, and minor parts of speech from a syntagmatic and paradigmatic point of view. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** At least 4 semester hours of Russian or the equivalent.

RUSS 450
Studies in the Russian Novel 3 OR 4 hrs.
Study of a major novelist, movement, or special themes. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). **Prerequisite(s):** 24 hours of Russian or consent of the instructor.

RUSS 460
Studies in Russian Literature 3 OR 4 hrs.
Study of a major author, movement, genre, or special topic. Content varies. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). **Prerequisite(s):** 24 hours of Russian or consent of the instructor.

**RUSS 499
Independent
Study** 1 TO 4 hrs.
Investigation of special problems under the general direction of a staff member. May be repeated to a maximum of 8 hours. Graduate students may register for more than one section per term.
Prerequisite(s): Senior or graduate standing, consent of the instructor and the head of the department.

**RUSS 510
History of
the Russian
Language** 4 hrs.
Formation and development of standard Russian to the end of the eighteenth century. Analysis of selected texts. **Prerequisite(s):** RUSS 410 or SLAV 505 or the equivalent.

**RUSS 515
Topics in
Contemporary
Russian Linguistics** 4 hrs.
Variable content. May be repeated to a maximum of 12 hours.
Prerequisite(s): RUSS 410 or the equivalent.

**RUSS 520
Topics in
Historical Russian
Linguistics** 4 hrs.
Specific topics are announced each term. May be repeated to a maximum of 12 hours.

**RUSS 550
Studies in Russian
Romanticism** 4 hrs.
Study of a topic, author, or movement. Content varies. May be repeated to a maximum of 12 hours.

**RUSS 555
Studies in
Russian Realism** 4 hrs.
Study of a topic, author, or movement. Content varies. May be repeated to a maximum of 12 hours.

**RUSS 560
Studies in
Russian Neorealism
and Modernism** 4 hrs.
Study of a topic, author, or movement. Content varies. May be repeated to a maximum of 12 hours.

**RUSS 565
Studies in
Soviet Prose** 4 hrs.
Study of a topic or movement. Content varies. May be repeated to a maximum of 12 hours.

**RUSS 570
Studies in Russian
Literary Criticism** 4 hrs.
Study of a critical school or movement. Content varies. May be repeated to a maximum of 12 hours.

**RUSS 575
Methods and
Principles of
Translation** 4 hrs.
Introduction to theory and methods of Russian-English and English-Russian literary translation. Intensive practice in kinds of translation: expository prose, literary prose, and poetry.

**RUSS 596
Independent
Study** 1 TO 4 hrs.
Investigation of special problems under the general direction of a staff member. May be repeated to a maximum of 8 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor and the head of the department.

Slavic and Baltic Languages and Literatures

**SLAV 405
Problems in Slavic
Grammars** 3 OR 4 hrs.
Systematic review of important topics in grammar and syntax. Content varies. Required for department undergraduate majors in Slavic programs. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). **Prerequisite(s):** RUSS 302 or POL 302 or SLAV 302 or the equivalent.

**SLAV 410
Structure of
Modern Serbian** 3 OR 4 hrs.
A synchronic linguistic analysis of Serbian phonology and morphology, with fundamentals of syntax. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SLAV 104 or the equivalent or consent of the instructor.

**SLAV 433
Topics in
Eastern European
History** 3 OR 4 hrs.
Specific topics are announced each term. **Same as** HIST 433. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** 3 hours of European history or consent of the instructor.

**SLAV 460
Studies in
East European
Literatures and
Culture** 3 OR 4 hrs.
Study of a topic, author, genre, or movement. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). **Prerequisite(s):** 24 hours of Slavic or Baltic or consent of the instructor.

**SLAV 470
Educational Practice
with Seminar I** 6 hrs.
The first half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, and approval of the department.

**SLAV 471
Educational Practice
with Seminar II** 6 hrs.
The second half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, credit or concurrent registration in SLAV 470, and approval of the department.

**SLAV 499
Independent
Study** 1 TO 4 hrs.
Investigation of special problems under the general direction of a staff member. May be repeated to a maximum of 8 hours. Graduate students may register for more than one section per term. **Prerequisite(s):** Senior or graduate standing, consent of the instructor and the head of the department.

**SLAV 505
Old Church Slavonic** 4 hrs.
Phonology, morphology, and basic elements of syntax. Readings in selected texts. **Prerequisite(s):** Three years of a Slavic language or consent of the instructor.

**SLAV 510
History of
Serbian Language** 4 hrs.
A diachronic linguistic analysis of Serbian phonology and morphology with fundamentals of syntax. **Prerequisite(s):** SLAV 104 or the equivalent, or consent of the instructor.

**SLAV 515
Topics in Contemporary
Serbian Linguistics** 4 hrs.
Variable content. May be repeated to a maximum of 12 hours. **Prerequisite(s):** SLAV 410.

**SLAV 520
Topics in Historical
Serbian Linguistics** 4 hrs.
Variable content. May be repeated to a maximum of 12 hours. **Prerequisite(s):** SLAV 505 or consent of the instructor.

**SLAV 525
Topics in
Serbian Syntax** 4 hrs.
Variable content. May be repeated to a maximum of 12 hours.

**SLAV 530
Topics in Ukrainian
Linguistics** 4 hrs.
Variable content. May be repeated to a maximum of 12 hours.

**SLAV 535
Topics in Comparative
Slavic Linguistics** 4 hrs.
Comparative study of various linguistic aspects of the Slavic languages. May be repeated to a maximum of 12 hours.

**SLAV 536
Topics in Comparative
Slavic Literatures** 4 hrs.
Comparative study of a literary topic or movement. Content varies. May be repeated to a maximum of 12 hours.

**SLAV 542
Studies in
Serbian Poetry** 4 hrs.
Specific topics are announced each semester. May be repeated to a maximum of 12 hours.

**SLAV 545
Studies in
Serbian Prose I** 4 hrs.
Specific topics of the Serbian short story and novel are announced each term. May be repeated to a maximum of 12 hours.

**SLAV 546
Topics in
Serbian Prose II** 4 hrs.
Specific topics of Serbian drama are announced each semester. May be repeated to a maximum of 12 hours.

**SLAV 550
Studies in
Yugoslav Literary
Historiography
and Criticism** 4 hrs.
Major concepts and movements in the South Slavic literary history. May be repeated to a maximum of 12 hours.

**SLAV 560
Studies in Ukrainian
Renaissance and
Baroque Literature** 4 hrs.
Ukrainian prose, poetry, and drama of the sixteenth, seventeenth, and eighteenth centuries.

**SLAV 562
Studies in Ukrainian
Romantic and
Postromantic Poetry** 4 hrs.
Study of a period or movement in the nineteenth and early twentieth-century Ukrainian poetry. Content varies. May be repeated to a maximum of 12 hours.

**SLAV 563
Studies in
Twentieth-Century
Ukrainian Poetry** 4 hrs.
Study of a period or movement. Content varies. May be repeated to a maximum of 12 hours.

**SLAV 565
Studies in
Nineteenth-Century
Ukrainian Prose** 4 hrs.
Study of a genre, topic, period, movement, or author. Content varies. May be repeated to a maximum of 12 hours.

**SLAV 566
Studies in
Twentieth-Century
Ukrainian Prose** 4 hrs.
Study of a genre, topic, period, movement, or author. Content varies. May be repeated to a maximum of 12 hours.

**SLAV 568
Studies in
Ukrainian Drama** 4 hrs.
Study of a period, movement, or author. Content varies. May be repeated to a maximum of 12 hours.

SLAV 570
Studies in Ukrainian Literary Historiography and Criticism 4 hrs.
Study of methodology, periods, and schools, and groups, individual literary historians, and critics. Content varies. May be repeated to a maximum of 12 hours.

SLAV 575
Studies in Slavic Literary Theory 4 hrs.
Russian, Czech, Polish, and Serbian contributions to literary theory: formalism, structuralism, semiotics, phenomenology. May be repeated to a maximum of 12 hours. Taught in English.

SLAV 576
Methods and Principles of Translation 4 hrs.
Introduction to theory and methods of literary translation. Extensive practice translating expository prose, literary prose, and poetry from Slavic languages into English. Taught in English.

SLAV 596
Independent Study 1 TO 4 hrs.
Investigation of special problems under the general direction of a faculty member. May be repeated up to 8 time(s). Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor and the head of the department.

SLAV 599
PhD Thesis Research 0 TO 16 hrs.
Independent research on a topic approved for a graduate thesis. Students engaged in research and writing theses will be assigned to this course at the discretion of the department. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the department. Open only to PhD degree students.

Social Work

SOCW 410
Human Behavior and the Social Environment 3 hrs.
Human development through the life cycle, including urban family, group, community, and organizational interactions with social, cultural, and psychological factors. Credit is not given for SOCW 410 if the student has credit for SOCW 535. **Prerequisite(s):** Graduate standing and consent of the instructor or admission to the MSW program.

SOCW 411
Social Work in a Multicultural Society 3 hrs.
Place of social work in a multicultural society; focus on racial and ethnic minority groups, particularly African Americans, Latinos, Asian Americans, and Native Americans. Credit is not given for SOCW 411 if the student has credit for SOCW 537. **Prerequisite(s):** Admission to MSW program.

SOCW 420
Policy I: Social Welfare Policy and Services 3 hrs.
Social work history; structure and development of current policies; policy analysis and policy advocacy skills for social and economic justice. Credit is not given for SOCW 420 if the student has credit for SOCW 550. **Prerequisite(s):** Admission to MSW program.

SOCW 430
Practice I: Generalist Practice with Individuals, Families, and Groups 3 hrs.
Generalist practice principles applied to individuals, families, and groups, including content on community context, racial and ethnic minorities, poor, oppressed, and other urban vulnerable communities. Credit is not given for SOCW 430 if the student has credit for SOCW 501. **Prerequisite(s):** Admission to the MSW program.

SOCW 431
Practice II: Generalist Practice with Task Groups, Organizations, and Communities 3 hrs.
Generalist practice principles applied to task groups, organizations, and communities, including focus on community context and the poor, oppressed, and other urban vulnerable communities. Credit is not given for SOCW 431 if the student has credit for SOCW 502. **Prerequisite(s):** SOCW 430 and graduate standing.

SOCW 460
Research I: Social Work Research 3 hrs.
Research methodology basics applied to social work: problem formulation, design, measurement, sampling, data analysis, computerization, ethics, qualitative and quantitative methodologies. Credit is not given for SOCW 460 if the student has credit for SOCW 560. **Prerequisite(s):** Admission to the MSW program.

SOCW 480
Special Studies in School Social Work Practice 3 hrs.
Ecological and strengths-based interventions in urban school systems. **Prerequisite(s):** Admission to the post-MSW Type 73 program and graduate standing.

SOCW 503
Family Practice in Urban Communities 3 hrs.
Empowering at-risk urban families using strengths-based intervention; brief treatment models; attention to diversity, community, poor, and other urban at-risk populations. **Prerequisite(s):** SOCW 430.

SOCW 504
Group Theory and Practice 3 hrs.
Theory and practice of social work with empower groups in both clinical and large system settings; diversity and equity issues. **Prerequisite(s):** SOCW 430.

SOCW 508
Models of Social Work Scholarship and Knowledge Development I 3 hrs.
Functions of scholarship in social work, contributions of scholarship to social and economic justice, research methodologies, and knowledge-building processes for practice and policy analysis. Extensive computer use required. Previously listed as SOCW 592. **Prerequisite(s):** Admission to the PhD in Social Work program or consent of the instructor.

SOCW 509
Models of Social Work Scholarship & Knowledge Development II 3 hrs.
Functions and processes of research in social work, knowledge-building methodologies and the contributions of multiple research models to the growth of knowledge for the profession. Extensive computer use required. **Prerequisite(s):** SOCW 508.

SOCW 511
Practice with Children 3 hrs.
Direct treatment with urban at-risk children, including situations involving homelessness, substance-abuse, violence; treatment modalities emphasizing family, community, culture. **Prerequisite(s):** SOCW 430.

SOCW 517
Practice with Family Violence, Neglect, and Abuse 3 hrs.
Ecological approach to family violence: physical, psychological, and sexual abuse of children, women, and elders at practice and policy levels; urban vulnerable population. **Prerequisite(s):** SOCW 430; or consent of the instructor.

SOCW 519
Practice III: Community Health and Urban Development 3 hrs.
Advanced integrated practice with urban communities at levels of individuals, families, groups, organizations, and communities. Emphasis in diversity, strengths, capacity-building, and small systems. **Prerequisite(s):** Grade of C or better in SOCW 431.

SOCW 520
Practice IV: Community Health and Urban Development 3 hrs.
Advanced, integrated practice with urban communities with emphasis on diversity, strengths, capacity-building, and large systems. **Prerequisite(s):** Grade of C or better in SOCW 519.

SOCW 521
Aging Populations: Social Work Response 3 hrs.
Psychological, social, biological aging factors of individuals and families; emphasis on practice skills for community, long-term care, and hospital-based services with urban emphases. **Prerequisite(s):** SOCW 410; or consent of the instructor.

SOCW 522
Crisis Intervention 3 hrs.
Nature of crises, including suicide and large-scale disaster; strengths-based interventions in urban settings; medical and mental health facilities, schools, community centers, and neighborhoods. **Prerequisite(s):** SOCW 430.

SOCW 523
Drug and Alcohol Abuse and Social Work 3 hrs.
History and pharmacology of alcohol and other drugs; etiology of abuse and dependence; assessment and treatment models; practice in multidisciplinary settings; emphasis on urban systems. **Prerequisite(s):** SOCW 430.

SOCW 525
Social Work with Women 3 hrs.
Research, policy, and practice approaches to working with women in diverse urban settings; empowerment and diversity perspectives. **Same as** GWS 525. **Prerequisite(s):** SOCW 410; or consent of the instructor.

SOCW 527
Topics in Social Services 3 hrs.
Critical review of selected areas of social work, social services, and social welfare. **Prerequisite(s):** Consent of the instructor and admission to MSW program.

SOCW 530
Leadership and Professional Development 3 hrs.
Social work leadership and professional development, including writing for publication, communication skills, personal leadership plan development, theory and practice of leadership at individual agency and community levels. **Prerequisite(s):** SOCW 410.

SOCW 531
Policy II: Community Health and Urban Development 3 hrs.
Advanced policy content for urban communities, including health disparities, discrimination, urban poverty, and social dislocation. Analytical and policy practice skills addressed. **Prerequisite(s):** Grade of C or better in SOCW 420.

SOCW 532
Social Work in Corrections 3 hrs.
Policy and practice roles of social workers in correctional settings with emphasis on race, ethnicity, gender, sexual orientation, and poverty factors. **Prerequisite(s):** SOCW 410; or consent of the instructor.

SOCW 533
Sexual Minority Communities 3 hrs.
Community and social justice framework applied to gay, lesbian, bisexual, and transgendered populations; historical development of sexual minority communities; overview of social work response. **Prerequisite(s):** Admission to the MSW program or consent of the instructor.

SOCW 534
Independent Study in Practice 1 TO 3 hrs.
Independent study in practice area not covered by existing course offerings. May be repeated to a maximum of 6 hours. **Prerequisite(s):** Consent of the instructor and approval of the college.

SOCW 539
Mental Health Issues with Children and Adolescents 3 hrs.
Critical, strengths-based understanding of current classification and diagnostic systems for assessment and treatment planning with children and adolescents. **Prerequisite(s):** SOCW 410 or consent of the instructor.

SOCW 540
Mental Health Issues with Adults 3 hrs.
Critical, strengths-based understanding of current classification and diagnostic systems for assessment and treatment planning with adults. **Prerequisite(s):** SOCW 410 or consent of the instructor.

SOCW 544
Community Violence 3 hrs.
Urban community violence; impact on individuals and society; policies and theories critically studied from race, class, and gender perspectives; social work implications. **Prerequisite(s):** SOCW 410 or consent of the instructor.

SOCW 545
HIV/AIDS: Social Work Challenges 3 hrs.
HIV prevention and intervention in urban settings; system and ecological understanding of impact of HIV on society and role of social work practice and policy. **Prerequisite(s):** SOCW 410 or consent of the instructor.

SOCW 546
Public Health Aspects of Adolescent Health 3 hrs.
Overview of critical health/developmental issues in adolescence; youth participation in health initiatives. Cross-cutting perspectives of social identity, gender, culture, and social class will be essential to any topic discussion/assignment. **Same as CHSC 544. Prerequisite(s):** CHSC 446 or consent on the instructor. Recommended background: Research, policy, and/or practice and interest in adolescence and in community development and intervention studies; ethnic/minority studies; education; health and social/human service professions.

SOCW 549
Independent Study in Human Behavior and the Social Environment 1 TO 3 hrs.
Independent study in human behavior and social environment areas not covered by existing course offerings. May be repeated to a maximum of 6 hours. **Prerequisite(s):** Consent of the instructor and approval of the college.

SOCW 551
Policy II: School Social Work Policy 3 hrs.
Critical analysis of federal, state, and local policies relevant to social work practice in urban school systems. **Prerequisite(s):** SOCW 420.

SOCW 552
Policy II: Child and Family Policy 3 hrs.
Critical analysis of policies affecting welfare of families and children; focus on child welfare, juvenile justice, adult criminal justice, mental health, and special education systems. **Prerequisite(s):** SOCW 420.

SOCW 553
Policy II: Healthcare Systems & Policies 3 hrs.
Critical analysis of current healthcare programs and policies, including policy change skills; content on urban poor and at-risk populations. **Prerequisite(s):** SOCW 420.

SOCW 554
Policy II: Mental Health Policy 3 hrs.
Critical analysis of policies and structures in mental health delivery system with focus on urban and chronically mentally ill populations. **Prerequisite(s):** SOCW 420.

SOCW 556
Policy II: Community and Administrative Practice 3 hrs.
Critical analysis of national, state, and local policies affecting urban community building and development. **Prerequisite(s):** SOCW 420.

SOCW 558
Social Work and the Law 3 hrs.
Social work input in legal system: family law, family violence, crime, delinquency, civil rights, education, health, mental health, social advocacy, social work practice regulation. **Prerequisite(s):** SOCW 420 or consent of the instructor.

SOCW 559
Independent Study in Social Welfare Policy and Services 1 TO 3 hrs.
Independent study in social welfare policy and services areas not covered by existing course offerings. May be repeated to a maximum of 6 hours. **Prerequisite(s):** Consent of the instructor and approval of the college.

SOCW 563
Program Evaluation 3 hrs.
Review and assessment of evaluative approaches in social work practice and policy. Prepares students for evaluation of own practice. **Prerequisite(s):** SOCW 560.

SOCW 565
Research Seminars: Social Service Issues 3 hrs.
Methodologies and results of research in selected fields of social services; special issues and problems in practice; relationship of research, theory, and practice; priorities for future research. **Prerequisite(s):** SOCW 460 or consent of the instructor.

SOCW 567
Research Project 0 TO 9 hrs.
Application of research methods to social work problems in an individual or group project or library research project. Preparation of a formal report based on field study processes and findings. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** SOCW 460 or consent of the instructor; and approval of the college.

SOCW 569
Independent Study in Research 1 TO 3 hrs.
Independent study in research methodology or areas not covered by existing course offerings. May be repeated to a maximum of 6 hours. **Prerequisite(s):** Consent of the instructor and approval of the college.

SOCW 570
Field Instruction I 5 hrs.
Students are assigned to social agencies where, under the supervision of an agency field instructor, selected micro and macro system cases are carried for social work services. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

SOCW 571
Field Instruction II 5 hrs.
Students are assigned to social agencies where, under the supervision of an agency field instructor, they carry selected cases or groups for social work services. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** SOCW 570 and consent of the instructor.

SOCW 572
Field Instruction III 8 hrs.
Students are assigned to social agencies where, under the supervision of an agency field instructor, selected micro and macro system cases are carried for social work services. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** SOCW 571 and consent of the instructor.

SOCW 573
Field Instruction IV 8 hrs.
Students are assigned to social agencies where, under the supervision of an agency field instructor, selected micro and macro system cases are carried for social work services. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** SOCW 572 and consent of the instructor.

SOCW 574
Special Studies in Field Instruction I 2 TO 4 hrs.
Practicum experiences in approved social agencies/organizations where students carry selected cases applying knowledge to skill applications under the supervision of an agency field instructor. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

SOCW 575
Special Studies in Field Instruction II 2 TO 4 hrs.
Practicum experiences in approved social agencies/organizations where students carry selected cases applying knowledge to skill applications under the supervision of an agency field instructor. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

**SOCW 577
Social Welfare
History 3 hrs.**
Social work history in context of political, economic, and social developments; focus on gender, class, and race; critical application of theoretical models.
Prerequisite(s): Admission to the PhD in Social Work program or consent of the instructor.

**SOCW 579
Integrative Seminar 2 hrs.**
Application of concepts of social work practice, policy, and research to selected fields of social service. Focus on appropriate service delivery models and intervention strategies. May be repeated to a maximum of 4 hours.
Prerequisite(s): Concurrent registration in SOCW 575 and consent of the instructor.

**SOCW 580
Practice III:
Community and
Administrative
Practice 3 hrs.**
Management of human service organizations; resource acquisition and management; planning; community relations; focus on urban, community-based agencies.
Prerequisite(s): SOCW 431.

**SOCW 581
Practice IV:
Community and
Administrative Practice 3 hrs.**
Advanced urban community building and developing; emphasis on poor, at-risk communities.
Prerequisite(s): SOCW 580.

**SOCW 582
Practice III:
Practice with
Children and
Families 3 hrs.**
Ecological and strengths-based practice with urban children and families; special focus on child welfare.
Prerequisite(s): SOCW 431.

**SOCW 583
Practice IV:
Practice with
Children and
Families 3 hrs.**
Advanced critical analysis and application of ecological and strengths-based practice emphasizing interactions of children and families with urban courts, schools, and child welfare systems.
Prerequisite(s): SOCW 582.

**SOCW 584
Practice III:
Healthcare 3 hrs.**
Theoretical basis and skills for health social work in diverse settings; biopsychological understanding of health and disease; emphasis on direct practice with urban clients and families.
Prerequisite(s): SOCW 431.

**SOCW 585
Practice IV:
Healthcare 3 hrs.**
Advanced knowledge and skills in healthcare settings; specific populations, including urban poor and at-risk populations; emphasis on urban community and organizational levels.
Prerequisite(s): SOCW 584.

**SOCW 586
Practice III:
Mental Health 3 hrs.**
Strengths-based assessment and treatment planning in urban settings; diversity issues; managed care settings; critical use of current mental health diagnostic and classification systems.
Prerequisite(s): SOCW 431.

**SOCW 587
Practice IV:
Mental Health 3 hrs.**
Advanced urban mental health practice; diversity issues; focus on children and adolescents and their families; critical application of current mental health diagnosis and classification.
Prerequisite(s): SOCW 586.

**SOCW 588
Practice III:
School Social Work 3 hrs.**
Ecological and strengths-based perspectives on development of basic competencies for urban school social work; diversity issues.
Prerequisite(s): SOCW 431.

**SOCW 589
Practice IV:
School Social Work 3 hrs.**
Advanced interventions in urban school systems; use of groups, consultation, classroom interventions, family empowerment, conflict resolution, and community interventions; diversity issues.
Prerequisite(s): SOCW 588.

**SOCW 590
Analysis of
Social Work
Practice Approaches 3 hrs.**
Historical and current developments in the conceptualization of social work practice. Implications of practice approaches for contributing to social justice. Values and ethics addressed. Extensive computer use required.
Prerequisite(s): Admission to the PhD in Social Work program or consent of the instructor.

**SOCW 591
Social Welfare
Policy Analysis
and Development 3 hrs.**
Analysis of social welfare policies with particular attention to issues of social and economic justice; conceptual models for analysis; application of models to selected problems.
Prerequisite(s): Admission to the PhD in Social Work program or consent of the instructor.

**SOCW 593
Quantitative
Methods in
Social Work Research 3 hrs.**
Selected statistical and analytical methods as applied to social issues. Use of computerized tools, sampling, hypothesis testing, descriptive and inferential procedure, introduction to multivariate analysis. Extensive computer use required.
Prerequisite(s): Admission to PhD in Social Work program or consent of the instructor.

**SOCW 594
Dissertation
Proseminar in
Social Work 3 hrs.**
Preparation in development of dissertation focus and planning of dissertation research. Readings are assigned and discussed in class. Emphasis on ideas for dissertation topic, its formulation, operationalization, and research design.
Prerequisite(s): SOCW 592 and SOCW 593.

**SOCW 595
Seminar in
Social Work
Education 3 hrs.**
Preparation for roles as social work educators. Historical development of social work education with special emphasis on relation between curriculum design and the accreditation process. Pedagogical issues such as selecting educational objectives, teaching methods, and evaluation of student performance. Students must participate in a teaching laboratory.
Prerequisite(s): Admission to the PhD in Social Work program.

**SOCW 596
Proseminar on
Selected Topics
and Issues in
Social Work 2 TO 4 hrs.**
Review and critique of selected areas of social work content, theory, or practice. State of current knowledge and needed research stressed. May be repeated.
Prerequisite(s): Admission to the PhD in Social Work program.

**SOCW 599
PhD Thesis
Research 0 TO 16 hrs.**
Individual research, under faculty direction, on social work doctoral dissertation. Satisfactory/Unsatisfactory grading only. May be repeated.
Prerequisite(s): Consent of the instructor.

Sociology

**SOC 401
Sociological
Statistics 4 hrs.**
Descriptive and inferential statistics for graduate and advanced undergraduate sociology majors and related fields. Tests of means, regression, correlation, analysis of variance, and related topics.
Prerequisite(s): SOC 201 and two additional 200-level sociology electives; or graduate standing, or consent of the instructor.

**SOC 402
Intermediate
Sociological
Statistics 4 hrs.**
Covers general linear models emphasizing regression, analysis of variance and covariance, simple structural equation models, simple categorical methods, and elementary matrix algebra.
Prerequisite(s): SOC 401.

**SOC 405
Writing in the
Social Sciences 3 OR 4 hrs.**
Leads to effective, clear writing for a social science audience. Teaches how to organize ideas, avoid tiresome jargon, and write with precision. 3 undergraduate hours. 4 graduate hours.
Prerequisite(s): 6 hours of upper-division social science courses.

**SOC 406
Urban
Ethnography 3 OR 4 hrs.**
The study of processes and meanings in African American communities in urban areas, interviews, participant observation, focus groups. **Same as** AAST 405. 3 undergraduate hours. 4 graduate hours.
Prerequisite(s): AAST 100; and junior standing or above.

**SOC 407
Seminar in
Comparative
Racialization 3 OR 4 hrs.**
Provides an interdisciplinary and comparative approach to the making and remaking of "race" and the resultant racialized experiences of different groups in the U.S. and globally. **Same as** AAST 407. **Prerequisite(s):** AAST 247 or AAST 248 or AAST 340 or SOC 225; and senior standing or above; or consent of the instructor.

**SOC 424
Sociology
of Gender 3 OR 4 hrs.**
Variety and change in gender roles; patterns and consequences of gender inequality; gender and sexuality; gender and social institutions such as family, economy. **Same as** GWS 425. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SOC 224, or any 100- or 200-level GWS course and an additional 200- or 300-level elective in sociology or gender and women's studies; junior standing or above; or graduate standing; or consent of the instructor.

**SOC 425
Race
and Ethnicity 3 OR 4 hrs.**
Critical examination of the conceptual frameworks and empirical findings in the study of race and ethnicity. 3 undergraduate hours. 4 graduate hours.
Prerequisite(s): SOC 225 an additional 200- or 300-level elective in sociology; or consent of the instructor.

SOC 426
Topics in Race, Ethnicity, and Gender 3 OR 4 hrs.

Intensive examination of a specialized topic in race, ethnicity, and gender. The specific topic of the course varies depending on the faculty offering it. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 times. Students may register in more than one section per term. **Prerequisite(s):** SOC 224; or SOC 225; and junior standing or above and an additional 200- or 300-level elective in sociology; or consent of the instructor.

SOC 428
Asian/Asian American Women in the Global Economy 3 OR 4 hrs.

Examines the racialization and feminization of a global division of labor and focuses primarily on Asian and Asian American women's participation and incorporation as workers and key actors in the development of the global economy. **Same as** ASAM 428 and GWS 428. 3 undergraduate hours; 4 graduate hours. **Prerequisite(s):** ASAM 125 or ENGL 125 or SOC 125 or AAST 225 or LALS 225 or SOC 225 or ASAM 228 or ASST 228 or SOC 228 or ASAM 290 or two 200-level courses in either SOC, GWS, or ASAM, or a combination of these.

SOC 440
Topics in Organizations and Institutions 3 OR 4 hrs.

Intensive examination of a specialized topic announced when the class is scheduled. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 times. Students may register in more than one section per term. **Prerequisite(s):** SOC 244 or MGMT 340, and an additional 200-level sociology elective, and junior standing; or consent of the instructor.

SOC 441
Social Stratification 3 OR 4 hrs.

The nature of systems of differentiation and ranking in societies and their consequences; emphasis on class structure in the United States; prestige, status, power, and social mobility in the United States and other societies. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SOC 241 and an additional 200- or 300-level elective in sociology; and junior standing or above; or consent of the instructor.

SOC 445
Sociology of the Family 3 OR 4 hrs.

Variety and change in family patterns; family formation and break-up; parents' and children's effects on each other; influences of culture and political economy; consequences for other institutions. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SOC 224, or SOC 245 and an additional 200- or 300-level sociology elective; and junior standing or above; or consent of the instructor.

SOC 446
Race, Ethnicity, and Gender in American Religion 3 OR 4 hrs.

Religious institutions in the U.S. as a crucible for racial, ethnic, and gender identities, group formation, and intergroup relations; major world religions represented in the U.S. **Same as** RELS 446. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SOC 246 and an additional 200- or 300-level elective in Sociology; and junior standing or above; or consent of instructor.

SOC 447
Organizations 3 OR 4 hrs.

Characteristics of business, government, and not-for-profit organizations; approaches used to study organizations; theoretical and empirical analysis of organizational processes. **Same as** MGMT 447. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SOC 241 or MGMT 340 or SOC 244 and an additional 200- or 300-level elective in sociology; and junior standing or above; or consent of the instructor.

SOC 448
Sociology of Development 3 OR 4 hrs.

Historical, economic, political, social, and geographic factors shaping national and international development experiences and outcomes. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** 6 hours of upper-division social science courses or consent of the instructor.

SOC 451
Medical Sociology 3 OR 4 hrs.

Survey of major topics in sociology of health and medicine, including social definitions of health and illness, patient/practitioner interaction, the organization of health institutions and professions. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** 6 hours of upper-division sociology or consent of the instructor.

SOC 455
Topics in Medical Sociology 3 OR 4 hrs.

Intensive examination of a specialized topic announced when the class is scheduled. 3 undergraduate hours. 4 graduate hours. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** SOC 451 or consent of the instructor.

SOC 465
Topics in Sociology of Politics 3 OR 4 hrs.

Intensive examination of a specialized topic announced when the class is scheduled. **Same as** POLS 465. 3 undergraduate hours. 4 graduate hours. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** 6 hours of upper-division sociology or consent of the instructor.

SOC 471
Population 3 OR 4 hrs.

The measurement and study of major trends and differentials in fertility, mortality, migration, growth, and compositional characteristics of the population of the United States and other nations. **Same as** EPID 471. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SOC 201 and an additional 200- or 300-level course in Sociology; and junior standing or above; or consent of the instructor.

SOC 473
Cities and Regions 3 OR 4 hrs.

Characteristics, conditions, and consequences of structure and change of cities and metropolitan regions. Spatial, political economy, cultural perspectives. Census, ecological, historical, comparative data for cities. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SOC 201 and an additional 200- or 300-level course in sociology; and junior standing or above; or consent of the instructor.

SOC 476
Topics in Urban Sociology 3 OR 4 hrs.

Intensive examination of a specialized topic announced when the class is scheduled. 3 undergraduate hours. 4 graduate hours. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** 6 hours of upper-division sociology or consent of the instructor.

SOC 485
Classical Social Theory 3 OR 4 hrs.

Survey and analysis of classical European and American social theory. Examination of how theorists such as Marx, Weber, Durkheim, Veblen, and Park defined and described society within their own social contexts and how we derive meaning from these theories. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SOC 385; and senior standing or above; or consent of the instructor.

SOC 487
Current Social Theory 3 OR 4 hrs.

Review and evaluation of major currents in sociological theory since the 1940s. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SOC 385; and senior standing or above; or consent of the instructor.

SOC 490
Senior Research Experience 4 hrs.

The course integrates theory, methods, and analytical skills to a substantive area of sociology. Students will gain hands-on experience by collecting data, analyzing data, writing up their findings, and presenting their projects to the class. May be repeated to a maximum of 8 hours, with approval of the department. Students may register for more than one section per term. Previously listed at SOC 400. **Prerequisite(s):** SOC 300 and SOC 385; and senior standing or above and one 400-level elective in sociology and consent of the instructor.

SOC 496
Independent Study or Research 1 TO 9 hrs.

Extensive readings in specialized areas of sociology or empirical research for advanced undergraduate or graduate students. May be repeated with approval. Students may register in more than one section per term. Approval to repeat course granted by the department. Undergraduate students may repeat course for maximum of 9 hours of credit. **Prerequisite(s):** 18 hours of sociology, excluding SOC 296 and SOC 299, consent of the instructor, and approval of the department.

SOC 499
Senior Thesis 1 TO 4 hrs.

Individual study for students working on a senior thesis under the supervision of a faculty advisor. This course is required for students graduating with highest departmental distinction. May be repeated to a maximum of 8 hours, with approval of the department. Students may register for more than one section per term. Previously listed as SOC 299. **Prerequisite(s):** SOC 490; and senior standing or above; and consent of the instructor.

SOC 500
Sociological Research Methods I 4 hrs.
Introduction to research design, data gathering, and data reduction; logic of problem formulation, units of analysis, measurement, data analysis.

SOC 501
Sociological Research Methods II 4 hrs.
Evaluating sociological research, data analysis, and reporting; proposal writing and evaluation; professional issues, including research ethics; student presentation of master's research proposals. May be repeated to a maximum of 12 hours.
Prerequisite(s): SOC 500.

SOC 509
Seminar: Sociological Research Methods 0 TO 4 hrs.
Research practicum of specialized social science research methods. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. Students register for 1 to 7 hours.
Prerequisite(s): SOC 500 and SOC 501.

SOC 520
Seminar: Race, Ethnicity, and Gender 4 hrs.
Intensive analysis of specialized topics. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

SOC 524
Gender 4 hrs.
Review of a wide range of theories that explain the development and maintenance of gender, focusing on how gender stratification has developed historically and how and why individuals "do gender" in their daily lives. **Prerequisite(s):** Consent of the instructor.

SOC 525
Sociology of Race and Ethnicity 4 hrs.
A survey of classical and contemporary research on "race" and "ethnicity" focusing on how their meaning is both ascribed and achieved and the relationship of these categories to individual and collective life chances.
Prerequisite(s): Consent of the instructor.

SOC 528
Societal Analysis of Aging, Health, and Healthcare 3 hrs.
Analysis of aging, health, and healthcare issues mainly from sociological and public health perspectives. Review and application of appropriate concepts, theories, and methods. **Same as** CHSC 528.
Prerequisite(s): CHSC 425 or consent of instructor.

SOC 540
Seminar: Social Institutions 4 hrs.
Intensive analysis of specialized topics in social institutions. May be repeated to a maximum of 12 hours. Students may register in more than one section per term.
Prerequisite(s): Consent of the instructor.

SOC 541
Sociology of Social Stratification 4 hrs.
Provides students with an overview of sociological research on social stratification, emphasizing individual and structural elements.
Prerequisite(s): Consent of the instructor.

SOC 547
Social Organization 4 hrs.
Intensive analysis of specialized topics. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

SOC 548
Seminar: Comparative Societies 1 TO 7 hrs.
Intensive analysis of specialized topics. May be repeated. Students may register in more than one section per term.

SOC 550
Proseminar on Current Research in Health, Illness, and Medicine 4 hrs.
Review and critique of current research in the following health areas: healthcare systems, social epidemiology, and health and illness behavior. **Prerequisite(s):** SOC 451.

SOC 551
Seminar: Sociology of Health and Medicine 1 TO 7 hrs.
Intensive analysis of specialized topics. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

SOC 565
Seminar: Political Sociology 1 TO 7 hrs.
Intensive analysis of specialized topics. May be repeated to a maximum of 12 hours. Students may register in more than one section per term.

SOC 571
Seminar: Population and Human Ecology 1 TO 7 hrs.
Intensive analysis of specialized topics. May be repeated to a maximum of 12 hours. Students may register in more than one section per term.

SOC 572
Sociology of Education 4 hrs.
Education as a social institution in interaction with other institutions, such as the economy. Topics include the emergence of national systems of education, purposes of education, inequality, and educational reform. **Same as** EDPS 572. **Prerequisite(s):** Consent of the instructor.

SOC 585
Classical Sociological Theory 4 hrs.
Examination of how theorists have defined and described society within their own social contexts and how we derive meaning from these theories. **Prerequisite(s):** Consent of the instructor.

SOC 587
Contemporary Sociological Theory 4 hrs.
Sociological theory since World War II. Course content will be both "substantive," covering widely divergent schools of thought, and "methodological," analyzing and constructing theories as explanatory systems.
Prerequisite(s): Consent of the instructor.

SOC 593
Colloquium on College Teaching of Sociology 4 hrs.
Covers strategies and techniques for contemporary university teaching and for the teaching of sociology at the college level. May be repeated.

SOC 595
Proseminar 1 hour.
Presentation and discussion of issues of professional concern to sociologists, including current research, consulting, teaching, and applied sociology. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term.

SOC 596
Independent Study 1 TO 12 hrs.
Research on special problems not included in the graduate thesis. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor and approval of the department.

SOC 597
Master's Project Research 1 TO 4 hrs.
Supervised writing and research on topic of the master's paper. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 12 hours.

SOC 599
Thesis Research 0 TO 16 hrs.
Supervised dissertation research. Satisfactory/Unsatisfactory grading only. May be repeated.

Spanish
SPAN 400
History of the Spanish Language 3 OR 4 hrs.
Origins and development of Spanish; phonological, morphological, syntactic development of the language; foreign influences; origin of dialects. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SPAN 362 or SPAN 401 or consent of the instructor.

SPAN 401
Intensive Introduction to Hispanic Linguistics 4 hrs.
An intensive introduction to phonetics/phonology, syntax, and semantics of Spanish.
Prerequisite(s): Graduate standing.

SPAN 402
Spanish Syntax 3 OR 4 hrs.
Introduction to the generative approach to Spanish syntax. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SPAN 361 or SPAN 401; or consent of the instructor.

SPAN 403
Advanced Spanish Syntax 3 OR 4 hrs.
In-depth examination of current theoretical issues in Spanish syntax. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SPAN 402 or consent of the instructor.

SPAN 404
Spanish Phonology and Morphology 3 OR 4 hrs.
Analysis of the phonological and morphological structure of Spanish. Emphasis on the production and mental representation of sounds. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SPAN 362 or SPAN 401; or consent of the instructor.

SPAN 405
Advanced Spanish Phonology and Morphology 3 OR 4 hrs.
Advanced and detailed study of the phonological and morphological structure of Spanish. Emphasis on current theories. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SPAN 404 or the equivalent or consent of the instructor.

SPAN 406
Spanish Sociolinguistics 3 OR 4 hrs.
Past and current theoretical and empirical sociolinguistics as applied to the study of variation within Spanish and U.S. Hispanic communities. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SPAN 402 or SPAN 404 or consent of the instructor.

SPAN 407
Methods of Literary and Cultural Analysis 3 OR 4 hrs.
Introduction to basic tools and critical vocabulary to conduct advanced work in Hispanic literatures. 3 undergraduate hours. 4 graduate hours. Taught in Spanish or English.
Prerequisite(s): Junior standing or above and completion of two 300-level courses in Spanish literature; or consent of the instructor.

SPAN 408
Hispanic Dialectology 3 OR 4 hrs.
Descriptive and historical analysis of the most salient linguistic phenomena of peninsular and American Spanish dialects. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SPAN 362 or SPAN 401; or consent of the instructor.

SPAN 409
Semantics/Pragmatics in Span 3 OR 4 hrs.
Introduction to the study of meaning in language with a focus on Spanish. Includes formal/compositional semantics and an introduction to pragmatics. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SPAN 365 or SPAN 401; or consent of the instructor.

SPAN 411
Topics in Medieval and Early Modern Spanish Literature and Culture 3 OR 4 hrs.
Exploration of topics and theoretical approaches to the literature and culture of medieval and early modern Spain. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing or above. Completion of two 300-level courses in Spanish literature; or consent of the instructor.

SPAN 414
Topics in Cervantes' Don Quijote 3 OR 4 hrs.
Examination of current critical and theoretical approaches to Cervantes' Don Quijote, including questions of gender, class, historiography, and ideology. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing or above and completion of two 300-level courses in Spanish literature; or consent of the instructor.

SPAN 421
Topics in 18th and 19th Century Spanish Literature and Culture 3 OR 4 hrs.
Exploration of topics and theoretical approaches to Peninsular literature and culture from the neoclassical period through the generation of 1898. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing or above and completion of two 300-level courses in Spanish literature; or consent of the instructor.

SPAN 422
Topics in 20th and 21st Century Spanish Literature and Culture 3 OR 4 hrs.
Exploration of topics; sociological and historical approaches to the literature and culture from the vanguard movements of the early 20th century through the present day. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing or above and completion of two 300-level courses in Spanish literature; or consent of the instructor.

SPAN 427
Studies in Language Policy and Cultural Identity 3 OR 4 hrs.
Examines the development, articulation, and effects of language policies on identity formation and culture. Focuses on the United States and the Spanish language, although other countries and languages are included. **Same as** LALS 427. 3 undergraduate hours. 4 graduate hours. Taught in English. **Prerequisite(s):** Junior standing or above. Reading and writing knowledge of Spanish.

SPAN 430
Topics in Colonial History, Literature, and Culture 3 OR 4 hrs.
Topics in colonial literature, history, and culture intended to introduce students to the main methodologies, paradigms, issues, and critical approaches to colonial studies. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing or above and completion of two 300-level courses in Spanish literature; or consent of the instructor.

SPAN 431
Topics in Latin American Letters from the Revolutionary Era to Independence 3 OR 4 hrs.
Nineteenth-century literary trends from the beginnings of the novel through romanticism and realism to urban naturalism. Prose and poetry. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing or above and completion of two 300-level courses in Spanish literature; or consent of the instructor.

SPAN 434
Topics in Latin American Letters from Modernism to the Early 1970's 3 OR 4 hrs.
Emergence of new literary and cultural trends from the beginning of the 20th century to the end of the so-called Latin American Boom. It may include fiction, poetry, film, theater, as well as less traditional genres. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing or above and completion of two 300-level courses in Spanish literature; or consent of the instructor.

SPAN 435
Topics in Contemporary Urban Latin American and Latino Culture, Literature, and the Arts 3 OR 4 hrs.
Study of particular cultural, artistic, or literary phenomenon in urban Latin American and Latino culture, literature, or the arts. Emphasis on cultural studies and/or literary analysis. Critical writing is an important component of the course. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing or above and completion of two 300-level courses in Spanish literature; or consent of the instructor.

SPAN 436
Special Topics in the Teaching of Spanish 1 TO 4 hrs.
Course content is announced prior to each term in which course is given. May be repeated. Students may register in more than one section per term. Taught in English. Some semesters may be taught in Spanish. **Prerequisite(s):** Approval of the department.

SPAN 448
Foundations of Second Language Teaching 3 OR 4 hrs.
Provides an introduction to second language acquisition research and its implications for communicative language teaching. Emphasis is on creating activities to develop high school students' communicative abilities in speaking and listening. **Same as** FR 448, and GER 448. 3 undergraduate hours. 4 graduate hours. Taught in English. **Prerequisite(s):** Junior standing or above; and consent of the instructor and three courses at the 200- and 300-levels.

SPAN 449
Teaching Second Language Literacy and Cultural Awareness 3 OR 4 hrs.
Examines the nature of literacy as a reciprocal relationship between readers, writers, texts, and culture. Students learn the practical and theoretical foundations of classroom teaching of second language reading and writing skills. **Same as** FR 449 and GER 449. 3 undergraduate hours. 4 graduate hours. Taught in English. **Prerequisite(s):** Junior standing or above; and consent of the instructor.

SPAN 451
Educational Practice with Seminar I 6 hrs.
The first half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, and approval of the department.

SPAN 452
Educational Practice with Seminar II 6 hrs.
The second half of a two-segment sequence of practice teaching, including seminar, to meet certification requirements for teaching in grades six through twelve. Graduate credit only with approval of the department. **Prerequisite(s):** Good academic standing in a teacher education program, completion of 100 clock hours of pre-student-teaching field experiences, credit or concurrent registration in SPAN 451, and approval of the department.

SPAN 487
Computer Assisted Language Learning 3 OR 4 hrs.
An introduction to computer assisted language learning (CALL): the use of computer technology in second language reading and research. The effectiveness of CALL technology is assessed based on SLA theory and research studies. **Same as** GER 487 and LING 487. 3 undergraduate hours. 4 graduate hours. Taught in English. Extensive computer use required. **Prerequisite(s):** LING 483 or CI 483 or GER 448 or FR 448 or SPAN 448 or GER 449 or FR 449 or SPAN 449; or SPAN 502 or FR 502 or the equivalent; and senior standing or above.

SPAN 494
Special Topics 3 OR 4 hrs.
Topics will vary from term to term and may cover such areas as literary theory or culture. **Same as** FR 494 and ITAL 494. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. Taught in English. **Prerequisite(s):** Junior standing or above; and approval of the department.

SPAN 502
Theoretical and Research Foundations of Communicative Language Teaching 4 hrs.
Introduces students to contemporary theory and research on second language acquisition. Emphasis is on understanding the research and examining classroom practice. **Same as** FR 502. Credit is not given for FR 502/SPAN 502 if the student has credit for SPAN 450 or FR 450 or GER 407. Taught in English. **Prerequisite(s):** Appointment as a teaching assistant. For students outside the department: Consent of the instructor.

SPAN 503
Professional Development Workshop I 1 hour.
Introduction to the academic profession for students of foreign languages and literatures. Focus on the development of research and writing skills. Satisfactory/Unsatisfactory grading only.

SPAN 504
Professional Development Workshop II 1 hour.
Introduction to the academic profession for students of foreign languages and literatures. Focus on presentational skills and preparation for the job market. Satisfactory/Unsatisfactory grading only. Recommended for first year, second semester students.
Prerequisite(s): Graduate standing.

SPAN 505
Seminar in Spanish Theoretical and Descriptive Linguistics 4 hrs.
Topics in phonology, morphology, syntax, semantics, pragmatics, or dialectology of Spanish. May be repeated to a maximum of 8 hours.
Prerequisite(s): One 400-level Spanish course from among SPAN 402, SPAN 404, SPAN 408, SPAN 409; or consent of the instructor.

SPAN 507
Seminar in Second Language Acquisition and Bilingualism 4 hrs.
Current theoretical and research directions of bilingualism and second language acquisition by nonnatives. May include original empirical research projects. May be repeated to a maximum of 8 hours.

SPAN 515
Advanced Seminar in Medieval and Early Modern Spanish Literature and Culture 4 hrs.
Examination of topics using selected literary, historical and philosophical readings from medieval and early modern Spain. May be repeated up to 1 time(s). May be taught in English or Spanish. Recommended background: Credit or concurrent registration in SPAN 409 and SPAN 411.

SPAN 520
Advanced Seminar on Modern and/or Contemporary Spanish Literature and Culture 4 hrs.
Particular areas, genres, works, or figures in 19th, 20th, or 21st century Spanish literature and culture. May be repeated to a maximum of 8 hours. May be taught in English or Spanish.

SPAN 522
Advanced Seminar on Hispanic Colonial and Postcolonial Letters and Culture 4 hrs.
An in-depth examination of problems and issues that concern the study of colonial and postcolonial cultures and societies. May be repeated to a maximum of 8 hours. May be taught in English or Spanish.

SPAN 523
Advanced Seminar on Postmodern Latin American Literature, Film, and Culture 4 hrs.
An in-depth examination of issues, trends, and problems that concern recent and contemporary Latin American literature, film, and other art forms. May be repeated to a maximum of 8 hours. May be taught in English or Spanish.

SPAN 525
Advanced Seminar on Trans-American, Transatlantic, and/or U.S. Latino Studies 4 hrs.
Intensive study of relevant issues in comparative transatlantic, trans-American, and/or U.S. Latino literatures and cultures. May be repeated up to 1 time(s). May be taught in English or Spanish.

SPAN 535
Concepts and Methodologies in Hispanic Interdisciplinary Studies 4 hrs.
Inception and development of Latin American society from interdisciplinary perspectives. Cultural evolution from the encounter of European values and indigenous cosmogony to New World syncretism. May be repeated to a maximum of 8 hours.

SPAN 540
Seminar on Language in Context 4 hrs.
Past and current theoretical and empirical directions as applied to the study of oral and written discourse and its social context.
Prerequisite(s): One 400-level Spanish course and two from SPAN 402, SPAN 404, SPAN 406, and SPAN 408.

SPAN 551
Research Practicum in Sociolinguistics 4 hrs.
Strategies and methods for studying language use in communities: participant observation, interviewing, elicitation, using public-domain data, note taking vs. tape recording, and issues of transcription and ethics. **Same as** LING 551. May be repeated to a maximum of 12 hours.
Prerequisite(s): LING 480; or consent of the instructor.

SPAN 556
Second Language Learning 4 hrs.
An introduction to research findings and methods in second language learning. **Same as** LING 556. **Prerequisite(s):** Consent of the instructor.

SPAN 557
Theories in Second Language Acquisition 4 hrs.
Review of current linguistic, cognitive, and sociocultural theories with the following in mind: What do these theories purport to explain? What methodologies are used by researchers working within the theories? Taught in English. Recommended background: LING 556.

SPAN 567
Discourse Analysis 4 hrs.
Discourse analysis addresses issues of intentional communication, inference, the structure of texts or talk-in-interaction, and the interactive construction of social actions or identities in discourse. **Same as** ENGL 567 and LING 567.

SPAN 570
Seminar in Literary Theory and Criticism 4 hrs.
Theories of literary production and reception; their application to the practice of literary criticism. Specific themes and topics vary. **Same as** FR 570. May be repeated to a maximum of 8 hours with approval. Approval to repeat course granted by the instructor. Taught in English.

SPAN 594
Special Topics in Hispanic Studies 4 hrs.
Topics that involve multiple approaches to problems in linguistics and literature, or that cross the chronological and geographical boundaries established in the seminars. May be repeated to a maximum of 8 hours.

SPAN 596
Independent Study 1 TO 4 hrs.
Provides for areas of study not regularly covered by departmental offerings. Study proposals must conform to departmental guidelines. May be repeated. Students may register in more than one section per term.
Prerequisite(s): Consent of the instructor.

SPAN 598
MA Thesis Research 0 TO 16 hrs.
Students involved in thesis research and writing are assigned to the course at the discretion of the graduate committee. Satisfactory/Unsatisfactory grading only.
Prerequisite(s): Approval of the graduate committee.

SPAN 599
PhD Thesis Research 0 TO 16 hrs.
The writing of a PhD thesis based on original research in the area of the candidate's major specialization (Literature, Linguistics, or Culture). Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 24 hours. **Prerequisite(s):** Admission to candidacy for the doctoral degree and consent of the director of graduate studies.

Special Education

SPED 410
Survey of Characteristics of Learners with Disabilities 3 hrs.
Fulfills requirements for Illinois House Bill 150. Field experience required. Learning and personality characteristics of exceptional learners. Diagnostic processes and educational approaches are examined. **Prerequisite(s):** ED 210 or ED 421 or graduate standing and consent of the instructor.

SPED 415
Characteristics of Exceptional Learners 3 hrs.
Provides a foundation for the understanding of the exceptional learner in an inclusive environment. No graduation credit for students enrolled in a secondary education, social work, or any graduate degree program. **Prerequisite(s):** Junior standing or above and admission to the Bachelor of Arts in Elementary Education program or consent of the instructor.

SPED 416
Methods of Instruction for Exceptional Learners 2 hrs.
The purpose of this course is to address issues of instruction for individuals with special needs. Topics include effective instructional and accommodative practices and strategies in multiple areas (math, literacy, science, social studies, art). Junior standing or above and admission to the Bachelor of Arts in Elementary Education program. Successful completion of SPED 415.

SPED 423
Assessment of Monolingual and LEP Children with Disabilities 4 hrs.
Psychoeducational assessment of monolingual and limited English proficient children with learning disabilities. First and second language development. Theoretical and practical aspects of measurement and testing.
Prerequisite(s): Graduate standing; and SPED 410 or the equivalent.

SPED 424
Assessment of Students with Special Needs 3 OR 4 hrs.
Theoretical basis and practical application of standardized and alternative testing of children with learning and behavior difficulties. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SPED 410

SPED 426
Curricular/Behavioral Considerations for Learners with Special Needs 3 OR 4 hrs.
Instructional practices related to academics, classroom management, individualized and group instruction for students with special needs. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SPED 424 or the equivalent or consent of the instructor.

SPED 427
Curricular and Behavioral Considerations for LEP Learners with Special Needs 4 hrs.
Exploration of best practice instruction and behavior management for limited English proficient students with learning disabilities, behavioral disabilities, and/or mild cognitive delays. **Prerequisite(s):** Graduate standing; and SPED 410 or the equivalent or consent of the instructor.

SPED 442
Language Development and Disorders 3 OR 4 hrs.
Theory and research on the acquisition of phonology, syntax, semantics, and pragmatics in children with and without disabilities. Models for language assessment and intervention. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** SPED 410

SPED 444
Assistive Technology for Literacy, Learning, and Participation in Pre-K Through High School 3 hrs.
Use of communication systems, computers, adapted equipment, and strategies to foster participation and inclusion of students in preschool through high school. **Same as** DHD 444.

SPED 448
Topics in Special Education 1 TO 4 hrs.
Course or workshop on preannounced topic on the education of handicapped children, adolescents, or adults. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** SPED 410 and consent of the instructor.

SPED 449
Early Childhood/ Early Childhood Special Education: Perspectives, Policies, and History 3 hrs.
Perspectives, policies, history, and foundations of early childhood education and early childhood special education. Emphasis on the effects of changing economic, political, legal, and social views of human development. **Same as** EPSY 449 and EDPS 449.

SPED 461
Political and Sociocultural Perspectives on Special Education 3 hrs.
Students will examine issues of access and equity through legislation, litigation, and sociocultural perspectives and be introduced to major theoretical frameworks that influence special education programs. **Same as** ED 461. Fieldwork required.

SPED 462
Assessment of Individuals with Disabilities 3 hrs.
To prepare students in the use of formal and informal assessment in making decisions regarding placement, instructional planning, and evaluation of students with disabilities. Fieldwork required. **Prerequisite(s):** ED 461 or SPED 461 or the equivalent or consent of the instructor.

SPED 463
Instructional Adaptations in Reading and Writing I 3 hrs.
Emphasizes the components of designing, implementing, and assessing reading and writing instruction for individuals with disabilities at the elementary level. Fieldwork required. **Prerequisite(s):** ED 461 or SPED 461 or the equivalent or consent of the instructor.

SPED 465
Cognitive Development and Disabilities 3 hrs.
Theory and research on cognitive development in children with disabilities from infancy through adolescence, in the context of typical development. Models for cognitive assessment and intervention. **Same as** EPSY 465. Fieldwork required. **Prerequisite(s):** SPED 461 or ED 461 or the equivalent or consent of the instructor.

SPED 466
Language Development, Diversity, and Disabilities 3 hrs.
Theory and research on language development in children with disabilities, in the context of typical development. Models for language assessment and intervention. **Same as** EPSY 466. Fieldwork required. **Prerequisite(s):** SPED 461 or ED 461 or the equivalent or consent of the instructor.

SPED 467
Social and Emotional Development and Disabilities 3 hrs.
Exploration of the risk factors and different theoretical approaches associated with the social and emotional development of youth ages 5-21 with and without disabilities. **Same as** EPSY 467. Fieldwork required. **Prerequisite(s):** SPED 461 or ED 461 or the equivalent or consent of the instructor.

SPED 471
Curricular Adaptations for Learners with Significant Disabilities 3 hrs.
Addresses methods of instruction, assessment, planning for instruction, development and evaluation of learning environments, and instructional delivery for students with significant disabilities. Fieldwork required. **Prerequisite(s):** SPED 465 and SPED 466 and SPED 467; or consent of the instructor.

SPED 472
Promoting Academic and Prosocial Behavior I 3 hrs.
The importance of school-wide and classroom structure and climate in the educational process. Strategies to promote academic success and desired social behavior. **Same as** ED 472. Fieldwork required. **Prerequisite(s):** SPED 461 or ED 461 or the equivalent or consent of the instructor.

SPED 473
Teaching Math and Science with Adaptations 3 hrs.
Provides prospective teachers with assessment strategies and a range of adaptations, modifications, and interventions in math and science for students with disabilities. **Same as** ED 473. Fieldwork required. **Prerequisite(s):** SPED 461 or ED 461 or the equivalent or consent of the instructor.

SPED 480
Technology and Multimedia: Learning Tools in the Classroom 3 OR 4 hrs.
New technologies to support teaching and learning in pre-college classrooms. **Same as** CI 480. 3 undergraduate hours. 4 graduate hours.

SPED 481
Theoretical Foundations of Bilingual/ESL Special Education 4 hrs.
Overview of historical, political, pedagogical, and theoretical issues involved in the education of students with special learning needs and who are second language learners. **Prerequisite(s):** Graduate standing; and SPED 410 or the equivalent or consent of the instructor.

SPED 500
Research Methods in Special Education 4 hrs.
Research strategies and statistical methods for the assessment of applied and theoretical research studies in special education. **Prerequisite(s):** SPED 410 or consent of the instructor.

SPED 506
Characteristics and Assessment of Young Children with Disabilities 4 hrs.
Biological and environmental factors in infancy may cause developmental disabilities. Impact of such factors on child development will be reviewed. Appropriate assessment techniques reviewed. Fieldwork required.

SPED 507
Children with Disabilities and the Family 4 hrs.
Strategies for working with families of young children with disabilities. Focus on parents and siblings within community context. Design and implementation of individual family service plans. **Prerequisite(s):** SPED 506 or SPED 511 or SPED 513 or SPED 515.

SPED 508
Methods of Instruction & Assessment of Young Children with Disabilities 4 hrs.
Intervention and assessment methods for infants and young children at risk for or showing developmental delays. Systems perspective on utilizing family and community to support intervention. Fieldwork required. **Prerequisite(s):** Grade of B or better in SPED 506; or consent of the instructor.

SPED 511
Characteristics of Learning Disabilities 3 hrs.
Characteristics of and educational implications for cognitive, language, academic, and social-emotional development in students with learning disabilities. Fieldwork required. **Prerequisite(s):** SPED 500.

SPED 512
Instructional Methods for Students with Learning Disabilities 3 hrs.
Development and evaluation of individualized educational programs for learning-disabled students, including instructional methods and materials. Fieldwork required. **Prerequisite(s):** SPED 511

SPED 513
Characteristics of Mental Retardation 3 hrs.
The nature, characteristics, and educational implications for the cognitive, social, and physical development of persons with mental retardation. Fieldwork required. **Prerequisite(s):** SPED 500.

SPED 514
Instructional Methods for Students with Mild Mental Retardation 2 hrs.
Instructional theory, methods, and techniques; and behavioral and academic objectives for students with mild mental retardation. Field experience. **Prerequisite(s):** SPED 513 and concurrent registration in SPED 515.

SPED 515
Instructional Methods for Students with Moderate to Profound Mental Retardation 2 hrs.
Instructional theory and techniques, instructional methods and materials, and behavioral and academic objectives for moderate, severe, and profound mental retardation. Fieldwork required. **Prerequisite(s):** SPED 513 and concurrent registration in SPED 514.

SPED 516
Characteristics of Students with Emotional and Behavioral Disorders 3 hrs.
Exploration of the risk factors and different theoretical approaches associated with the development and prevention of serious emotional and behavioral disorders. Fieldwork required. **Prerequisite(s):** SPED 424 and SPED 426.

SPED 517
Instructional Methods for Students with Emotional and Behavioral Disorders 3 hrs.
Instructional programming for the academic and social development of students with serious emotional and behavioral disorders. Strategies for effective classroom and behavioral management. Fieldwork required. **Prerequisite(s):** SPED 516.

SPED 522
Special Educator as Consultant 4 hrs.
Training for consultants in educational and employment settings: consultation models, observation, and coaching skills to use with educators, parents, employers, and community-agency personnel. **Prerequisite(s):** SPED 410 or the equivalent or consent of the instructor.

SPED 537
Special Education Practicum 6 TO 12 hrs.
Practice teaching in the field of special education; focus on teaching students who are experiencing social and/or emotional disturbance, mental retardation, or learning disabilities. **Prerequisite(s):** Completion of 100 clock hours of pre-student teaching field experiences, completion of a sequence in an area of special education, and consent of the advisor. Applications are due two semesters in advance.

SPED 538
Internship in Special Education 1 TO 9 hrs.
Clinical, research, or field-based internship experiences for special education majors. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** SPED 424 and SPED 426 and SPED 500 and consent of the instructor one semester prior to enrollment.

SPED 564
Proseminar in Special Education 4 hrs.
Various areas of special education research are reviewed. Topics include areas of faculty research. **Prerequisite(s):** SPED 500 or consent of the instructor; and admission to PhD in Special Education program.

SPED 572
Promoting Academic and Prosocial Behavior II 2 hrs.
Provides an in-depth examination of serious problem behavior and the skills to develop individualized programs to address the academic and social needs of challenging students. Fieldwork required. **Prerequisite(s):** SPED 472; or consent of the instructor.

SPED 573
Understanding Research in Special Education 3 hrs.
Overview of research methodology appropriate for teachers of special populations with emphasis on developing skills in critically reading research reports. **Prerequisite(s):** ED 461 or SPED 461 or the equivalent or consent of the instructor.

SPED 576
Internship in Assessment 3 hrs.
Internship experiences in an assessment clinic for special education majors. Fieldwork required. **Prerequisite(s):** SPED 462 or the equivalent or consent of the instructor.

SPED 577
Field Teaching Internship Experience 3 hrs.
Field-based internship experiences for special education. Fieldwork required. **Prerequisite(s):** Approval of the program faculty.

SPED 578
Classroom-Based Inquiry Internship 3 hrs.
Field-based internship experiences in special education classrooms. Fieldwork required. **Prerequisite(s):** Approval of the program faculty.

SPED 579
Research Internship 3 hrs.
Students work on a specific research project under the direction of a faculty member. Fieldwork required. **Prerequisite(s):** SPED 573 or the equivalent and consent of the instructor.

SPED 580
Student Teaching in Special Education 6 hrs.
Practice teaching in the field of special education. Fieldwork required. **Prerequisite(s):** SPED 463 and SPED 471 and SPED 473 and SPED 572 and SPED 573 and SPED 576 and SPED 577 and approval of the program faculty.

SPED 582
Forging Collaborations with Family and Community 3 hrs.
Develops skills necessary to work in partnership with the families of children with disabilities, and community members. **Same as** EPSY 582. **Prerequisite(s):** ED 461 or SPED 461 or the equivalent or consent of the instructor.

SPED 583
Instructional Adaptations in Reading and Writing II 3 hrs.
Students learn advanced strategies for designing, implementing, and assessing reading and writing instruction for individuals with disabilities at the middle school and secondary level. Fieldwork required. **Prerequisite(s):** ED 461 or SPED 461; and SPED 463; or consent of the instructor.

SPED 592
Seminar on Theory and Research in Special Education 4 hrs.
Systematic in-depth review of theory and research on selected topics in special education. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** SPED 500 and consent of the instructor.

SPED 593
PhD Research Project 1 TO 8 hrs.
Students design, implement, and analyze results of a research problem in this area of specialization. Completed study is reviewed by faculty. May be repeated to a maximum of 8 hours. **Prerequisite(s):** Admission to the PhD in Education program.

SPED 595
Seminar in Special Education 4 hrs.
Discussion of current literature in the field of special education. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** SPED 564.

SPED 596
Independent Study 1 TO 4 hrs.
Students independently study related topics not covered by courses, under faculty supervision. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** SPED 500 or the equivalent, and consent of advisor and instructor.

SPED 599
Thesis Research 0 TO 16 hrs.
Research on the topic of the student's dissertation. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the dissertation advisor.

Statistics

STAT 401
Introduction to Probability 3 OR 4 hrs.
Probability spaces, random variables, and their distributions, conditional distribution and stochastic independence, special distributions, sampling distributions, limit theorems. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 210.

STAT 411
Statistical Theory 3 OR 4 hrs.
Estimation, tests of statistical hypotheses, best tests, sufficient statistics, Rao-Cramer inequality, sequential probability ratio tests, the multivariate normal distribution, nonparametric methods. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in STAT 401.

STAT 416
Nonparametric Statistical Methods 3 OR 4 hrs.
Distribution free tests for location and dispersion problems, one-way and two-way layouts, the independence problem, regression problems involving slopes, detecting broad alternatives, resampling methods. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in STAT 381 or STAT 411.

STAT 431
Introduction to Survey Sampling 3 OR 4 hrs.
Simple random sampling; sampling proportions; estimation of sample size; stratified random sampling; ratio estimators; regression estimators; systematic and cluster sampling. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in STAT 411 or STAT 481.

STAT 461
Applied Probability Models I 3 OR 4 hrs.
Computing probabilities and expectations by conditioning, Markov chains, Chapman-Kolmogorov equations, branching processes, Poisson processes and exponential distribution, continuous-time Markov chains, reversibility, uniformization. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in STAT 401.

STAT 462
Applied Probability Models II 3 OR 4 hrs.
Renewal theory, regenerative processes, semi-Markov processes, queuing theory, exponential models, M/G/1 and G/M/1 systems, reliability, bounds on the reliability function, system life, Brownian motion, stationary processes. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in STAT 461.

STAT 471
Linear and Nonlinear Programming 3 OR 4 hrs.
Linear programming, simplex algorithm, degeneracy, duality theorem sensitivity analysis, convexity, network simplex methods, assignment problems. Constrained and unconstrained minima. Quasi-Newton methods. Ellipsoidal methods of Kachian. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 310.

STAT 473
Game Theory 3 OR 4 hrs.
Games in extensive and normal form. Minimax theorem. Solving matrix games via linear programming. Nash equilibria for nonzero-sum games, Shapley value, bargaining models. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in MATH 310 or STAT 401.

STAT 477
Introduction to Reliability Theory 3 OR 4 hrs.
Structural and probabilistic properties of coherent systems, notions of aging and classes of life distributions, preservation properties, dependent components, optimal allocation models. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in STAT 401 or consent of the instructor.

STAT 481
Applied Statistical Methods II 3 OR 4 hrs.
Linear regression, introduction to model building, analysis of variance, analysis of enumerative data, nonparametric statistics, product and system reliability, quality control. SAS and SPSSX applications. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in STAT 381.

STAT 486
Statistical Consulting 3 OR 4 hrs.
Introduction to statistical consulting methods and techniques. Handling and transformation of raw data sets in CMS. Statistical analysis of data sets with SAS and SPSSX. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of C or better in STAT 411 or STAT 481.

STAT 494
Special Topics in Statistics, Probability, and Operations Research 3 OR 4 hrs.
Course content announced prior to each semester in which it is given. Topics drawn from areas such as distribution theory; Bayesian inference; discrete optimization; applied probability models; resampling techniques; biostatistics; environmental sampling. 3 undergraduate hours. 4 graduate hours. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

STAT 496
Independent Study 1 TO 4 hrs.
Reading course supervised by a faculty member. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the instructor and approval of the department.

STAT 501
Probability Theory I 4 hrs.
Abstract measure theory, probability measures, Kolmogorov extension theorem, sums of independent random variables, the strong and weak laws of large numbers, the central limit theorem, characteristic functions, law of iterated logarithm, infinitely divisible laws. **Prerequisite(s):** MATH 534 or consent of the instructor.

STAT 502
Probability Theory II 4 hrs.
Radon-Nikodym theorem, conditional expectations, martingales, stationary processes, ergodic theorem, stationary Gaussian processes, Markov chains, introduction to stochastic processes, Brownian motions. **Prerequisite(s):** STAT 501.

STAT 511
Advanced Statistical Theory I 4 hrs.
Statistical models, criteria of optimum estimation, large sample theory, optimum tests and confidence intervals, best unbiased tests in exponential families, invariance principle, likelihood ratio tests. **Prerequisite(s):** STAT 411.

STAT 512
Advanced Statistical Theory II 4 hrs.
Basic concepts in decision theory, prior and posterior distributions, Bayesian decision theory, hierarchical models, robustness, minimax analysis, invariance principle, sequential analysis, completeness. **Prerequisite(s):** STAT 511.

STAT 521
Linear Statistical Inference 4 hrs.
Estimation and testing in linear models, generalized inverses of matrices, n-dimensional normal distribution, quadratic forms, likelihood ratio tests, best invariant tests, analysis of variance. **Prerequisite(s):** STAT 411.

STAT 522
Multivariate Statistical Analysis 4 hrs.
Multivariate normal distribution, estimation of mean vector and covariance matrix, T-square statistic, discriminant analysis, general linear hypothesis, principal components, canonical correlations, factor analysis. **Prerequisite(s):** STAT 521.

STAT 531
Sampling Theory I 4 hrs.
Foundations of survey design and inference for finite populations; the Horvitz-Thompson estimator; simple random, cluster, systematic survey designs; auxiliary size measures in design and inference. **Prerequisite(s):** STAT 411.

STAT 532
Sampling Theory II 4 hrs.
Uses of auxiliary size measures in survey sampling; cluster sampling; systematic sampling; stratified sampling; superpopulation methods; randomized response methods; resampling; nonresponse; small area estimations. **Prerequisite(s):** STAT 531.

STAT 535
Optimal Design Theory I 4 hrs.
Gauss-Markov theorem, optimality criteria, optimal designs for 1-way, 2-way elimination of heterogeneity models, repeated measurements, treatment-control; equivalence theorem, approximate designs for polynomial regression. **Prerequisite(s):** STAT 521.

STAT 536
Optimal Design Theory II 4 hrs.
Construction of optimal designs: BIB, Latin square and generalized Youden, repeated measurements, treatment-control studies; construction of factorial designs, including orthogonal arrays. **Prerequisite(s):** STAT 535 or consent of the instructor.

STAT 571
Noncooperative Games 4 hrs.
Extensive games. Separation and fixed point theorems. General minimax theorems. Nash equilibria. War duels. Completely mixed games. Games with convex payoff. Stochastic games. **Prerequisite(s):** STAT 461 or MATH 411.

STAT 572
Cooperative Game Theory 4 hrs.
Utility theory. Games with side payments, stable sets, core, bargaining sets, Shapley value, nucleolus. Market games. NTU value. Multilinear extensions, nonatomic games. **Prerequisite(s):** STAT 571 or consent of the instructor.

STAT 577
Reliability Theory 4 hrs.
Coherent structures, paths and cuts, modules, shape and properties of reliability function, association, classes of life distributions based on aging, dependence, multivariate models. **Prerequisite(s):** STAT 461.

STAT 591
Advanced Topics in Statistics, Probability, and Operations Research 4 hrs.
Special topics. Topics drawn from areas such as: data analysis; Bayesian inference; nonlinear models; time series; computer-aided design; reliability models; game theory. May be repeated. **Prerequisite(s):** Approval of the department.

STAT 593
Graduate Student Seminar 1 hour.
For graduate students who wish to receive credit for participating in a learning seminar whose weekly time commitment is not sufficient for a reading course. This seminar must be sponsored by a faculty member. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

STAT 595
Research Seminar 1 hour.
Current developments in research with presentations by faculty, students, and visitors. Researchers and practitioners from academia, industry and government will present talks on topics of current interest. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

STAT 596
Independent Study 1 TO 4 hrs.
Reading course supervised by a faculty member. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the instructor and the department.

STAT 598
Master's Thesis 0 TO 16 hrs.
Research work under the supervision of a faculty member leading to the completion of a master's thesis. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Approval of the department.

STAT 599
Doctoral Thesis
Research 0 TO 16 hrs.
Research work under the supervision of a faculty member leading to the completion of a doctoral thesis. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of the department.

Surgery

SURG 597
Project
Research 0 TO 16 hrs.
Research investigation of problems in surgery. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

SURG 598
Master's Thesis
Research 0 TO 16 hrs.
Research investigation of problems in surgery. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Consent of the instructor.

Theatre

THTR 410
Movement for
Stage III 3 OR 4 hrs.
Specialized topics in movement-based performance skills, such as stage combat, circus techniques, and mask work. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of B or better in THTR 310 and advanced physical performance experience; or graduate standing in theatre.

THTR 423
Playwriting 3 OR 4 hrs.
The development of scripts for stage performance. **Same as ENGL 495.** 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Junior standing or above; and approval of the department and submission and approval of a playwriting sample or dialog-centered fiction prior to registration.

THTR 444
Drama in Its
Cultural
Context I 3 OR 4 hrs.
Drama in its social and cultural context, through the seventeenth century. 3 undergraduate hours. 4 graduate hours.

THTR 445
Drama in Its
Cultural
Context II 3 OR 4 hrs.
Drama in its social and cultural context, eighteenth to twentieth centuries. 3 undergraduate hours. 4 graduate hours.

THTR 452
Acting:
Greeks and
Shakespeare 3 OR 4 hrs.
Techniques of performing Greek and Shakespearean drama. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of B or better in THTR 261 and grade of B or better in THTR 262 or graduate standing in Theatre.

THTR 455
Acting: Comedy 3 OR 4 hrs.
Techniques of performing classic comedy. Emphasis on the "Commedia dell'Arte" and improvisational comedy. Topics vary. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of B or better in THTR 262 or graduate standing in Theatre.

THTR 458
Acting:
Ibsen and
Chekhov 3 OR 4 hrs.
Techniques of performing Ibsen, Chekhov, and their contemporaries. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of B or better in THTR 262 or graduate standing in Theatre.

THTR 462
Voice
for Stage 3 OR 4 hrs.
Advanced techniques in the integration of voice, speech, dialects, and other text-related vocal performance skills. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of B or better in THTR 261 or graduate standing in Theatre.

THTR 464
Special
Projects in
Theatrical
Design 3 OR 4 hrs.
Twentieth-century styles: design for the contemporary stage. Problems in conceptualization, realization, and execution. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). **Prerequisite(s):** THTR 250 or THTR 256; or THTR 257 and THTR 259; or graduate standing in Theatre.

THTR 465
Stage
Direction 3 OR 4 hrs.
Exploration of conceptual planning and implementation skills for the stage director, ranging from script interpretation to rehearsal and performance. Performance projects required. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** THTR 210 and THTR 250 and THTR 262; and THTR 256 or THTR 257 or graduate standing in Theatre.

THTR 466
Special Projects
in Performance
Training 3 OR 4 hrs.
Training in varying advanced techniques of performance. 3 undergraduate hours. 4 graduate hours. May be repeated up to 2 time(s). **Prerequisite(s):** THTR 262; or for graduate students, consent of the instructor.

THTR 470
Contemporary
Performance
Techniques 3 OR 4 hrs.
The relationship of contemporary theory and performance techniques with attention to both text-and nontext-based forms. Topics vary. Performance projects required. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** Grade of B or better in THTR 262; or graduate standing in Theatre.

THTR 472
Investigative
Collaboration 3 OR 4 hrs.
Collaboration as the primary means for theatrical creation. Production teams assigned to joint-production projects. Topics vary. 3 undergraduate hours. 4 graduate hours. May be repeated up to 1 time(s). **Prerequisite(s):** Grade of B or better in THTR 262; or graduate standing in Theatre.

THTR 474
Internship 3 TO 8 hrs.
Students work in an approved professional setting. Individual projects developed through conferences with a faculty member and a field supervisor. May be repeated. Only three hours may be applied toward Theatre major requirements. **Prerequisite(s):** 12 hours of upper-division courses in theatre, with a 3.00 grade point average in those courses; recommendation of two faculty members and approval of department obtained in semester prior to internship.

THTR 475
Audition
Technique 3 OR 4 hrs.
Selection and staging of audition pieces from both classical and modern drama. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Grade of B or better in THTR 261 and grade of B or better in THTR 452 and grade of B or better in THTR 210; or graduate standing.

THTR 491
Study Abroad
in Theatre 0 TO 16 hrs.
Study abroad within an approved foreign exchange program or department-sponsored program. May be repeated with approval. Approval to repeat course granted by the department. **Prerequisite(s):** Approval of the department.

THTR 498
Independent
Study 1 TO 4 hrs.
Individual investigation of special problems that may be student-initiated or related to faculty research. May also be used for special University-sponsored projects, such as interdisciplinary seminars. May be repeated to a maximum of 6 hours. Students may register in more than one section per term. **Prerequisite(s):** Senior or graduate standing and approval of the department.

THTR 502
Introduction
to Research
in Theatre 4 hrs.
Focuses on the research directors and scholars need to do to make informed choices.

THTR 522
Theories
of Theatre 4 hrs.
Nature of the theatrical experience. Emphasis on topics varies, for example theory of comedy; semiotics of theatre; dada, surrealism, expressionism, futurism. May be repeated to a maximum of 12 hours. **Prerequisite(s):** At least three of the following: THTR 209; THTR 245; THTR 262; THTR 284, THTR 425; or consent of the instructor.

THTR 523
Special Topics
in Dramatic Criticism 4 hrs.
Intensive analysis of an individual critic or school, or critical history of an important play. May be repeated to a maximum of 12 hours.

THTR 596
Independent
Research 1 TO 4 hrs.
Department-approved research projects not included in thesis research. May be repeated to a maximum of 6 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the director of graduate studies.

THTR 597
Thesis
Production 0 TO 8 hrs.
Under the guidance of an advisor and committee, the student creates a theatre or video production, together with a written explanation of the work's intended significance. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Approval of faculty thesis production committee.

THTR 598
Thesis
Research 0 TO 16 hrs.
Under the guidance of an advisor and committee, the student develops and conducts a research project addressing a theatre problem of a basic or applied nature. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Approval of faculty thesis research committee.

Urban Planning and Policy

UPP 403
Introduction to
Urban Planning 3 OR 4 hrs.
Patterns of city growth, physical, socioeconomic, and environmental issues. Contemporary planning issues. Future of cities. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Advanced undergraduate standing or consent of the instructor.

UPP 420
**Great Cities:
London and
Chicago** 1 TO 8 hrs.
Comparative investigation of urban, economic, social, and political issues in the two global cities. Includes classes, study, and living in London. Fieldwork required. **Prerequisite(s):** Junior standing or above and selection by the Office of Study Abroad Admission Committee.

UPP 470
**Cohort Seminar
for Urban
Developers** 3 OR 4 hrs.
Application of the financial calculator, use of spreadsheets, and other tools commonly used in real estate-based urban development projects. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Consent of the instructor.

UPP 471
**Housing and
Community
Development
for Urban
Developers** 3 OR 4 hrs.
Housing policy at federal, state, and local levels affecting urban housing markets. Emphasis on assessment of market conditions affecting community development decisions. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** UPP 470 or consent of the instructor.

UPP 472
**Development
Finance For Urban
Developers** 3 OR 4 hrs.
Key financial principles of real estate development, particularly those related to the financing of affordable housing. How to develop a real estate pro forma. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Consent of the instructor.

UPP 473
**Organizational
Essentials
for Urban
Developers** 3 OR 4 hrs.
Theory and practice of management in public and nonprofit settings. Focus on developing communication, leadership, and legal skills for each step in development. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Consent of the instructor.

UPP 474
**Community
Development
Process for Urban
Developers** 3 OR 4 hrs.
Developing affordable housing: development team, acquisition strategy, legal issues, construction management and project sustainability, as it pertains to different types of housing developments. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Consent of the instructor.

UPP 475
**Sustaining the
Housing for
Urban
Developers** 3 OR 4 hrs.
Introduces students to a range of management issues: property management and maintenance, resident relations and services, and financial/asset management as it relates to sustaining affordable housing. 3 undergraduate hours. 4 graduate hours. **Prerequisite(s):** Consent of the instructor.

UPP 492
**Topics in Urban
and Public Affairs** 3 hrs.
In-depth study of selected issues of urban and public affairs. **Same as** UPA 492. May be repeated to a maximum of 6 hours. Students may register for more than one section per term. **Prerequisite(s):** Admission to the BA program in Urban and Public Affairs or consent of the instructor.

UPP 493
**Topics in Urban
Planning and
Policy** 1 TO 4 hrs.
Intensive analysis of selected planning problems or policy issues. May be repeated to a maximum of 12 hours. Students may register for more than one section per term. **Prerequisite(s):** Junior standing or above; and consent of the instructor.

UPP 500
**History and
Theory of Urban
Planning** 4 hrs.
Course surveys the history and theory of the planning profession and introduces major currents of thought and innovation that have guided and continue to shape theoretical and practical planning problems. **Prerequisite(s):** Admission to the Urban Planning and Policy program or consent of the instructor.

UPP 501
**Urban Space,
Place, and
Institutions** 4 hrs.
Students will learn to use a variety of social science disciplines to explain and interpret the form and function of urban space, including urbanization, suburbanization, regionalism, globalization, and sustainability. **Prerequisite(s):** Graduate standing in the Urban Planning and Policy program, the Master of Arts in Real Estate, or consent of the UPP program director.

UPP 502
**Planning Skills:
Computers, Methods,
and Communication** 4 hrs.
Introduction to methods for collecting, analyzing, and presenting socioeconomic and spatial data with a focus on computer-based methods and an emphasis on effective communication of findings and dispute resolution strategies. **Prerequisite(s):** Graduate standing in the Urban Planning and Policy program or consent of the UPP program director.

UPP 505
Plan Making 4 hrs.
Lecture to instruct students on making plans. Students learn to combine knowledge, skills, and values in each of three major areas of plan making: framing problems, composing alternatives, and devising implementation strategy. **Prerequisite(s):** Credit or concurrent registration in UPP 502. **Corequisite(s):** Requires concurrent registration in UPP 506.

UPP 506
Plan-Making Studio 4 hrs.
Instructs students on making plans. Students learn to combine knowledge, skills, and values in each of these major areas of plan making: framing problems, composing alternatives, and devising implementation strategy. **Prerequisite(s):** Credit or concurrent registration in UPP 502. **Corequisite(s):** Requires concurrent registration in UPP 505.

UPP 507
**Computer Topics
in Urban Planning** 4 hrs.
Specialized computational abilities for various planning areas, including data base, project scheduling, statistics, graphics, and simulations. Topics will vary each semester. **Prerequisite(s):** Graduate standing in the Urban Planning and Policy program.

UPP 508
**Geographic Information
Systems for Planning** 4 hrs.
Applications of geographic information systems to urban planning and policy making. **Same as** GEOG 589. **Prerequisite(s):** Graduate standing in the Urban Planning and Policy program or consent of the instructor.

UPP 510
**Data Analysis for
Planning and
Management I** 4 hrs.
Basic introduction to data analysis techniques most commonly used in urban planning. Addresses issues of decision making based on limited or imperfect information. Previously listed as UPP 503. **Prerequisite(s):** Admission to the Urban Planning and Policy program, or consent of the Urban Planning and Policy program director.

UPP 514
**Economic Analysis
for Planning and
Management** 4 hrs.
Basic micro-, macro-, and welfare economics theory; related analytical concepts including input-output, economic base, benefit cost. Economic forces which shape urban areas and affect public policy. Previously listed as UPP 504. **Prerequisite(s):** Admission to the Urban Planning and Policy program or consent of the UPP program director.

UPP 516
**Issues of Class
and Race in Planning** 4 hrs.
Critically examines the significant role of race, class, ethnicity, and gender as factors in planning public policy formation, implementation, and evaluation. **Prerequisite(s):** Consent of the instructor.

UPP 517
**Regional and
Metropolitan-Wide
Planning** 4 hrs.
History of regional planning. **Prerequisite(s):** UPP 500.

UPP 520
**Globalization and
International Planning I:
Theory and
Applications** 4 hrs.
Overview of international development theories and their practical applications. Particular emphasis is placed on globalization. Urban versions and applications of these theories. **Prerequisite(s):** Consent of the instructor.

UPP 521
**Globalization and
International Planning II:
Comparative
Planning and
Policies** 4 hrs.
Policies and practice of public sector planning and development in three regional areas of the world: Europe, South America, and Asia. **Prerequisite(s):** UPP 520 or consent of the instructor.

UPP 525
**Globalization and
International
Planning: Special
Topics** 1 TO 4 hrs.
Special topics selected for intensive analysis in international development planning. May be repeated to a maximum of 8 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

UPP 530
**Economic
Development I:
Analysis** 4 hrs.
Theoretical perspectives, data, data sources, and research techniques for analysis of regional, metropolitan, and neighborhood economies. **Prerequisite(s):** UPP 504.

UPP 531
**Economic
Development II:
Planning** 4 hrs.
Overview of development strategies, including financing, business development, industry retention, and human resources; implementation and evaluation. **Prerequisite(s):** UPP 530.

**UPP 533
Development
Finance Analysis** 4 hrs.
Financial feasibility analysis for residential, commercial, and industrial projects. Financial valuation and accounting principles, legal interests in real estate, and tax issues affecting cash flow and returns on investment. **Prerequisite(s):** UPP 504.

**UPP 535
Economic
Development:
Special Topics** 1 TO 4 hrs.
Special topics selected for intensive analysis in economic development. May be repeated to a maximum of 8 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**UPP 536
Urban Employment
Planning** 4 hrs.
The importance of employment as a focus in planning and policy making. History, theories, and methodologies of urban markets; labor market analysis methodologies and emergent public policies. **Prerequisite(s):** UPP 504 or consent of the instructor.

**UPP 537
Economic and
Environmental
Planning** 4 hrs.
Analytical and economic methods for environmental planning and management. Applications to selected problems. **Prerequisite(s):** UPP 504 or UPP 554.

**UPP 540
Community
Development I:
Theory** 4 hrs.
Critically examines community development as a field of practice, policy intervention, implementation, and analysis; emphasis on community and social dynamics of disadvantaged groups. **Prerequisite(s):** Admission to the Urban Planning and Policy program or consent of the UPP program director.

**UPP 541
Community
Development II:
Practice** 4 hrs.
Examines the methods and techniques used or adapted in community development as a field of planning practice, analysis, and evaluation; emphasis on community based settings, applications, and foci. **Prerequisite(s):** Consent of the instructor.

**UPP 542
Metropolitan
Housing Planning** 4 hrs.
Urban housing market structure and dynamics; impacts of government housing policy on market; development of local housing plans. **Prerequisite(s):** UPP 504 or consent of the instructor.

**UPP 543
Planning for
Healthy Cities** 4 hrs.
Investigates the needs of special populations such as the elderly or mentally ill, the role of the planner in serving these groups and community based strategies to meet needs.

**UPP 544
Urban Revitalization and
Gentrification** 4 hrs.
Urban change in U.S. cities since World War II that is associated with socioeconomic restructure under globalization. The course examines restructure under the new global order and its impact on cities and urban planning and different social groups.

**UPP 545
Community
Development:
Special Topics** 1 TO 4 hrs.
Special topics selected for intensive analysis in community development. May be repeated to a maximum of 8 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**UPP 547
Community
Organization
Practice** 4 hrs.
Critically examines the context, development, status, and problematics of organizing groups within communities of place, conditions, and interest at various levels of analysis, relative to public formation, implementation, and evaluation. **Prerequisite(s):** UPP 540 and UPP 541 and consent of the advisor and the instructor.

**UPP 548
Community
Development
Methods and
Techniques** 4 hrs.
Community development methods, including needs assessment, asset mapping, capacity building, resources mobilization, project planning, and program evaluation. Includes fieldwork. **Prerequisite(s):** Credit or concurrent registration in UPP 540 and credit or concurrent registration in UPP 541 and consent of the instructor.

**UPP 550
Physical Planning I:
Theoretical
Foundations** 4 hrs.
Physical form, economic characteristics, social qualities, and government structure of cities, suburbs, and regions; theories of urban spatial organization and planning. **Prerequisite(s):** Admission to the Urban Planning and Policy program or consent of the UPP program director.

**UPP 551
Physical Planning II:
Methods** 4 hrs.
Fundamentals of construction and infrastructure of cities and regions, including site engineering and landscape architecture, natural environmental factors, utilities and infrastructure, cost/benefit analysis, context of local government, and planning process. **Prerequisite(s):** UPP 550.

**UPP 552
Physical Planning III:
Studio** 4 hrs.
Analysis, evaluation, and development of land use and urban design plans for selected projects and clients. **Prerequisite(s):** UPP 551.

**UPP 553
Land Use Law** 4 hrs.
Legal constraints on land use control; constitutional and statutory principles and judicial review. **Prerequisite(s):** Graduate standing or consent of instructor.

**UPP 554
Environmental
Planning** 4 hrs.
The relationship of federal and state environmental policies and legislation to urban and regional planning efforts. **Prerequisite(s):** Consent of the instructor.

**UPP 555
Physical Planning:
Special Topics** 1 TO 4 hrs.
Special topics selected for intensive analysis in such areas as housing and urban design. May be repeated to a maximum of 8 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**UPP 556
Urban Design
Studio** 8 hrs.
Methods and tools for analysis, policy making, and evaluation of urban spaces, including theoretical approaches and trends, design elements, social dimensions, methods, policy formulation, computer applications, and project examples. **Prerequisite(s):** Consent of the instructor.

**UPP 557
Site Planning** 4 hrs.
Quantitative and qualitative tools for analysis and evaluation of site plans, including standards of site plans, spreadsheet computer models, elements of site design, landscape architecture, and red-penciling site plans.

**UPP 558
Land Use
Planning** 4 hrs.
Urban land use planning strategies and various land use control techniques which can be employed to carry out development policies; social implications of land use policy and practice. **Prerequisite(s):** Consent of the instructor.

**UPP 560
Urban Transportation I:
Introduction** 4 hrs.
Transportation planning and linkages between it and urban land use and regional economic development. Recent trends, traditional problems, and emerging issues.

**UPP 561
Urban Transportation II:
Policy and Methods** 4 hrs.
Formation and implementation of transportation policy at the national, regional, and local levels. Students will prepare an in-depth study of a major policy issue. **Prerequisite(s):** UPP 560 or consent of the instructor.

**UPP 562
Urban Transportation III:
Laboratory** 4 hrs.
Software packages for urban transportation planning, transportation GIS and air-quality modeling. Heavy reliance on case studies. **Prerequisite(s):** UPP 561 or consent of the instructor.

**UPP 563
Transportation
Management** 4 hrs.
Transit system planning, scheduling, pricing policy, and management; traffic control techniques and demand management; paratransit alternatives. **Prerequisite(s):** UPP 560.

**UPP 565
Transportation:
Special Topics** 1 TO 4 hrs.
Examination of specific and current problems in urban and regional transportation. Topics to be determined at the time the course is offered. May be repeated to a maximum of 8 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

**UPP 569
Infrastructure
Management** 4 hrs.
Integrated approach to the management of infrastructure systems: design, construction, operations, maintenance, and rehabilitation of facilities. Performance of facilities, approaches to management, and available tools and developing technologies. **Same as** CME 580. **Prerequisite(s):** IE 201 or the equivalent or consent of instructor. Recommended background: Familiarity with computer spreadsheets.

UPP 580
Dissertation
Proposal Workshop 1 hr.
Faculty-led workshop to assist students writing dissertation proposals identify their relevant literature, select appropriate methods, and demonstrate the significance of their original research. Satisfactory/Unsatisfactory grading only. May be repeated to a maximum of 2 hours. **Prerequisite(s):** Completion of the first year of the program; and consent of the instructor. PhD in Urban Planning and Policy students will generally take this course after or just before completing the preliminary examination.

UPP 583
Advanced
Planning Theory 4 hrs.
Study of theoretical ideas and debates about planning; the rational model and its competitors; critical review of planning methods and practice; composing alternative plans. **Prerequisite(s):** Consent of the instructor.

UPP 584
Methods of
Policy Analysis 4 hrs.
Analytic, allocative, and evaluative techniques in public policy analysis. Preparation of case studies in problem analysis and policy recommendation. **Same as** PPA 584. **Prerequisite(s):** Consent of the instructor.

UPP 586
Topics in Urban
Planning Research 4 hrs.
Course highlights research activities and opportunities related to research centers. May be repeated.

UPP 587
Planning and
Policy Research
Practicum 4 hrs.
PhD students work with a faculty member on engaged research related to their discipline. The topic and scope is determined by mutual agreement. **Prerequisite(s):** UPP 586 and consent of the instructor. Open only to PhD degree students.

UPP 588
Research Design
and Evaluation 4 hrs.
Methods used to evaluate policies and programs; quasi-experimental designs, valuation problems, and emerging evaluation methods. **Prerequisite(s):** Consent of the instructor.

UPP 589
Data Analysis for
Planning and
Management II 4 hrs.
Advanced topics in data analysis and model building, including specific models used in urban planning. **Prerequisite(s):** UPP 503.

UPP 590
Professional
Practice Experience 4 hrs.
300 hours of practical planning experience through an internship placement approved by the Urban Planning and Policy program. Satisfactory/Unsatisfactory grading only. Fieldwork required. **Prerequisite(s):** Approval of the department and completion of 12 hours of credit towards the Master of Urban Planning and Policy degree.

UPP 591
Professional
Practice 1 hour.
Reviews issues and problems in professional practice; analyzes prerequisites for rational, strategic, and ethical planning; considers career options; and defines professional goals. **Prerequisite(s):** Graduate standing in Urban Planning and Policy.

UPP 593
Independent
Research in Urban
Planning and
Policy 1 TO 8 hrs.
Advanced study and analysis of a topic selected by a student under the guidance of a faculty advisor. Satisfactory/Unsatisfactory grading only. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

UPP 594
Topics in Urban
Planning and
Policy 1 TO 4 hrs.
Intensive analysis of selected planning problems or policy issues. May be repeated to a maximum of 12 hours. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

UPP 596
Independent Study
in Urban Planning
and Policy 1 TO 4 hrs.
Advanced study and analysis of topic selected by student under the guidance of faculty advisor. May be repeated. Students may register in more than one section per term. **Prerequisite(s):** Consent of the instructor.

UPP 597
Master's Project
Research 0 TO 4 hrs.
Preparation of plan, research report, or other document which demonstrates readiness for professional planning responsibility. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Open only to degree candidates, upon approval of student's faculty advisor.

UPP 598
Master's Thesis
Research 0 TO 16 hrs.
Preparation of a major research paper under the guidance of a faculty committee. Satisfactory/Unsatisfactory grading only. **Prerequisite(s):** Open only to degree candidates, upon consent of the director of graduate studies.

UPP 599
PhD Thesis
Research 0 TO 16 hrs.
Individual study and research. Satisfactory/Unsatisfactory grading only. May be repeated. **Prerequisite(s):** Open only to degree candidates, upon approval of topic by the dissertation committee.

Women's Health Nursing

NUWH 450
Women and Mental
Health Nursing 3 hrs.
Theories of female psychology; women's daily lives and mental health; gender differences in mental illness; strategies for improving women's mental health. **Same as** GWS 450 and NUSC 450. **Prerequisite(s):** Consent of the instructor. Students enrolled in the College of Liberal Arts and Sciences must have credit in PSCH 100 and either PSCH 270 or PSCH 315 or GWS 315.

NUWH 455
Women's Health:
A Primary Healthcare
Approach 3 hrs.
Health promotion and disease prevention in women's health. Includes community experience with community women. Primary healthcare approaches examined. **Same as** CHSC 456 and NUSC 455. **Prerequisite(s):** Consent of the instructor.

NUWH 507
Biological Basis for
Women's Health and
Perinatal Nursing I 2 hrs.
Focuses on the anatomy and physiology of reproductive function, pregnancy, parturition, the puerperium, and menopause as the biological basis for women's health and perinatal nursing. **Same as** NUMC 507. **Prerequisite(s):** Consent of the instructor.

NUWH 517
Healthcare of
Women I 4 hrs.
Healthcare of women through the life span with an emphasis on health promotion and disease prevention, fertility control, and pregnancy care. **Same as** NUMC 517. **Prerequisite(s):** Credit or concurrent registration in NUMC 507 or credit or concurrent registration in NUWH 507, and credit or concurrent registration in NUSC 532, or consent of the instructor.

NUWH 518
Healthcare of
Women II 4 hrs.
Healthcare of women through the life span with an emphasis on the parturition, the puerperium, and common health and pregnancy problems. **Same as** NUMC 518. **Prerequisite(s):** NUMC 508; and NUMC 517 or NUWH 517, or consent of the instructor.

NUWH 519
Healthcare of
Women III 4 hrs.
Healthcare of women through the life span with an emphasis on gynecologic and primary care. **Same as** NUMC 519. **Prerequisite(s):** NUMC 518 or NUWH 518; and NUSC 531 and NUSC 532 and NUSC 535.

NUWH 550
Issues for Research
and Practice in
Women's Health 3 hrs.
Analysis of gender-related definitions of health and illness in theory issues and research evaluation criteria for women's healthcare practice are developed as a basis for research. **Same as** NUSC 550. **Prerequisite(s):** Consent of the instructor.

NUWH 555
Theories and Methods
in Women's Health
Nursing Research 3 hrs.
Critical analysis of theoretical and methodological approaches in women's health nursing research. Emphasis on evaluation schema useful to researchers. **Same as** NUSC 555. **Prerequisite(s):** NUSC 550 or NUWH 550, and consent of the instructor.

NUWH 565
Advanced
Research in
Women's Health 1 TO 2 hrs.
Advanced seminar for doctoral students in graduate nursing concentration in women's health. Faculty and students present and critique on-going and developing research. **Same as** NUSC 565. **Prerequisite(s):** Consent of the instructor.

NUWH 570
International
Dimensions in Women's
Health 3 hrs.
Critical examination of the health of women from a global perspective. Emphasizes resources and strategies nurse researchers use to monitor women's health across cultures and countries. **Same as** NUSC 570. **Prerequisite(s):** Consent of the instructor.

NUWH 575
Minority Women's
Health Nursing 3 hrs.
Theoretic and descriptive overview of the health concerns and health conditions of women from ethnic/racial minority backgrounds with implications for nursing research and practice. **Same as** NUSC 575. **Prerequisite(s):** Consent of the instructor.