Courses

167

For definitions of course numbers, abbreviations, and symbols, see page 169.

This is the Courses section of the 2007-2009 Graduate School Catalog for the University of Minnesota.
Courses

Contents

Course Numbers, Symbols, and Abbreviations 169
Accounting (ACCT) 170
Adult Education (ADE) 171
Adult Psychiatry (ADPY) 171
Aerospace Engineering and Mechanics (AEM) 171
Afro-American Studies (AFRO) 172
Agricultural, Food, and Environmental Education (AFE) 173
Agronomy and Plant Genetics (AGRO) 174
Akddian (AKKA) 174
American Indian Studies (AIM) 175
American Sign Language (ASL) 175
American Studies (AMST) 175
Anesthesiology (ANES) 176
Animal Science (ANSC) 176
Anthropology (ANTH) 176
Applied Economics (APEC) 177
Applied Plant Sciences (APSC) 178
Arabic (ARAB) 179
Aramaic (ARM) 180
Architecture (ARCH) 180
Art (ART) 182
Art History (ARTH) 183
Asian American Studies (AAS) 184
Asian Languages and Literatures (ALL) 184
Astronomy (AST) 185
Biochemistry (BIOC) 186
Bioethics, Center for (BTIX) 186
Biominformatics (BINF) 187
Biology (BIOL) 187
Biomedical Engineering (BMEN) 187
Biomedical Science (BMSC) 188
Biophysical Sciences (BPHY) 188
Bioproducts and Biosystems Engineering (BPE) 188
Business Administration (BA) 190
Business and Industry Education (BIE) 190
Center for Spirituality and Healing (CSHP) 190
Central Asian Studies (CAS) 192
Chemical Engineering (CHEN) 192
Chemical Physics (CHPH) 193
Chemistry (CHEM) 193
Chicano Studies (CHR) 193
Child and Adolescent Psychiatry (CAPY) 195
Child Psychology (CPSY) 196
Chinese (CHN) 196
Civil Engineering (CE) 196
Classics and Near Eastern Studies (CNES) 196
Clinical Laboratory Science (CLS) 200
Cognitive Science (CGSC) 201
College of Food, Agricultural and Natural Resources Science (CFANS) 201
Communication Studies (COMM) 201
Comparative and Molecular Biosciences (CMB) 202
Comparative Literature (CL) 203
Comparative Studies in Discourse and Society (CDDS) 203
Computer Engineering (CEME) 204
Computer Science (CSCI) 204
Conservation Biology (CBIO) 206
Control Science and Dynamical Systems (CSDY) 206
Coptic (COTP) 206
Cultural Studies and Comparative Literature (CSCS) 206
Curriculum and Instruction (CI) 207
Dance (DANCE) 212
Dentistry (DENT) 213
Design Institute (DESI) 214
Design, Housing, and Apparel (DHA) 214
Development Studies and Social Change (DSSC) 215
Dutch (DUTCH) 215
East Asian Studies (EAS) 216
Ecology, Evolution, and Behavior (EEB) 216
Economics (ECON) 217
Education (EDUC) 219
Educational and Human Development (EHD) 219
Educational Policy and Administration (EPDA) 219
Educational Psychology (EPSY) 223
Electrical and Computer Engineering (EE) 228
English: Creative Writing (ENGW) 230
English: Literature (ENGL) 231
Entomology (ENT) 232
Environmental Sciences, Policy, and Management (ESPMM) 233
Experimental and Clinical Pharmacology (ECP) 234
Family Medicine and Community Health (FMCH) 235
Family Policy Research (FPR) 235
Family Social Science (FSOS) 235
Finance (FINA) 237
Financial Mathematics (FM) 237
Finnish (FINN) 237
Fisheries and Wildlife (FW) 237
Food Science and Nutrition (FSCN) 238
Foreign Study—SPAN (FSSP) 238
Forest Resources (FR) 238
French (FREN) 240
French and Italian (FRIT) 240
Gay, Lesbian, Bisexual, and Transgender Studies (GLBT) 241
Gender, Women, and Sexuality Studies (GWSS) 241
Genetics, Cell Biology and Development (GCD) 242
Geology and Life Science (GILS) 242
Geography (GEOG) 244
Geological Engineering (GEODE) 244
Geology and Geophysics (GEOG) 246
German (GER) 246
German, Scandinavian and Dutch (GSD) 246
Gerontology (GERO) 247
Global Studies (GLO) 247
Graduate School (GRAD) 248
Greek (GKA) 248
Health Information (HINF) 248
Hebrew (HEB) 249
Hindi (HINDI) 249
History (HIST) 249
History of Medicine (HMED) 252
History of Science and Technology (HSCI) 253
Hmong (HMNG) 253
Horticultural Science (HORT) 253
Human Factors (HUMF) 254
Human Resource Development (HRD) 254
Human Resources and Industrial Relations (HRIR) 255
Industrial Engineering (IE) 257
Information and Decision Sciences (IDSC) 258
Infrastructure Systems Engineering (ISE) 258
Innovation Studies (IS) 258
Insurance and Risk Management (INS) 259
Interdisciplinary Archaeological Studies (IDAR) 259
Interpersonal Relationships Research (IRER) 259
Italian (ITAL) 259
Japanese (JPN) 259
Jewish Studies (JWST) 260
Journalism and Mass Communication (JOUR) 260
Kinesiology (KIN) 262
Laboratory Medicine and Pathology (LAMP) 263
Landscape Architecture (LA) 263
Language, Teaching, and Technology (LTTG) 265
Latin (LAT) 265
Liberal Studies (LS) 265
Linguistics (LINGU) 266
Logistics Management (LM) 266
Management (MGMT) 266
Management of Technology (MOT) 267
Managerial Communications (MICOM) 267
Manufacturing Systems (MS) 268
Marathi (MAR) 268
Marketing (MARK) 268
Master of Business Taxation (MBT) 269
Master of Healthcare Administration (MHA) 270
Materials Science (MATS) 270
Mathematics (MATH) 271
Mathematics Education (MTHE) 274
Mechanical Engineering (ME) 275
Medicinal Chemistry (MEDC) 277
Medieval Studies (MEST) 277
Microbial Engineering (MICE) 277
Microbiology (MICB) 278
Microbiology, Immunology, and Cancer Biology (MICC) 278
Middle Eastern Languages and Cultures (MELC) 278
Molecular Cellular Developmental Biology and Genetics (MCDBG) 278
Museum Studies (MST) 278
Music (MUS) 278
Music Industry (MUSA) 282
Music Education (MUED) 283
Nanostructure Science and Engineering (NPSE) 283
Natural Resources Science and Management (NR) 284
Neuroscience (NSC) 285
Neuroscience Department (NSCI) 285
Neurosurgery (NSU) 285
Nursing (NURS) 285
Nutrition (NUTR) 289
Obligations in Antiquity (OBLA) 290
Operations and Management Sciences (OMS) 290
Oral Biology (OBIO) 291
Otolaryngology (OTOL) 291
Pharmaceuticals (PHM) 292
Philosophy (PHIL) 293
Physical Medicine and Rehabilitation (PMED) 294
Physical Therapy (PT) 294
Physics (PHYS) 294
Pharmacology (PHSL) 294
Plant Biological Sciences (PBS) 296
Plant Biology (PBIO) 297
Plant Pathology (PLPA) 297
Polish (POLN) 298
Pontifical Biblical Institute (PBIB) 298
Portuguese (PORT) 301
Psychology (PSY) 301
Public Affairs (PA) 304
Public Health (PUBH) 307
Radiology (RAD) 308
Recreation Resource Management (RRM) 309
Recreation, Park, and Leisure Studies (REC) 309
Rehabilitation Science (RSC) 310
Religious Studies (REL) 310
Religious Studies (RELS) 311
Russian (RUS) 311
Sanskrit (SKT) 311
Scandinavian (SCAN) 311
Scientific Computation (SCIC) 312
Slavic (SLAV) 312
Social and Administrative Pharmacy (SAPH) 312
Social Work (SW) 312
Social, Administrative, and Clinical Pharmacy (SACP) 315
Sociology (SOC) 315
Software Engineering (SEN) 316
Soil, Water, and Climate (SOIL) 316
South Asian Languages and Cultures (SALT) 317
Spanish (SPAN) 318
Spanish and Portuguese (SPPT) 319
Speech-Language-Hearing Sciences (SLHS) 319
Statistics (STAT) 320
Studies in Cinema and Media Culture (SCMC) 322
Studies of Science and Technology (SST) 322
Sumerian (SUM) 322
Surgery (SURG) 322
Sustainable Agricultural Systems (SAGAR) 322
Teaching English as a Second Language (TESL) 322
Theatre Arts (TH) 323
Therapeutic Radiology (TRAD) 324
Toxicology (TXCL) 324
Translation and Interpreting (TRIN) 324
Urban Studies (URBS) 324
Veterinary & Biomedical Sciences (VBS) 324
Veterinary Medicine, Graduate (VMED) 325
Water Resources Science (WRS) 327
College of Food, Agricultural and Natural Resources (CFANS) 327
Work and Human Resource Education (WHRE) 327
Writing Studies (WRIT) 328
Youth Development and Research (YST) 329

168
Course Numbers, Symbols, and Abbreviations

The courses in this catalog are not offered every semester. For a listing of courses offered in a particular semester, consult the Class Schedule at [http://onestop.umn.edu/onestop/registration.htm](http://onestop.umn.edu/onestop/registration.htm).

**Course Numbers**—Courses numbered from 5000 to 5999 (listed as 5xxx if individual course number is unspecified) are primarily for graduate students, but are also open to third or fourth year undergraduate students. (5xxx courses in the School of Dentistry and in some clinical departments of the Medical School may not be applied to graduate programs.) Courses numbered 8000 or above (8xxx) are open to graduate students only.

Courses at the 6000 (6xxx) and 7000 (7xxx) levels are for postbaccalaureate students in professional degree programs not offered through the Graduate School. Courses numbered at the 4000 (4xxx) level are primarily for undergraduate students in their fourth year of study. 4xxx, 6xxx, and 7xxx courses may be applied toward a Graduate School degree with approval by the student’s major field and if the course is taught by a member of the graduate faculty or an individual authorized by the program to teach at the graduate level. For course descriptions for 4xxx, 6xxx, and 7xxx courses, consult the list of University courses at [http://onestop2.umn.edu/courses/index.htm](http://onestop2.umn.edu/courses/index.htm).

Courses at the 1000 (1xxx), 2000 (2xxx), and 3000 (3xxx) levels are for undergraduates and may not be applied to graduate programs. Courses numbered 0000 to 0999 do not carry credit.

**Course Designators**—In conjunction with course numbers, departments and programs are identified by a 2-, 3-, or 4- letter prefix known as a designator (e.g., CE for Civil Engineering, POL for Political Science, WOST for Women's Studies). When no course designator precedes the number of a course listed as a prerequisite, that prerequisite course is in the same discipline as the course being described.

**Course Symbols and Abbreviations**—The following abbreviations and symbols are used throughout the course descriptions of most University catalogs to denote common and recurring items of information.

- **Prereq** ...............Course prerequisites.
- **cr** ....................Credit.
- **1-4 cr [max 6]** ......The course can be taken for 1 to 4 credits and may be repeated for up to 6 credits.
- **!** ........................Work for this course will extend past the end of the term. A grade of K will be assigned to indicate that the course is still in progress.
- **†** ........................All courses preceding this symbol must be completed before credit will be granted for any term of the sequence.
- **§** ........................Credit will not be granted if credit has been received for the course listed after this symbol.
- **¶** ........................Concurrent registration is required (or allowed) in the course listed after this symbol.
- **Δ** ........................Approval of the department offering the course is required for registration.
- **o** ........................Approval of the college offering the course is required for registration.
- **,** ........................In prerequisite listings, comma means “and.”
- **DGS** ....................Director of graduate studies.
- **W** ........................Following a course number, the W indicates the course is writing intensive.
- **A-F, S-N, NGA** ......Grading options. NGA means “no grade associated.” If no grading option is listed, the course may be taken either A-F or S-N. For more information about grading, see page 14.

The courses in this catalog are current as of June 12, 2007.

Check online at [http://onestop2.umn.edu/courses/index.htm](http://onestop2.umn.edu/courses/index.htm) for the most current course information.

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### Course Listing Sample

**Xology (Xolo)**

**Xology and Diometrics**

**College of Liberal Education**

<table>
<thead>
<tr>
<th>Course title</th>
<th>Course credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xolo S101. Methods in Xology. (3-4 cr [max 8 cr]; A-F only, §3101. Prereq—3578 or #)</td>
<td></td>
</tr>
</tbody>
</table>

Historical, numerical, sociological, and Freudian methods of research in xology with applications to contemporary problems.

Credit will not be granted if credit has been received for the course listed after this symbol.
Courses

Accounting (ACCT)

Department of Accounting

Curtis L. Carlson School of Management

ACCT 5100. Corporate Financial Reporting. (4 cr; A-F only. Prereq–mgmt student, non-accounting major) Overview of asset/liability valuation and income measurement. Focus on how economic events are reported in the financial statements. Examines accounting theory and the accounting standard-setting process.


ACCT 5102. Intermediate Accounting II. (4 cr; A-F or Aud. Prereq–5101) Auditing/professional standards established by Public Company Oversight Board (PCAOB) and American Institute of Certified Public Accountants (AICPA). U.S. federal system of taxation. Concepts of gross income, deductions, credits. Analysis of structure of Internal Revenue Code, its provisions with respect to specific areas of law. Interrelationships between legislative, judicial, and administrative authority. Methods, tools, and techniques to conduct tax research.

ACCT 5160. Financial Statement Analysis. (2 cr; A-F or Aud. Prereq–[5100/6100 or 5101/5101], [accounting or finance major]) Interpretation/analysis of financial statements. Introduction to techniques of financial statement analysis and applies them in different settings (e.g., in investment/credit decisions).

ACCT 5180. Consoloids and Advanced Reporting. (2 cr; A-F or Aud. Prereq–5102, mgmt or grad mgmt student) Theory underlying the preparation of consolidated financial statements, as well as the mechanical computations needed to prepare the statements themselves.

ACCT 5236. Introduction to Taxation of Businesses. (2 cr; A-F or Aud. Prereq–5135, accnt major) Introduction to the income tax laws governing the taxation of corporations, partnerships, limited liability companies, limited liability partnerships, and S corporations. Students will also increase their knowledge and skills related to tax research by writing research memorandums.

ACCT 5271. Accounting Information Systems. (2 cr; Prereq–3101/5101 or 5100/6100) Applications of electronic data processing systems in accounting, including modeling, financial planning, auditing, and data security. Analysis/design of accounting information systems.

ACCT 5281. Special Topics in Financial Reporting. (2 cr; A-F or Aud. Prereq–5102. [mgmt or grad mgmt student]) Covers areas of financial reporting frequently covered on the CPA exam, including partnerships, foreign operations, accounting for government and nonprofit organizations.

ACCT 5320. Current Topics in Accounting. (2 cr; A-F or Aud) Topics vary.

ACCT 5420. MAcc directed study. (1-4 cr [max 4 cr]; A-F or Aud. Prereq–MAcc student) Internship or directed study in Master of Accountancy degree program.


ACCT 8811. Information Economics I. (4 cr; Prereq–Business admin PhD student or #) Econometric studies of information contained in accounting numbers; volume and price reactions to accounting disclosure; earnings management; accounting based valuation; market microstructure.

ACCT 8802. Emerging Issues in Accounting. (4 cr [max 8 cr]; Prereq–Business admin PhD student or #) Topics vary.

ACCT 8811. Information Economics I. (4 cr; Prereq–Business admin PhD student or #) Econometric studies of information contained in accounting numbers; volume and price reactions to accounting disclosure; earnings management; accounting based valuation; market microstructure.

ACCT 8812. Information Economics II. (4 cr; Prereq–Business admin PhD student or #) Information in capital markets; asset pricing with asymmetric information; economics of disclosure and information acquisition.

ACCT 8821. Experimental Economics. (4 cr; Prereq–Business admin PhD student or #) Auction markets; price formation in experimental asset markets; experimental studies of information transfer and capital market efficiency; experimental tests of strategic behavior, trust, and reciprocity.

ACCT 8822. Behavioral Research in Accounting. (4 cr; Prereq–Business admin PhD student or #) Heuristics and biases in information processing; auditor judgment, mental accounting, and decision aids.

ACCT 8892. Readings in Accounting. (1-8 cr [max 16 cr]; Prereq–Business admin PhD student or #) Readings appropriate to an individual student’s program or objectives that are not available in regular courses.

ACCT 8894. Research in Accounting. (1-8 cr [max 16 cr]; Prereq–Business admin PhD student or #) Individual research on an approved topic appropriate to student’s program and objectives.

Adult Education (ADED)

College of Education and Human Development

ADED 5101. Strategies for Teaching Adults. (3 cr; A-F or Aud) Psychological theories of adult learning; learning styles and personality types; teaching styles; group and team learning; moderating and study circles; teaching technologies and distance learning; gender, race, and cultural communication. Applications of strategies.

ADED 5102. Perspectives of Adult Learning and Development. (3 cr) Emphasis on major adult development theorists, theories, and current applications. Transformative learning, self-directed learning, experiential learning, and cooperative learning provide theoretical framework for exploring physiological, psychological, sociological, and cultural aspects of adult development through the life span.

ADED 5103. Designing the Adult Education Program. (3 cr; A-F or Aud) Designing and implementing educational programs for adults. Application of concepts, theories, and models in different adult learning situations.

ADED 5106. Field Experience in Adult Education. (3-6 cr; [max 6 cr]; S-N or Aud) Supervised fieldwork and practice. Presentations and evaluations of adult education practices.

ADED 5201. Introduction to Adult Literacy. (3 cr; Prereq–#) Definitions of literacy: workplace, community and family. Issues: poverty, welfare, ethnicity, cultural diversity, social class, language and learning, immigrants. Review of literacy programs, funding, and professionalization. Reaching/recruiting undereducated adults. Role of family, schools, community, and state/local government. New social action approaches required for licensure.

ADED 5202. Assessment of Adult Literacy. (3 cr; Prereq–#) Assessment of adult literacy problems as they affect work, family, and community. Setting educational goals. Formal versus informal assessment. Case studies. Educational planning.


ADED 5211. Introduction to the Undereducated Adult. (1 cr; A-F or Aud) Definitions of literacy in workplace, community, and family. Issues: poverty/welfare, ethnicity, cultural diversity, social class, language/learning, immigrants.

ADED 5212. Introduction to Adult Literacy in the Workplace. (1 cr; A-F or Aud. Prereq–5211) Review workplace literacy programs, funding, program planning, and needs assessment. Reaching/recruiting workers. Role of employers and the unions. Writing for low literacy employees.

ADED 5213. Introduction to Adult Literacy in the Community. (1 cr; A-F or Aud. Prereq–5211) Reviews role of the community programs in the United States in literacy building, the family in developing literacy skills, correctional education in reintegrating offenders back into community. Integrating people with disabilities through community literacy programs. Literacy/development in developing countries. Reaching/recruiting indigenous, migrant, and immigrant groups. Social action approaches to literacy education.

ADED 5224. Formal Assessment of Adult Literacy. (1 cr; A-F or Aud. Prereq–5211) Assessment of adult English/literacy skills needed for work, family, community, and continuing education. Formal testing policy, techniques, standardized tests.
Underlying assumptions about testing, cultural bias, and interpretation of formal tests. Test preparation programs.

AED 5225. Informal Assessment of Adult Literacy. (1 cr; A-F or Aud. Prereq—5211)
Informal assessment of adult English/literacy skills for work, family, community, and further education.

AED 5526. Advanced Assessment of Adult Literacy. (1 cr; A-F or Aud. 5211, 5224, 5225)
Applications and case studies. Educational planning for work, family, and community.

AED 5527. Methods of Teaching Beginning Adult Literacy. (1 cr; A-F or Aud. 5211, 5212) Learning English and literacy as an adult: initial approaches to teaching reading, writing, and communication skills. Theories of learning and curriculum design. Technology as a teaching tool: teaching students with disabilities or with cultural/ gender differences.

AED 5528. Methods of Teaching Intermediate Adult Literacy. (1 cr; A-F or Aud. 5211, 5221, 5223) Learning English/literacy as an adult: intermediate approaches to teaching reading, writing, and communications skills. Emphasizes communication/comprehension in oral/written English. English reading and oral communication skills for workplace. Evaluating commercial materials/software.

AED 5529. Methods of Teaching Advanced Adult Literacy. (1 cr; A-F or Aud. 5211, 5224) Advanced approaches to teaching reading, writing, and communication skills. Preparing students for college and continuing education. Reading/study skills. English in workplace and on Internet. Problem solving, analytical thinking. Technology as teaching tool. Evaluating commercial material/software.

AED 5530. Continuing Education for Professionals. (3 cr)
Analysis of philosophies, issues, policies, trends, professional needs and statutory requirements in continuing professional education programs. Role of the program director and organization.

AED 5531. Working with Volunteers in Community Settings. (3 cr)
Uses collaborative, experiential methods to address fundamental issues and practices in volunteer development. Explore personal philosophies, staffing, and key issues and trends in the administration of volunteer programs.

AED 5700. Special Topics in Adult Education. (1-8 cr [max 12 cr]) Exploration of issues, methods, and knowledge in areas of adult education. Content varies.

Adult Psychiatry (ADPY)

Department of Psychiatry

Medical School

ADPY 5515. Neuropsychology: University Hospitals. (3-9 cr [max 8 cr]; N-0 or Aud)

ADPY 8205. Special Assignments. (1-16 cr [max 16 cr])

ADPY 8206. Research. (1-16 cr [max 16 cr])

ADPY 8240. Clinical Neuropsychopharmacology. (1-15 cr [max 15 cr]; Prereq—Resident status or 3rd- or 4th-yr med student or 8240 for grad students) The course is designed for a two-day presentation, four hours one afternoon, followed by eight hours the next day, to include the following subject matter: introduction to neurotransmitter theory and mechanism of action of psychoactive drugs; evaluation of anxiety states and use of anxiolytics agents; clinical picture of depression, use of antidepressants, and principles of drug combinations; schizophrenia diagnosis, use of antipsychotics, anxioparkinson medication, parkinson side effects of neuroleptics, and tardive dyskinesia; clinical evaluation of seizure and use of anticonvulsants; neurophysiology of sleep, prescription of hypnotics and sedatives, and significance of over-the-counter sleep aids; use of anxiolytics, over-the-counter appetite suppressants, and opiate analogues; diagnostic pathopharmacology; classification of drug side effects and principles of drug interaction; abused drugs; and ethnopsychopharmacology.

ADPY 8970. Directed Studies. (1-24 cr [max 24 cr])

Aerospace Engineering and Mechanics (AEM)

Department of Aerospace Engineering and Mechanics

Institute of Technology


AEM 5251. Computational Fluid Mechanics. (3 cr; A-F or Aud. Prereq—4201 or [equiv], [CSCI 1113 or equiv], [IT upper div I or grad student or upper div IV]) Introductory concepts in finite difference and finite volume methods as applied to various ordinary/partial differential model equations in fluid mechanics. Fundamentals of spatial discretization and numerical integration. Numerical linear algebra. Introduction to engineering and scientific computing environment. Advanced topics may include finite element methods, spectral methods, grid generation, turbulence modeling.

AEM 5401. Intermediate Dynamics. (3 cr; Prereq—IT upper div or grad, 2012, Math 2243) Three-dimensional Newtonian mechanics, kinematics of rigid bodies, dynamics of rigid bodies, generalized coordinates, holonomic constraints, Lagrange equations, applications.

AEM 5431. Trajectory Optimization. (3 cr; A-F or Aud. Prereq—4311 or equiv or #) Parameter optimization problems. Topics in calculus of variations; necessary conditions of nonlinear optimal control problems; classification of trajectory optimization algorithms; steady-state aircraft flight; minimum-time climb aircraft trajectory; aerodynamic perturbation theory; boundary-layer trajectories.

AEM 5441. Structural Dynamics. (3 cr; A-F or Aud. Prereq 2012, 3031, [grad student or IT upper div IV]) Frequency, time domain analysis of multi-degree of freedom mechanical systems. Natural frequencies, normal modes of vibration. Free/forced vibrations of strings, rods, and shafts beams. Introduction to finite elements in structural dynamics.

AEM 5451. Optimal Estimation. (3 cr; A-F or Aud. Prereq—4311 or equiv or #) Method of matched asymptotic expansions presented for problems of linear and nonlinear strain measures, boundary-value problem for linear elasticity, plate problems in linear elasticity, three dimensional problems in linear elasticity. Topics from nonlinear elasticity, micromechanics, contact problems, fracture mechanics.

AEM 5551. Aeroelasticity. (3 cr; A-F or Aud. Prereq—4202, 4301, [grad student or IT upper div IV]) Static aeroelastic phenomena, torsional divergence of a lifting surface, control surface reversal. Aeroelastic flutter, unsteady aerodynamics. Problems of gust response, buffeting. Design project.

AEM 6000. Seminar: Aerospace Engineering and Mechanics. (1 cr [max 4 cr]; S-N or Aud. Prereq—DSG consent)

AEM 6201. Fluid Mechanics I. (3 cr; Prereq—4201 or equiv, Math 2263 or equiv) Mathematical and physical principles governing the motion of fluids. Kinematic, dynamic, and thermodynamic properties of fluids; stress and deformation; equations of motion; analysis of rotational and irrotational inviscid incompressible flow; two-dimensional and three-dimensional potential flow.

AEM 6202. Fluid Mechanics II. (3 cr; Prereq—4201) Analysis of incompressible viscous flows; creeping flow, boundary layer flow.

AEM 6203. Fluid Mechanics III. (3 cr; Prereq—4202) Analysis of compressible flow and shock waves; method of characteristics for one-dimensional unsteady flow and for two-dimensional steady flow.


AEM 6211. Theory of Turbulence I. (3 cr; Prereq—4202) Reynolds equations, methods of averaging, elements of statistical stability and vortex dynamics; description of large vortical structures in mixing layers and boundary layers; horseshoe vortices; flow visualization.

AEM 6212. Theory of Turbulence II. (3 cr; Prereq—4211) Prandtl’s mixing length theory applied to classical boundary layer, pipe, jet, and wake flows; prediction methods used at Stanford Conference; law of wall; law of wake; K-epsilon method.


AEM 6221. Rheological Fluid Mechanics. (3 cr; Prereq—2021 or 5501 or #) Methods of solution for flows of simple fluids with general constitutive equations. Topics from viscometric flow, extensional flow, perturbations of the rest state with steady and unsteady flow, secondary flow.


AEM 6241. Perturbation Methods in Fluid Mechanics. (3 cr; Prereq—5502 or #) Method of matched asymptotic expansions presented through simple examples and applied to viscous flows at high and low Reynolds numbers and other problems in fluid mechanics and applied mathematics.
Courses

AEM 8251. Finite-Volume Methods in Computational Fluid Dynamics. (3 cr; Prereq–4201 or 8201 or equiv, CSci 1107 or equiv)

Development of finite-volume computational methods for solution of compressible Navier-Stokes equations. Accuracy, consistency, and stability of numerical methods; high-resolution upwind shock-capturing schemes; treatment of boundary conditions; explicit and implicit formulations; considerations for high performance computers; recent developments and advanced topics.

AEM 8253. Computational Methods in Fluid Mechanics. (3 cr; A-F or Aud. Prereq–4201)


AEM 8261. Nonlinear Waves in Mechanics. (3 cr; Prereq–5501 or #)

Theory of kinematic, hyperbolic, and dispersive waves, with application to traffic flow, gas dynamics, and water waves.

AEM 8271. Experimental Methods in Fluid Mechanics. (3 cr; Prereq–4201; #)

Overview of computer organization, including external communications and A/D, D/A conversion. Measurement techniques, such as pressure measurements and hot-wire and laser Doppler anemometry. Signal processing and uncertainty; computer control of experiments.

AEM 8295. Selected Topics in Fluid Mechanics. (1–4 cr [max 8 cr]; Prereq–4201 or #)

Includes individual student projects completed under guidance of a faculty sponsor.

AEM 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

AEM 8400. Seminar: Aerospace Systems. (1 cr [max 4 cr]; S-N or Aud. Prereq–AerosEng grad student)

Developing program of research in aerospace systems. Discussions of current research/topics of interest.

AEM 8401. Modern Feedback Control. (3 cr; Prereq–4311 or #)

State space theory for multiple-input-multiple-output (MIMO) aerospace systems. Singular value decomposition (SVD) technique and its applications to performance and robustness. Linear quadratic gaussian (LQG) and eigenstructure assignment design methodologies. Topics in H∞ Applications.

AEM 8421. Robust Multivariable Control Design. (3 cr; Prereq–4411 or equiv)

Application of robust control theory to aerospace systems. Role of model uncertainty/modeling errors in design process. Control analysis and synthesis, including H₂ and H∞ optimal control design and structural singular value μ techniques.

AEM 8426. Optimization and System Sciences. (3 cr; A-F or Aud. Prereq–8401, IF grad student)

Applications of modern finite dimensional optimization techniques in system/control theory. Linear/nonlinear programming, duality, complexity theory, interior point methods, matrix inequalities, convex optimization over cones, bisection matrix inequalities, rank-constrained problems.


AEM 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

AEM 8495. Advanced Topics in Aerospace Systems. (1–4 cr [max 8 cr]; A-F or Aud. Prereq–#)

Individual student projects completed under guidance of a faculty sponsor.

AEM 8500. Research Seminar in Mechanics of Materials. (1-3 cr [max 12 cr]; A-F or Aud. Prereq–#)

Seminars given by students, faculty, and visitors on topics drawn from current research.

AEM 8511. Advanced Topics in Continuum Mechanics. (3 cr [max 6 cr]; A-F or Aud. Prereq–5501 or #)

Constitutive equations; invariance and thermodynamic restrictions. Nonlinear elasticity theory; exact solutions, minimization, stability. Non-Newtonian fluids; viscometric flows, viscometric functions, normal stress. Other topics may include reactive and/or nonreactive mixtures, nonlinear plasticity, and deformable electromagnetic continua.

AEM 8521. Advanced Topics in Elasticity. (3 cr; A-F or Aud. Prereq–5503)

Contact stresses, finite deformations, and other topics.

AEM 8523. Elastodynamics. (3 cr; A-F or Aud. Prereq–5501 or 5503 or #)

Waves and vibrations in rods, beams, and plates; dispersion; surface and volume waves; reflection; energy theories; vibrations of bounded media and relation to technical theories; elements of nonlinear waves, inelastic waves, and stability of motion of elastic systems.

AEM 8531. Fracture Mechanics. (3 cr; A-F or Aud. Prereq–5503 or #)

Theories of mechanical breakdown. Kinetic rate theories and instability considerations; formation of equilibrium cracks and circular crack propagation under pulses; statistical aspects of strength and fracture of micromechanical systems; time and temperature dependency in fracture problems and instability of compressed material systems.

AEM 8533. Theory of Plasticity. (3 cr; Prereq–5203 or 5501 or #)

Theory of permanent deformation of ductile metals; bilinear material models, Drucker’s three bar truss, and other examples; 3-D continuum formulation, yield surfaces, hardening rules, and material stability; slip line theory, Prandtl punch solution; single crystal plasticity.

AEM 8541. Mechanics of Crystalline Solids. (3 cr; Prereq–5501 or #)

Atomic theory of crystals and origins of stress in crystals. Relation between atomic and continuum description; phase transformations and analysis of microstructure; effects of shear stress, pressure, temperature, electromagnetic fields, and composition on transformation temperatures and macrostructure; interfacial energy in solids.

AEM 8551. Multiscale Methods for Bridging Length and Time Scales. (3 cr; A-F or Aud. Prereq–Basic knowledge of [continuum mechanics, atomic forces], familiarity with partial differential equations; grad student in engineering or mathematics or physics)

Classical/emerging techniques for bridging length/time scales. Nonlinear thermoelasticity, viscous fluids, and micromagnetics from macro/atomic viewpoints. Statistical mechanics, kinetic theory of gases, weak convergence methods, quasicontinuum, techniques.

AEM 8553. Theory of Plasticity. (3 cr; Prereq–5203 or 5501 or #)

Theory of permanent deformation of ductile metals; bilinear material models, Drucker’s three bar truss, and other examples; 3-D continuum formulation, yield surfaces, hardening rules, and material stability; slip line theory, Prandtl punch solution; single crystal plasticity.

AEM 8595. Selected Topics in Mechanics and Materials. (1-4 cr [max 8 cr]; Prereq–#)

Includes individual student projects completed under guidance of a faculty sponsor.

AEM 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim exams, doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

AEM 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required Plan A only)

AEM 8888. Plan B Project. (1-3 cr [max 3 cr]; Prereq–Grad aerospace engineering or mechanics major, A) Satisfies project requirement for Plan B Master’s degree. May appear on M.S. program but does not count toward 20-credit minimum in the major field. Topic arranged by student and advisor; written report required.

AEM 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

Afro-American Studies (AFRO)

Department of African American and African Studies

College of Liberal Arts

AFRO 5072. Racism: Social and Psychological Consequences for Black Americans. (3 cr)

Racism and its effects on African Americans; definitions, determinants, and dynamics. Examined in an experiential context to reflect individual and institutional racism.

AFRO 5101. Seminar: Introduction to Africa and the African Diaspora. (3 cr)

Comparative frameworks, related theories, and pivotal texts in study of Africa and African Diaspora.

AFRO 5103. African History from the Perspective of the African Diaspora. (3 cr; A-F or Aud)


AFRO 5120. Social and Intellectual Movements in the African Diaspora. (3 cr; A-F or Aud. AFRO 3120)


AFRO 5181. Blacks in American Theatre. (3 cr; TH 5181)

Historical survey of significant events in the development of African American theatre traditions. Essays, plays, playwrights, and theaters from early colonial references to the Black Arts Movement.

AFRO 5182. Contemporary Black Theatre: 1960—Present. (3 cr; TH 5182)

Essays, plays, playwrights, and theaters that have contributed significantly to contemporary black theater. From the beginning of the Black Arts movement to the present.

AFRO 5191. Seminar: The African American Experience in South Africa. (3 cr; HIST 5438)

Africana or African culture(s), language(s), and Africana or African Studies major or minor, #)

AFRO 5193. Ideological, political, religious, and cultural ties that have informed African American and black South African relations from late 18th century to present.

AFRO 5401. Field Studies in African American and African Studies. (1-6 cr [max 6 cr]; Prereq–AFRO or African American Studies major or minor, #)

Supervised field study/internship focused on African American or African culture(s), language(s), and development.

AFRO 5405. The African American Child. (3 cr; AFRO 3405)

Research carried out by African American psychologists and behavioral/social scientists, and by experts on African American child/youth development.
AFRO 5429. Slavery in Africa and in the Americas, 1400 to 1865. (3 cr; A-F or Aud) AFRO 3429

AFRO 5437. History of East Africa. (3 cr; A-F or Aud; AFRO 3437, HST 3437, HST 5437)
Major themes in history of East Africa, from era of early human cultural development to present. Methods that historians use to reconstruct history. Varying interpretations/constructions of history over time.

AFRO 5478. Contemporary Politics in Africa and the Colonial Legacy. (4 cr; A-F or Aud) AFRO 4478, POL 4478W, POL 5478. Prereq-Pol 1054 or Pol 3051 or non-pol sci grad student or cr
How current politics in mainly, though not exclusively, sub-Saharan Africa have been shaped by pre-colonial/colonial processes. Reality of independence, recurrent political/economic crises. Global context, prospects for effective democracy.

AFRO 5551. Methods: Use of Oral Traditions as Resources for History. (3 cr)
Use of spoken information through time as a source for writing history. Use of canons of history to analyze and critique oral traditions and integrate them into written history.

AFRO 5701. Proseminar: Classic Works in African American Studies. (3 cr)

AFRO 5702. Proseminar: Major Figures in African American Studies. (3 cr)
Major figures from various fields in African American studies. Biocritical focus.

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

AFRO 5756. Social and Cultural History of Blacks in Sports. (3 cr; AFRO 3756)
Social/cultural contexts surrounding era of athletes such as Jack Johnson, Jackie Robinson, Joe Louis, Jesse Owens, Althea Gibson, Wilma Rudolph, Muhammad Ali, Michael Jordan, and Tiger Woods. Impact of these athletes on national/international events. Periods when it was not uncommon for black entertainers/athletes to become involved in politics and community activism.

AFRO 5864. Proseminar: African-American History. (3-4 cr [max 4 cr]; Prereq–#)
Examination of issues including slavery, Reconstruction, the Great Depression, and civil rights movement using cultural and intellectual history and autobiography/biography. Focuses on dynamics of race, gender, class, region, sexuality, and religion.

AFRO 5865. Proseminar: African-American History. (3-4 cr [max 4 cr]; Prereq–#)
Construction of a detailed research agenda, locating appropriate depositories of primary materials and secondary sources, and developing appropriate methodologies and frameworks.

AFRO 5866. The Civil Rights and Black Power Movement, 1954-1968. (3 cr; A-F or Aud. AFRO 3866)

AFRO 5876. Proseminar: Approaches to African Development. (3 cr)
Study, critical analysis, and comparison of primary documents relevant to African development.

AFRO 5910. Topics in African American and African Studies. (1-3 cr [max 9 cr]; Prereq–#)
Topics specified in Class Schededule.

AFRO 5993. Directed Study. (1-3 cr [max 3 cr]; Prereq–#)
Guided individual reading/study for qualified seniors and graduate students.

AFRO 6202. Seminar: Intellectual History of Race. (3 cr)
Shifting and contested meanings of “race” from the “Age of Conquest” to the present. Starting from the proposition that race is not a fixed or stable category of social thought or being, the seminar seeks to ascertain how and why Western ideas about race have changed.

AFRO 6554. Seminar: Gender, Race, Nation, and Policy—Perspectives from Within the African Diaspora. (3 cr; Prereq–#)
Interdisciplinary analysis of U.S. domestic and foreign policies as they affect Africans and peoples of African descent in the diaspora. Intersections of gender, race, nation, and class.

AFRO 6591. Figures in Contemporary Black Fiction. (3 cr [max 9 cr]; Prereq–#)
Each term focuses on works of an individual writer, such as Toni Morrison, Paule Marshall, and Jamaica Kincaid. Critical studies.

AFRO 8802. Seminar: Orientalism. (3 cr)
Recent arguments related to Orientalism as a trend in modern literary and cultural criticism.

AFRO 8910. Topics in Studies of Africa and the African Diaspora. (3 cr [max 9 cr]; Topics specified in [Class Schedule].

Agricultural, Food, and Environmental Education (AFEE)

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

AFEE 5112. Agricultural Education Program Organization and Development. (3 cr; A-F or Aud)
Innovations and procedures; consideration of various instructional strategies and structural configurations.

AFEE 5113. Adult Agricultural Education Program Organization. (3 cr; A-F or Aud)
Career exploration, improvement projects, experiences, placement in production/business/community settings, entrepreneurship. Current state and national programs and resource material.

AFEE 5114. Agricultural Education Teaching Seminar. (2 cr; A-F or Aud)
Philosophy, organization, and administration of instruction in agricultural education programs at the elementary, middle, and high school levels.

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

AFEE 5235. Advanced Supervised Agricultural Experience Programs. (2 cr)
The organization and administration of agricultural education programs for middle and secondary level students: career exploration, improvement projects, experiments, placement in production/business/community settings, entrepreneurship. Current state and national programs and resource material.

AFEE 5237. Mentorship for Supervising Agricultural Education Teachers. (2 cr; A-F or Aud)
Professional development training for experienced teachers to serve as mentors for beginning and student teachers of agricultural education. Emphasis on supervision and assessment of teaching performance. Focus on critical period of induction into the teaching profession.

AFEE 5239. Program Organization and Management in Agricultural Education. (2 cr)
Analysis of organization, management, and assessment of agricultural education programs at the middle, high school, and adult levels.

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

AFEE 5290. Seminar: Current Issues in Agricultural Education and Extension. (1-3 cr [max 6 cr])
Exploration of current issues in agricultural education and extension, strategies of response, implications of response actions, and related leadership roles.

AFEE 5296. Professional Experience Practicum in Agricultural Education and Extension. (1-4 cr [max 4 cr])
Observation, study, and experience in agricultural business and industry; identification of educational problems observed in the agricultural industry; evaluation of personal experience.

AFEE 5331. History, Philosophy, and Systems of Extension. (3 cr; A-F or Aud)
History and philosophy of extension; modification and adaptation to worldwide methods and approved practices; extension methodologies; innovative approaches; systems appropriate to development environments.

AFEE 5361. World Development Problems. (3 cr; A-F or Aud)
Introduction to development problems throughout the world. Development in Third World countries. Examples of First World development problems. Interdisciplinary focus on population, health and disease, education, agriculture, industry, finance, politics, and human rights.
Courses

AFEE 5371. Farming Systems Research and Extension. (3 cr; A-F or Aud) Introduction to the theory and practice of linking farming systems, research, and extension. An interdisciplinary and holistic approach to rural development for individuals and communities throughout the world.


AFEE 5407. Application of Advanced Farm Financial Analysis Tools and Methods. (1 cr) Use of advanced farm financial analysis tools/methodology to analyze financial performance of actual farm businesses. Case farms are used to apply whole entity financial analysis tools/concepts and enterprise analysis methodologies.

AFEE 5409. Seminar: Teaching Strategic Farm Business Planning. (1 cr [max 4 cr]; A-F or Aud) Teaching strategic farm business planning to farm managers and agricultural professionals. Philosophy of strategic management, components of a strategic business plan. Materials/tools to apply strategic farm business planning in educational programs. Students apply strategic planning methods/concepts to case farm businesses.

AFEE 5411. Seminar: Farm Financial Planning Teaching Tools and Methods. (1 cr [max 4 cr]; A-F or Aud) Preparation to teach farm financial planning to farm managers and agricultural professionals. Principles/concepts of long range financial planning and short range cash flow planning. Farm planning software tools, case farm situations, practical farm planning experience.

AFEE 5413. Seminar: Teaching Effective Use of Commodity Marketing Tools. (1 cr [max 4 cr]; A-F or Aud) Teaching commodity marketing tools to farm managers and agricultural professionals. Commodity marketing tools used in forward contracting, futures, and options, and how to use them to enhance price and protect income. How to choose marketing tools, given financial/market conditions.

AFEE 5415. Seminar: Teaching Commodity Marketing Strategies. (1 cr [max 4 cr]; A-F or Aud) Teaching commodity market planning to farm managers and agricultural professionals. Development of marketing plans to enhance price and protect income. Introduction to tools to simulate implementation of plans against actual price scenarios.

AFEE 5993. Directed Study in Agricultural Education and Extension. (1-4 cr [max 9 cr]) Topics may be chosen to permit study of areas within education or to supplement areas of inquiry not provided in the regular course structure.

AFEE 5995. Integrating Paper—Master of Education: Agricultural and Extension Education. (1-4 cr [max 4 cr]; A-F or Aud) Students prepare paper dealing with issues in agricultural education applied to professional responsibilities.

AFEE 8090. Seminar: Agricultural Education and Extension. (1-3 cr [max 6 cr]; Prereq—AgEd grad student) Topics on various aspects of agricultural education. Prepare, present, and critique a report.

AFEE 8094. Research in Agricultural Education and Extension. (1-6 cr [max 6 cr]; A-F or Aud. Prereq—AgEd student doing Plan B research, A) Select problems, prepare bibliographies, analyze and interpret data, and prepare manuscripts on studies.

Agronomy and Plant Genetics (AGRO)

Department of Agronomy and Plant Genetics

College of Food, Agricultural and Natural Resource Sciences

AGRO 5201. Introduction to Plant Breeding. (3 cr; Prereq—GCB 3022 or equiv, background in plant science) For majors not specializing in plant breeding. How genetics is applied to plant improvement. Emphasizes sustainable-production scenarios.

AGRO 5121. Applied Experimental Design. (4 cr; ENTR Stat 5202 or equiv or #) Principles of sampling methodologies, experimental design, and statistical analyses. Methods/procedures in generating scientific hypotheses. Organizing, initiating, conducting, and analyzing scientific experiments using experimental designs and statistical procedures.

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

AGRO 5321. Ecology of Agricultural Systems. (3 cr; A-F or Aud. ENTR Stat 5202. Prereq—[3xxx or above] course in [AGRO or ANSC or ENT or HORT or PPA or SOIL or #]) Ecological approach to problems in agricultural systems. Formal methodologies of systems inquiry are developed/applied.

AGRO 5999. Special Topics: Workshop in Agronomy. (1-6 cr [max 6 cr]; Prereq—Jr or sr or grad student) Workshops on various topics in agronomy and plant genetics. Presenters/faculty may include guest lecturers/experts. Topics specified in Class Schedule.

AGRO 8005. Supervised Classroom or Extension Teaching Experience. (2 cr; S-N or Aud. JBBE 8005, HORT 8005, PLPA 8005, SOIL 8005. Prereq—grad major or #) Classroom or extension teaching experience in one of the following departments: Agronomy and Plant Genetics; Biosystems and Agricultural Engineering; Horticulture Science; Plant Pathology; or Soil, Water, and Climate. Participation in discussions about effective teaching to strengthen skills and develop personal teaching philosophy.

AGRO 8201. Plant Breeding Principles I. (3 cr; A-F or Aud. HORT 8201. Prereq—Stat 5301 or equiv or #) Principles and current methods involved in breeding agronomic and horticultural crops. Use of genotype/environment data to increase genetic gain, population improvement, parent building, alternative selection strategies, breeding for special traits, and new approaches.

AGRO 8202. Plant Breeding Principles II. (3 cr; Prereq—Stat 5201, Stat 5202 or equiv or #) Breeding principles/methods. Population concepts, constructing source populations, varietal development. Use of quantitative genetics in decision making in plant breeding. Emphasizes covariance of relatives, genotype by environment interactions, stability analysis, statistical methods of analysis, selection theory and application.

AGRO 8231. Cyto genetics. (4 cr; Prereq—GCB 5034 or equiv or #) Genetic principles in relation to the eukaryotic chromosome. Molecular cyto genetic of chromosome structure, replication, pairing, and crossing over. Behavior of deficiencies, duplications, inversions, interchanges. Aneuploidy, autopolyploidy, allopolyploidy, and uses of cytogenetic stocks in molecular and classical genetics and plant breeding.

AGRO 8241. Molecular and Cellular Genetics of Plant Improvement. (3 cr; Prereq—GCB 5034 or equiv or #) Principles of genetic modification of higher plants by application of molecular and cellular biotechnology approaches. Gene isolation and transfer, tissue culture manipulations, organelle genetics, molecular markers and mapping, and discussions and lab demonstrations of current research on genetic mechanisms related to crop improvement.

AGRO 8270. Graduate Seminar. (1 cr; A-F or Aud. §HORT 8270. Prereq—Grad major in [applied plant sci or agro or ent or hort or plant bred or plant path or soil or #] Reports/discussions of problems and investigational work.

AGRO 8280. Current Topics in Applied Plant Sciences. (1 cr; S-N or Aud. Prereq—Grad major in agro or applied plant sciences or ent or hort or plant bred or plant path or soil or #) Topics presented by faculty or visiting scientists.

AGRO 8305. Physiological Ecology of Plants in Natural and Managed Ecosystems. (4 cr; A-F or Aud. §HORT 8305. Prereq—Bioc 3021, Biol 1001 or Biol 1002, Biol 1009) Introduction to plants and their reactions and responses in managed and natural ecosystems, including carbon and nitrogen allocation, root biology, microbial interaction, secondary metabolism, and plant response to biotic and abiotic stress.

AGRO 8505. Advanced Perspectives in Weed Science. (2 cr; A-F or Aud. Prereq—Grad major in agro or applied plant sciences or ent or hort or plant bred or plant path or soil or #) Topics concerning the biochemistry and sustainability of chemical and biological weed control methods. Lecture and student-directed discussion.

AGRO 8605. Advanced Management of Agroecosystems. (3 cr; Prereq—4605 or #) Problem-based learning approach to developing a holistic approach to agroecosystem-based crop management. Field trips combined with classroom discussion and decision-focused case studies. Students conduct research and develop a decision case.

AGRO 8900. Advanced Discussions. (1-3 cr [max 12 cr]; S-N or Aud. §HORT 8900. Prereq—#) Special workshops or courses in applied plant sciences.

Akkadian (AKKA)

Department of Classical and Near Eastern Studies

College of Liberal Arts

AKKA 5011. Elementary Akkadian I. (3 cr; Prereq—Adv undergrads with # or grad) Introduction to cuneiform script. Basics of Old Babylonian morphology and syntax. Writing drills, readings from Hammurabi laws, foundation inscriptions, annals, religious and epic literature.

AKKA 5012. Elementary Akkadian II. (3 cr; Prereq—5011) Continuation of 5011. Readings include The Gilgamesh Epic, The Descent of Ishtar, Mari Letters, Annals of Sennacherib and Essarhaddon, Sargon II.

AKKA 5300. Readings in Akkadian. (3 cr [max 18 cr]; Prereq—5011, 5022) Survey of Akkadian literature, including literary, legal, historiographical, and sacred texts. Topics specified in Class Schedule.
American Indian Studies (AMIN)

Department of American Indian Studies
College of Liberal Arts

AMIN 5107. The Structure of Anishinaabemowin, the Ojibwe Language. (3 cr; A-F or Aud. §AMIN 5107. Prereq–3104) Analysis of grammatical structures of Anishinaabemowin.

AMIN 5108. History of Anishinaabemowin, the Ojibwe Language. (3 cr; A-F or Aud. §AMIN 3108. Prereq–3107 or #) Historical development of Anishinaabemowin.

AMIN 5109. Anishinaabe Literature. (3 cr; A-F or Aud. §AMIN 3109. Prereq–3115 or #) Readings in Anishinaabe oral literature.


AMIN 5303. American Indians and Photography. (3 cr; §AMIN 3303) Historical/comparative overview of photos in which American Indian people are central subjects. Primary features of images in American Indian photos. Relationships among those involved in making/ viewing photos. Ways in which photos are interpreted. Relation of photos to social contexts in which they are produced and to agencies of those who stand behind their making.

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

AMIN 5409. American Indian Women: Ethnographic and Ethnohistorical Perspectives. (3 cr; §AMIN 3409, GWSS 3412) Comparative survey of ethnographic/ethnohistorical writings by/about American Indian women.

AMIN 5890. Problems in American Indian History. (3 cr; §HIST 5890. Prereq–#) Intensive consideration of topics in American Indian history. Possible topics include social history, Indian history of particular regions, political systems, education, and American Indian policy.

AMIN 5920. Topics in American Indian Studies. (3 cr [max 12 cr]; A-F or Aud) Various topics in American Indian Studies depending upon instructor and semester

American Sign Language (ASL)

Department of Educational Psychology
College of Education and Human Development


American Studies (AMST)

Department of American Studies
College of Liberal Arts

AMST 5101. Religion and American Culture. (3 cr; A-F or Aud) Role of religion in shaping contemporary American cultural pluralism. Institutions and processes, intellectual frameworks, aesthetic and symbol systems that form religious communities and contribute to religious conflicts in U.S. society and culture.

AMST 5202. Thought and Practice of American Religions. (4 cr; Prereq–#) Holidays, festivals, religious arts, organizations, spirituality, ethics, and systems of thought of “civil religion,” “women’s religion,” indigenous American religions, American versions of Christianity, Judaism, Islam, Buddhism, and other world faiths, and their interactions in the United States and worldwide.

AMST 5402. American Indians in the Cinema. (3 cr; A-F or Aud) Representations of American Indians in film, historically/contemporarily. What such representations assert about Native experience and cultural viability. What they reflect about particular relationships of power.

AMST 5920. Topics in American Studies. (1-4 cr [max 9 cr]) Topics specified in Class Schedule.

AMST 8210. Historical Foundations of American Studies. (3 cr; Prereq–grad AmSt major or #) Exposition of American studies as a field of inquiry, including its history, major theoretical framework, and interdisciplinary methodologies.

AMST 8260. Theoretical Foundations and Current Practice in American Studies. (3 cr; Prereq–grad AmSt major or #) Analysis of central theoretical work in the field and survey of key methodologies.

AMST 8280. Thought and Practice of American Religions. (3 cr; Prereq–#) Role of religion in shaping contemporary American cultural pluralism. Institutions and processes, intellectual frameworks, aesthetic and symbol systems that form religious communities and contribute to religious conflicts in U.S. society and culture.

AMST 8401. Practicum in American Studies. (3 cr; S-N or Aud. Prereq–#) Training in teaching undergraduate courses in American studies.

AMST 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

AMST 8666. Doctoral Pre-Thesis Credits. (1-4 cr; max 12 cr) No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations; up to 12 combined cr; a for 3rd/4th registrations; up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

AMST 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

AMST 8801. Dissertation Seminar. (3 cr; S-N or Aud. Prereq–AmSt doctoral student beginning dissertation work) Conceptualizing the research problem for the dissertation and structuring the process of writing a chapter of it.

AMST 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr], No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

AMST 8920. Topics in American Studies. (3 cr [max 9 cr]) Topics specified in Class Schedule.

AMST 8970. Independent Study in American Studies. (1-9 cr [max 9 cr]; Prereq–#) Independent study of interdisciplinary aspects of American civilization under guidance of faculty members of various departments.
Courses

Anesthesiology (ANES)
Department of Anesthesiology

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


ANES 5686. Chemistry and Physics for Nurse Anesthetists. (3 cr; A-F or Aud. Prereq—General chemistry or #) Chemical equilibrium, organic chemistry, physics of fluids/gases, anesthetic applications.

ANES 8296. Research in Anesthesia. (1 cr)

Animal Science (ANSC)
Department of Animal Science

College of Food, Agricultural and Natural Resource Sciences
ANSC 5099. Special Workshop in Animal Science. (1-6 cr; max 12 cr; A-F or Aud. Prereq—#) Topics vary. See Class Schedule or department. Topics may use guest lectures/experts.

ANSC 5200. Statistical Genetics and Genomics. (4 cr; §ECMB 5200. Prereq—[Stat 3021 or equiv], [BIOL 4003 or equiv]) Linkage analysis for mapping genes with codominance, dominance, imprinting inheritance modes, linkage/transmission disequilibrium. Radiation hybrid mapping. Parentage testing. Testing/estimation of candidate gene effects. Experimental designs, statistical analysis for mapping quantitative trait loci (QTL) with additive, dominance, and epistasis effects, and for gene expression studies using microarrays. QTL analysis of gene expression data for mapping transcriptional regulation factors.

ANSC 8111. Genetic Improvement of Animals. (3 cr; Prereq—#) Application of population genetics to livestock breeding; selection index theory and practice; basis of relationships and covariances among relatives; and selection based on multiple sources of information.

ANSC 8121. Linear Model Methods. (3 cr; Prereq—Stat 3201) Techniques and statistical tools for analysis of data. Matrix manipulation, least-squares procedures, correlation for environmental factors, estimation of components of variance, and standard errors of estimates.

ANSC 8311. Molecular Biology Techniques. (3 cr; §ECMB 8335. Prereq—Bioc 4332, BIOL 4003) Basic theory and current methodologies of molecular biology and recombinant DNA technology. Lab work includes DNA and RNA hybridization, gene transfer, and polymerase chain reaction techniques. Primarily for students with limited exposure to molecular biology.

ANSC 8314. Ethical Conduct of Animal Research. (2 cr; A-F or Aud. §MED 8314. Prereq—Grad student or prof school student or #) Ethical considerations in use of animal subjects in agricultural, veterinary, and biomedical research. Federal, state, and University guidelines relating to proper conduct for acquisition/use of animals for laboratory, observational, epidemiological, and clinical research. Regulatory requirements, bases for what is deemed proper conduct. Societal impact on scientific investigations utilizing animal subjects.

ANSC 8194. Research in Animal Genetics. (1-3 cr [max 3 cr]; Prereq—#) Research in quantitative genetics, cyto genetics, molecular genetics, and other areas related to animal breeding.

ANSC 8211. Animal Growth and Development. (3 cr; Prereq—#) Whole body growth of animals, bone, and adipose tissue; structure, function, differentiation, and development of tissues; mode of action of hormones, growth factors, and growth promoters.

ANSC 8294. Research in Muscle Chemistry and Physiology. (1–3 cr [max 3 cr]; Prereq—#) Research in selected areas.

ANSC 8311. Animal Bioenergetics. (3 cr; A-F or Aud. Prereq—BIOC 4331 recommended, #) Integrated systems approach to energy metabolism of animals. Application of classical techniques of calorimetry and comparative slaughter, development of systems for expressing energy content of feeds, and techniques for measuring whole body and organ metabolism of specific nutrients. Offered alternate years.

ANSC 8312. Protein Metabolism. (3 cr; A-F or Aud. Prereq—BIOC 4331) Basic and applied concepts of protein metabolism in farm animals.

ANSC 8320. Concepts and Developments in Nutritional Physiology. (3 cr [max 6 cr]; A-F or Aud. Prereq—#) Review and critical evaluation of pertinent scientific literature.


ANSC 8333. FTE: Master’s. (1 cr; No grade. Prereq—Master’s student, adviser and DGS consent) ANSC 8300. Concepts and Developments in Swine Nutrition. (2 cr; A-F or Aud. Prereq—#) Review and critical evaluation of scientific literature.

ANSC 8344. Mechanisms of Hormone Action. (2 cr; Prereq—Course in biochemistry or cell biology or #) Major signal transduction, apoptosis. Topics incorporate pharmacology, biochemistry, and cell biology of hormone action in relevant physiological systems. Lectures on basic principles. Specialized lectures. Discussion of primary literature.

ANSC 8394. Research in Animal Nutrition. (1-3 cr [max 3 cr; Prereq—#) Research in selected areas: topics and animal species determined by consultation.

ANSC 8411. Physiology of Reproduction. (3 cr; A-F or Aud. Prereq—3305 or equiv) Emphasis is on gametogenesis, conception, and implantation.

ANSC 8421. Physiology of Fertilization and Gestation. (3 cr; Prereq—3305 or #) Physiological events occurring during gametogenesis; conception, fertilization, and period of the embryo; period of the fetus; and parturition.

ANSC 8431. Immunoreproduction. (3 cr; Prereq—3305 or #) Blood groups and polymorphic proteins affecting reproduction; immunological contraception; antigens of semen, ova, and genital secretions; immunopathology; maternal-fetal incompatibility; and antibodies to hormones.

ANSC 8444. FTE: Doctoral. (1; No grade. Prereq—Doctoral student, adviser and DGS consent)

ANSC 8451. Reproductive Endocrinology. (2 cr; A-F or Aud. Prereq—3305 or 3327 or equiv, BIOC 3021) Hormonal regulation of mammalian reproductive cycles and seasonal patterns; nutritional and stress effects on reproductive endocrinology; mechanism of hormone action.

ANSC 8494. Research in Animal Physiology. (1-3 cr [max 3 cr]; Prereq—#) Individual research under faculty direction. Topic determined by consultation: a specialized aspect of a thesis problem or an independent problem of mutual interest to graduate student and adviser.

ANSC 8510. Graduate Seminar. (1-2 cr [max 12 cr]; S-N or Aud. Prereq—#) Student presentations of literature, proposals, and research results; instructional guidelines and performance evaluation; preparation of visual material.

ANSC 8594. Research in Animal Science. (1-3 cr [max 3 cr]; Prereq—#) Research including experimental studies in disciplines associated with animal production and research, with emphasis on interdisciplinary studies.

ANSC 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; §; 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

ANSC 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade. Prereq—Max 18 cr per semester or summer; 10 cr total required [Plan A only])

ANSC 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

Anthropology (ANTH)
Department of Anthropology

College of Liberal Arts
ANTH 5008. Advanced Flintknapping. (3 cr; A-F or Aud. Prereq—[3308 or 5269] or #) Hands-on training in techniques of advanced stone tool production, artifact reproduction, and lithic experimental design for academic/artistic purposes.

ANTH 5025W. Cultural Semantics. (3 cr; §ANTH 3041, 5027W) Understanding cultures and cognitive classification systems through lexical semantics.

ANTH 5027W. Origins of European Civilization. (3 cr; §ANTH 3027W) Early development of European society, from Old Stone Age to Roman period. Principle transformations of European culture with introduction of agriculture, development of metallurgy and trade, and emergence of towns and cities.

ANTH 5029. Philosophical Anthropology. (3 cr; A-F or Aud. Prereq—sr or grad or #) Advanced survey of traditional problems associated with broad-ranging views on human nature and culture. Specific arguments of relativists, behaviorists, phenomenologists, and others in relation to social life. Structuralist and post-structuralist approaches.

ANTH 5031. Science as Cultural Practice. (3 cr; A-F only. Prereq—Sr or grad student or #) Ethnographic, historical and sociological accounts of scientific practice. How facts are constructed/negotiated. Social, cultural, and political influences on scientific methods. How scientific projects articulate with hierarchies of race/gender. International differences in scientific practice.

ANTH 5033. Feminist Anthropology. (3 cr; Prereq—3047 or grad or #) Advanced introduction to the development of feminist theory in anthropology. Theoretical and methodological shifts in feminist anthropology and ethnography. Feminist ethnography within the discipline as a whole; current debates concerning the reading and writing of ethnography.

ANTH 5041. Ecological Anthropology. (3 cr; §ANTH 3041, 5031) Prereq—Grad—#) Concepts, theories, and methods of ecological anthropology (ecological ecology) show how humans interact with the biophysical environment. Compare biological and cultural interactions with
the environment; examine adaptive strategies cross-culturally.

ANTH 5043. Colonialism and Culture. (3 cr; A-F or Aud. §GLOS 5043) Making of culture as colonial/anthropological object of knowledge. Relationship between colonial knowledge/formation of academic disciplines (especially anthropology). Colonial/postcolonial transformations of colony, nation, and metropole.

ANTH 5045. Urban Anthropology. (3 cr; Prereq–4003 or grad or #) Anthropological approaches to urban life in Western and non-Western settings. Topics include social networks and voluntary organizations; class, ethnicity, gender and power; migration and immigration; urban labor and economics; and urban “problems.”

ANTH 5221. Anthropology of Material Culture. (3 cr; A-F or Aud) Material culture as a social creation, studied from multiple perspectives (e.g., social anthropology, archaeology, primatology). Conceptions of how humans articulate with material world they construct.


ANTH 5269. Analysis of Stone Tool Technology. (4 cr; A-F or Aud. Prereq–1001 or 3001 or #) Practical lab experience. How to analyze archaeological collections of stone tools to learn about human technological behavior in past. Students analyze archaeological/experimental collections, make stone tools themselves.

ANTH 5422. Anthropologies of Citizenship and Nationalism. (3 cr; A-F only. Prereq–3xxx course in [anthropology or related discipline]) Why/how citizenship and nationalism have been constructed over time as a force of cultural identity/belonging. Key theories, recent developments in citizenship theory. Defining an anthropological approach to citizenship.


ANTH 5446. Archaeology of Representation as Communication. (3 cr; A-F only) Seminar. Uses of paintings, sculptures, drawings, and photographs as means of communication, from earliest representations of 30,000 years ago to present day.

ANTH 5525. Understanding Cultures for Social Science Professionals. (3 cr; A-F only) Culture in a globalized world. How anthropological concept of culture can help social service professionals understand and engage with people from diverse backgrounds.

ANTH 5980. Topics in Anthropology. (3 cr [max 6 cr]) Topics specified in Class Schedule.

ANTH 5990. Topics in Anthropology. (3 cr [max 9 cr]; A-F or Aud. Prereq–#) Topics specified in Class Schedule.

ANTH 8001. Ethnography, Theory, History. (5 cr; A-F or Aud) Introduces original theoretical concepts, methods, and ethnographic work. Emphasizes theories that have shaped 20th-century thinking in cultural anthropology. Connection of these theories to fieldwork and contemporary issues.


ANTH 8004. Foundations of Anthropological Archaeology. (3 cr; Prereq–4001, 4806) Theoretical foundations of anthropological archaeology in historical and contemporary perspective.

ANTH 8120. Problems in Culture Change and Applied Anthropology. (3-8 cr [max 6 cr]) Comparative research on change in cultural systems. Impact of global processes on local cultures. Roles of anthropology and anthropologists in policy, planning, implementation, and evaluation.

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

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

ANTH 8205. Economic Anthropology. (3 cr; §ANTH 4053) Theoretical foundations of economic anthropology examined through critical readings of traditional, classical, and contemporary authors. Ethnographic puzzles of material life and issues of ecological degradation, development, market expansion, gender, and transglobal processes.

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

ANTH 8209. Psychological Anthropology. (3 cr; §ANTH 4021) Self, emotion, cognitive processes, and child development in cross-cultural perspective.

ANTH 8211. Symbolic Anthropology. (3 cr; §ANTH 4019) Advanced introduction to semiotic, structuralist, and interpretive approaches in anthropology. Reviews classic foundations and recent developments.

ANTH 8213. Ecological Anthropology. (3 cr; §ANTH 3041, 4031) Seminar on method, theory, and key problems in ecological anthropology and human ecology. Examines approaches in light of human practices, interactions between culture and the environment, global environmental change, and our understanding of human dimensions of ecosystem-based management.

ANTH 8215. Anthropology of Gender. (3 cr; Prereq–Grad anth major or #) Comparative, cross-cultural approach to gender. Focuses on various theories (e.g., feminist, postmodernist, psychoanalytic) of power, gender, authority, and femininity and masculinity. Gender ambiguity and issues of sexuality.

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

ANTH 8220. Archaeology Field School. (3-6 cr [max 9 cr]; Prereq–Grad anth major) Advanced archaeological field excavation, survey, and research. Intensive training in excavation techniques, recordation, analysis, and interpretation of archaeological materials.


ANTH 8230. Development and Management of Anthropological Research Projects. (1 cr [max 4 cr]; A-F or Aud. Prereq–Anth grad student or #) Training seminar on research development, coordination, grant management, field/laboratory research management, and fundraising.


ANTH 8333. FTE: Masters. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

ANTH 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

ANTH 8510. Topics in Archaeology. (3-9 cr [max 9 cr]) Seminar examines particular aspects of archaeological methods and/or theory. Topics vary according to student and faculty interests.

ANTH 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]) No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr, a for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

ANTH 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]) No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required (Plan A only)

ANTH 8810. Topics in Sociocultural Anthropology. (3-9 cr [max 9 cr]) Seminar examines particular aspects of method and/or theory. Topics vary according to student and faculty interests.

ANTH 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

ANTH 8991. Independent Study. (1-18 cr [max 18 cr]; Prereq–#) Under special circumstances and with instructor approval, qualified students may register for a listed course on a tutorial basis.

ANTH 8992. Directed Reading. (1-18 cr [max 18 cr]; Prereq–#)

ANTH 8993. Directed Study. (1-18 cr [max 18 cr]; Prereq–#)

ANTH 8994. Directed Research. (1-18 cr [max 18 cr]; Prereq–#)

### Applied Economics (APEC)

#### Department of Applied Economics

**College of Food, Agricultural and Natural Resource Sciences**


APEC 5032. Economic Data Analysis for Managerial and Policy Decisions. (3 cr; Prereq–5031 or #, familiarity with SAS) Statistical/econometric methods for the analysis of large data sets to support managerial/policy decisions. Methods for organizing, accessing, and ensuring the quality of data. Estimation techniques include panel

For definitions of course numbers, abbreviations, and symbols, see page 169.
Courses

data methods, limited dependent variable models, and time series analysis. Emphasizes clarity of reporting and design of procedures for maintaining/updating data estimates.

APEC 5151. Applied Microeconomics: Firm and Household. (3 cr; Prereq–3001 or Math 1271 or Math 2243 or equiv or grad student or #) Quantitative techniques for analysis of economic problems of firms and households. Links between quantitative tools and economic analysis Regression analysis, mathematical programming, and present value analysis.

APEC 5152. Applied Macroeconomics: Income and Employment. (3 cr; Prereq–3001 or Math 1271 or Math 2243 or equiv or grad student or #) Static general equilibrium open economy models and simple business cycle models that examine economic growth, business cycles, and fiscal and monetary policy. Input-output analysis and large scale econometric models. Sources/properties of economy and sector-wide data. Empirical applications.

APEC 5321. Regional Economic Analysis. (3 cr; Prereq–3006 or Econ 3102 or #) Regional development patterns and role of resources, transportation, and institutional constraints. Trade, migration, and investments in regional growth and change. Regional economic information in investment and location decisions. Evaluation of economic development policies and tools. Economic impact analysis.

APEC 5341. Public Finance. (3 cr; A-F or Aud. Prereq–3001 or Econ 3101 or PA 5021) Which services should the public sector provide? Which level of government should provide them? How should governments fund those services? Which types of taxes should be levied and on whom? Applying economic theory to spending, revenue, and tax policy issues facing governments.


APEC 5511. Labor Economics. (3 cr; Prereq–[3001 or Econ 3101 or PA 5021], [PA 5032 or equiv], grad student or #) Theoretical foundations of labor markets. Intertemporal/household labor supply. Demand for labor, efficiency wages. Human capital theory, unemployment, migration decisions. Analysis of econometric research applied to labor policy issues such as minimum wage, tax policy, social insurance, education.

APEC 5581. Human Capital and Household Economics. (3 cr; Prereq–3001 or Econ 3101 or #) Household economics and investment in human capital (e.g., children, education, health and nutrition); labor force participation, lifetime earnings, and nonmarket work; time allocation and substitution of capital for labor in the household in the western and third world.

APEC 5611. Economic Aspects of Environmental Management. (3 cr; A-F or Aud. Prereq–[or grad student] in [biological science or conservation biology or ecology or fisheries or forestry or public affairs or water resources or wildlife management or CLA or communicative science or conservation biology or ecology or fisheries or forestry or public affairs or water resources or wildlife management or CLA or communicative science] Economist approach to environmental problems such as water/air pollution. Application of supply/demand concepts to evaluation of environmental resources. Methods of evaluation. Analysis of pollution control policies from economic point of view.

APEC 5651. Economics of Natural Resource and Environmental Policy. (3 cr; Prereq–[3001 or Econ 3101], [4611 or Econ 3611 or NRES 3261W] or #) Economic analyses, including project evaluation of current natural resource/environmental issues. Emphasizes interactions of natural resources, natural resource scarcity/adequacy, environmental quality, and mechanisms for pollution control and their implications for public policy.

APEC 5711. U.S. Agricultural and Environmental Policy. (3 cr; Prereq–3001 or Econ 3101) U.S. agricultural policies in an open world economy; role of private markets and government in regulating supply and demand; income vs. price support, supply controls, environmental constraints, and export promotion; functioning of markets; roles of public interest groups and future of American agricultural policy.

APEC 5721. Economics of Science and Technology Policy. (3 cr; Prereq–[3151 or 3151A], PA 5022 or #) Economics of technical change, research, and technology. Productivity. Methods for evaluating impacts of R&D. Intellectual property rights.


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

APEC 5811. Cooperative Organization. (3 cr; Prereq–3001 or Econ 3101 or PA 5021) Application of economic analysis to cooperative form of organization. Producer/consumer cooperatives used to examine economic issues such as changing market organization, financing, management incentives, taxation, and antitrust regulations. Cooperatives as a tool for economic development.

APEC 5891. Independent Study: Advanced Topics in Farm and Agribusiness Management. (1-4 cr or max 4 cr; Prereq–#) Special topics or individual work suited to the needs of particular groups of students.

APEC 5991. Special Topics and Independent Study in Applied Economics. (1-4 cr or max 12 cr; Prereq–#) Special classes, independent study, and supervised reading/research on subjects/problems not covered in regularly offered courses.

APEC 8202. Mathematical Optimization in Applied Economics. (3 cr; Prereq–[5151, Econ 5151] or equiv or #) Mathematical foundations and applications of mathematical and dynamic programming and optimal control. Mathematical optimization concepts; structures and economic interpretations of various models of the firm, consumer, household, sector, and economy. Model building and solution techniques.

APEC 8203. Applied Welfare Economics and Public Policy. (3 cr; Prereq–[3151, intermediate econ theory] Basic concepts underlying measurement of welfare change, problems of market failure and externalities, social welfare functions, and distribution within and across generations. Application of concepts, based on case studies of specific environments, returns to research, technical change, and agricultural policy.

APEC 8204. Applied Financial Economics. (3 cr; A-F or Aud. Prereq–Econ 5151 or [Econ 8001, Econ 8002] or Econ 8003 or #) Introduction to major theories of asset pricing under competitive markets and systemic information. Equilibrium/arbitrage models of financial markets, option pricing models. Applications of asset pricing theory: agricultural markets, financial derivatives, interest rates, agricultural credit.

APEC 8205. Applied Game Theory. (3 cr; Prereq–[3011, 8101, 8102, 8104] or [APEC 5001, Econ 8002, Econ 8003, 8004] or #) Topics in game theory, application to economic problems. For each topic, important theory/ equilibrium concepts are followed by extensive applications. Focuses on the development of complete/incomplete information, evolutionary games.

APEC 8206. Dynamic Optimization: Applications in Economics and Management. (0-3 cr [max 3 cr]; A-F or Aud. Prereq–[3151 or equiv or #]) Formulation/solution of dynamic optimization problems using optimal control theory and dynamic programming. Analytical/numerical solution methods to solve deterministic/stochastic problems for various economic applications.

APEC 8211. Econometric Analysis I. (4 cr; Prereq–[Stat 4102 or Stat 5120], Ph.D. student or #) Classical multiple linear regression, stochastic regressors, heteroscedasticity, autocorrelated disturbances, panel data, discrete dependent variables.

APEC 8212. Econometric Analysis II. (4 cr; Prereq–[Stat 8211 or equiv or #]) Second semester of econometrics for Ph.D. students. Specification tests, instrumental variables, heteroscedasticity, panel data, simultaneous equations, bootstrap methods, limited dependent variable models, experimental econometrics, demand and cost functions, program evaluation, general method of moments, time series, hazard models.

APEC 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

APEC 8401. Consumer Behavior and Policy. (2 cr; A-F or Aud. Prereq–Econ 5151 or [Econ 8001, Econ 8002] or [Econ 8101, Econ 8102] or #) Analytical/empirical treatments of consumer behavior. Household decision making. Demand for quality characteristics. Review of basic consumer theory, policy-related issues, experimental economics, consumer-survey techniques. Types of data available to analyze consumer behavior and household decisions.

APEC 8402. Information and Behavioral Economics. (2 cr; A-F or Aud. Prereq–Econ 5151 or [Econ 8001, Econ 8002] or [Econ 8101, Econ 8102] or #) New theories of consumer behavior that combine economic and psychological models. Influence of information on consumer choice over time and under uncertainty. Expected, unexpected utility theory, information economics, bounded rationality, prospect theory, choice over time, and rational addiction with applications to empirical work.

APEC 8403. Demand Analysis and Household Economics. (2 cr; A-F or Aud. Prereq–[Econ 8211, Econ 5151] or [Econ 8001, Econ 8002] or [Econ 8101, Econ 8102] or [Econ 8201, Econ 8202, Econ 8203, Econ 8204] or #) Household/individual behavior: Consumer demand analysis, education, and other issues. Static demand theory/estimation, dynamic demand theory/estimation, equivalence scales, intrafamily allocation of consumption, analysis of education issues.


APEC 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

APEC 8601. Natural Resource Economics. (3 cr; Prereq–[3151, 8202, 8206] [ECON 5151 or equiv] or #) Economic analysis of resource use/management. Capital theory, dynamic resource allocation. Applications to renewable/nonrenewable resources. Empirical studies, policy issues.
APEC 8602. Economics of the Environment. (3 cr; Prereq–Econ 8001 or #) Analytical economic analysis of environmental management, emphasizing environmental policy. Application of microeconomic theory to problems of market failure, market-based pollution control policies, contingent valuation, hedonic models, option value, and other topics. 

APEC 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr) Sectoral economic activity in the United States; emphasizing changes role of agriculture. Role of macroeconomic forces and trade policy since World War II. Economic and institutional development in the international economy, including the World Trade Organization, regional trade agreements such as NAFTA, and the European Union. 

APEC 8703. Microeconomic Analysis of Economic Development. (3 cr; A-F or Aud. Prereq–Econ 8001-04 or Econ 8101-04, and ApEc 8211-8212 or #. Concurrent registration is OK) Topics concerning microecon nomics of economic development in low-income countries. Focuses on behavior of agricultural households, poverty, inequality, education, health/nutrition, and evaluation of development programs. 

APEC 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only]) Students work under guidance of adviser to complete their Plan B Paper project. 


APEC 8802. Financial Economics. (2 cr; A-F or Aud. Prereq–(8211, Econ 5151) [or Econ 8001, Econ 8002] or # Major theories of asset pricing under assumptions of uncertainty, competitive markets, and symmetric information. Equilibrium/arbitrage models of financial markets with econometric applications. Pricing/use of derivatives. 

APEC 8803. Marketing Economics. (2 cr; A-F or Aud. Prereq–(8202, Econ 5151) [or Econ 8001, Econ 8002] or #) Review of market structure, conduct, and performance. Market interdependency over space/time. Product forms. Issues pertaining to market failures/interventions. 

ARAB 5001. Research Methods in Arabic Studies. (3 cr) Skills and techniques required to deal with medieval and modern works in Arabic literature and Islam. A survey of the most important research bibliographies in Arabic and Islamic studies. Bibliographic references in English and, when appropriate, Arabic. 


ARAB 5036. Islam Religion and Culture. (3 cr) Religion of Islam, faith, practices, sectarian splintering, expansion outside original home to status of world religion, institutions, states in world societies—Asia, Europe, Americas. 

ARAB 5101. Advanced Arabic I. (3 cr [max 4 cr]; Prereq–5102 or #) Advanced readings in classical and modern Arabic. Beginnings of texts. 

ARAB 5102. Advanced Arabic II. (3 cr [max 4 cr]; Prereq–5101 or #) Readings in Arabic texts. Writing compositions based on texts. 

ARAB 5491. Classical Islamic Civilization. (3 cr; §ARAB 3491, HIST 3491, MELC 3491) Islamic legacy in the classical age (800-1400), including medical/natural sciences, mathematics, philosophy, literature, and their transmission to Europe. 


ARAB 5503. Arabic Drama in Translation. (3 cr) Emergence and development of drama as a European-inspired genre in Arabic literature. Emphasizes major trends and playwrights. All readings in English. 

ARAB 5505. Survey of the Middle East. (3 cr; §ARAB 3505, HIST 3505, MELC 3505) Peoples, lands, and cultures of the Middle East. Historical survey from earliest civilizations to the present. 


ARAB 5542. Medieval Islam. (3 cr; §ARAB 3542, HIST 3542, MELC 3542) Islamic dynasties, Mamluks and Mongols, and Crusaders and Assassins. Abbasid Caliphate’s disintegration and rise of Seljuk Turks. 

ARAB 5543. Arabs Under Mamluks and Ottomans: 1300-1920. (3 cr; §ARAB 3543, HIST 3543, MELC 3543) Struggle against Crusaders and Mongols. Disintegration and reemergence under Muhammad Ali of Egypt; dynamic struggles in Syria; rise of Young Turks; Arab revolt. 

ARAB 5544. Arab World 1920 to the Present. (3 cr [max 4 cr]; §ARAB 3544, HIST 3544, MELC 3544) Struggle in the Arab world for independence and its course since independence. Emphasis on development, political stability and unity; political structures; the Arab-Israeli conflict. 


ARAB 5900. Topics in Arabic Literature and Culture. (3 cr [max 9 cr]; Prereq–5912 or #) Readings and discussion of selected works in Arabic. Topics specified in Class Schedule. 

ARAB 5992. Directed Readings. (1-3 cr [max 3 cr]; Prereq–#) Individual research and readings for advanced students. 

APSC 8333. FTE: Master’s. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)
Courses

Arabic (ARM)

Department of Classical and Near Eastern Studies

College of Liberal Arts

ARM 5011. Biblical Arabic and Old Arabic Inscriptions.

Prerequisites/meth architecture design. Theories, history, technologies, media, and processes as foundation for critical thinking. Analytic modeling, visual thinking.

ARCH 5123. Architectural Thesis. (3 cr; A-F or Aud. Prereq—§ARCH 5212, 5241, BA Arch major; students must submit thesis plan in semester before writing thesis)

Student’s choice, study and solution of an architectural problem to demonstrate proficiency in all phases of design.

ARCH 5241. Principles of Design Programming. (3 cr; A-F or Aud. Prereq—§ARCH 5122, 5241, BA Arch major; for grad students in LA or M Arch major or #)

Concepts and techniques of architectural programming, including space and activity analysis, site selection, precedent study, code review, appropriate technology identification, hypothesis formulation and evaluation. Emphasis on conceptual development, research, and analytic drawing.

ARCH 5291. Accelerated Undergraduate Architecture Studio I. (6 cr; A-F or Aud. Prereq—§ARCH 5241, 5292, 5241, BA Arch major; for grad students in LA or M Arch major or #)

Selected architectural problems developed by faculty to deepen/enrich ideas introduced in required architectural studio sequence.

ARCH 5292. Accelerated Undergraduate Architecture Studio II. (6 cr; A-F or Aud. Prereq—§ARCH 5291, accelerated status or #)

Architectural problems. Emphasizes development of structures as integral part of design, site planning, design process.

ARCH 5301. Conceptual Drawing. (3 cr; A-F only. §ARCH 4301. Prereq—[11301, M Arch major or #)

Drawing as way of analyzing, exploring, and generating design ideas. Projection systems, diagramming, mapping. Different modes of visual perception. Nonverbal structures.

ARCH 5311. Theory of Architectural Representation. (3 cr; A-F or Aud. §ARCH 4311. Prereq—§ARCH 5371, 5372, M Arch or instr consent)

Integration of emerging computer graphics with photography and architectural graphic conventions. Historical, theoretical, and critical issues of representation. Influence of visual media on architectural field.

ARCH 5312. Visual Communication Techniques in Architecture. (3 cr; A-F or Aud. §ARCH 4312. Prereq—§ARCH 5311, 5372, M Arch or instr consent)

Presentation, and design techniques. Various visual media and methods of investigation.

ARCH 5321. Architecture in Watercolor. (3 cr; A-F or Aud. §ARCH 4321. Prereq—§ARCH 5321, Arch grad student or #)

Watercolor as a tool in design process. Foundation principles, techniques, medium, tools, materials. Color relationships, mixing, composition, applications to design.

ARCH 5350. Topics in Architectural Representation. (1-3 cr; max 3 cr; A-F or Aud. Prereq—§ARCH 5351, Arch major or M Arch major or #)

Selected topics in architectural representation.

ARCH 5361. 3-D Computer Architectural Modeling and Design. (3 cr; A-F or Aud. §ARCH 4361. Prereq—M Arch major)

Use of 3-D computer modeling for representation in abstract/realistic ways. Computer modeling software Creation/arrangement of objects, setting up lighting, developing surface materials, creating still renderings/ animations. Ways in which computer visualization can be used for design exploration, for feedback, development of ideas, and for realistic representation of fully formed designs.

ARCH 5371. Computer Methods I. (1 cr; S-N or Aud. §LA 5371. Prereq—Concurrent enrollment 8251, M Arch major or #)

Introduction to current techniques, computer programs, and their application to architectural computing.

ARCH 5372. Computer Methods II. (1 cr; S-N or Aud. §LA 5372. Prereq—§ARCH 5371, §E 5252 and M Arch major or #)

Current techniques, computer programs, and their application to architectural computing and design.

ARCH 5373. Computer Methods III. (1 cr; S-N or Aud. §LA 5373. Prereq—§ARCH 5372, §E 5253, M Arch major or #)

Advanced techniques, computer programs, and their application to architectural computing in design, theory, and technology.

ARCH 5374. Computer Methods IV. (1 cr; Prereq—§ARCH 5373, §E 5254, M Arch major or #)

Advanced architectural computing applications in design, history, theory, representation, and technology.

ARCH 5381. Introduction to Computer Aided Architectural Design. (3 cr; A-F or Aud. Prereq—Arch or BED or M Arch or grad student in LA or M Arch major or #)

2-D drawing, 3-D modeling-animation, printing, plotting. Electronic networking/communications, database management, spreadsheet analysis, land-use analysis, project management.

ARCH 5382. Computer Aided Architectural Design. (3 cr; A-F or Aud. Prereq—§ARCH 5381 or arch grad major or #)

2-D/3-D CAD, image manipulation. Advanced multimedia visualization techniques for design, including solid modeling, photo-realistic imaging, animation, video-editing/recording.

ARCH 5410. Topics in Architectural History. (3 cr [max 12 cr; A-F or Aud. Prereq—M Arch major or #)

Advanced study in architectural history. Readings, research, seminar reports.

ARCH 5411. Principles of Design Theory. (3 cr; A-F or Aud. Prereq—M Arch major or #)

Principles of design and their instrumentation. How and why architecture theory is generated. Types and significance of formal analysis. Theoretical positions and modes of criticism.

ARCH 5421. Architecture and Interpretation: The Cave and the Light. (3 cr; A-F only. §ARCH 4421W. Prereq—§ARCH 5411, 5412) or #)

Historical/hermeneutical investigation of iconography of grotto. Intertwined themes of descent into earth and ascent to light, from earliest strata of human culture to present day.

ARCH 5423. Gothic Architecture. (3 cr; A-F or Aud. §ARCH 4423. Prereq—M Arch major or #)

History of architecture and urban design in Western Europe, from 1150 to 1400.

ARCH 5424. Renaissance Architecture. (3 cr; A-F or Aud. §ARCH 4424. Prereq—M Arch major or instr consent)

History of architecture and urban design in Italy from 1400 to 1600. Emphasizes major figures (Brunelleschi, Alberti, Bramante, Palladio) and evolution of major cities (Rome, Florence, Venice).

ARCH 5425. Baroque Architecture. (3 cr; A-F or Aud. §ARCH 4425. Prereq—M Arch major or instr consent)

Architecture and urban design in Italy from 1600 to 1750. Emphasizes major figures (Bernini, Borromini, Cortona, Guarini) and evolution of major cities (Rome, Turin).

ARCH 5426. Architecture and Nature: 1500-1750. (3 cr; §ARCH 4426. Prereq—M Arch major or instr consent)


ARCH 5431. Eighteenth-Century Architecture and the Enlightenment. (3 cr; A-F or Aud. §ARCH 4431. Prereq—M Arch grad student or #)

Architecture, urban planning, and garden design in Europe and America from 1650 to 1850.

ARCH 5432. Modern Architecture. (3 cr; A-F or Aud. §ARCH 4432. Prereq—M Arch major or instr consent)

Architecture and urban design in Europe and the United States from early 19th century to World War II.

ARCH 5434. Contemporary Architecture. (3 cr; A-F or Aud. §ARCH 4434. Prereq—M Arch major or instr consent)

Developments, theories, movements, and trends in architecture and urban design from World War II to present.

ARCH 5439. History of Architectural Theory. (3 cr; A-F or Aud. §ARCH 4439. Prereq—M Arch major or instr consent)

History of architectural theory from antiquity to 20th century.

ARCH 5445. Suburbia. (3 cr; A-F only §ARCH 4445W)

Suburbia, from origins in 17th century England to present. Historical changes and present challenges, especially in America. Ideology, mythology, planning, development, geography, transportation, the family. Specific sites/designs. Representations in film, television, popular literature, and music.

ARCH 5446. Architecture Since World War II: Postwar Experimentation, Aesthetics, and Politics of Architecture. (3 cr; A-F only §ARCH 5446. Prereq—§ARCH 4441 or #)

Avant-garde responses to post-war consciousness of social issues/meaning in architecture. Eroding communal identity, common man, architectural symbolism, monumentality, critical regionalism, place/technology in form making, popular culture, rise of theory.

ARCH 5450. Topics in Architectural Theory. (1-3 cr; max 9 cr; A-F or Aud. Prereq—Arch or BED or M Arch major or #)

Selected topics in architectural theory and criticism.

ARCH 5451. Architecture: Defining the Discipline. (3 cr; A-F or Aud. Prereq—M Arch major or #)

Architecture as a discipline: its nature, role, purpose, and meaning discussed within a general, philosophical, and theoretical framework. Investigation and discussion of paradigms defining architectural theory and practice.

ARCH 5452. Architecture: Design, Form, Order, and Meaning. (3 cr; A-F or Aud. Prereq—M Arch major or #)

Architecture and the issue of meaning. Explores fundamental and constituent elements of architectural form and order; their inherent tectonic, phenomenal, experiential, and symbolic characteristics; their potential and implications for the creation and structure of meaningful human places.

ARCH 5455. Typology and Architecture: Theories of Analysis and Synthesis. (3 cr; A-F or Aud. Prereq—§ARCH 5451, M Arch major, #)

Theoretical traditions and development of typology’s role in architecture. Investigates works of Laugier, Quatremere de Quincy, Viollet-Le Duc, Ledoux, Durand, Camillo Sitte, and Le Corbusier. Recent developments and theoretical positionings of rational and contextual arguments for contemporary applications of the idea of type.

ARCH 5458. Architecture and Culture. (3 cr; A-F or Aud. Prereq—§ARCH 5412, Arch major or student or #)

Architecture as a cultural medium. Relationships among architecture, people, and culture; research findings and design; vernacular and high style architecture. Physiological and symbolic messages; reception theory in design. Repertoire; cultural critique and change; implications for architectural practice.
ARCH 5459. Gender and Architecture. (3 cr; Prereq–Arch or WGST major or Arch major) Examination of ideas related to gender and architecture, gendered and non-gendered places and practices, and their relations to cultural norms and change.


ARCH 5512. Building Methods in Architecture. (3 cr; A-F or Aud. Prereq–5511, M Arch major or #) Analysis of architectural materials, building systems, and construction operations related to enclosure systems design, building infrastructure, and detailing. Application of legal constraints and regulations (e.g., AIA, building codes, life-safety issues) in preparation of drawings, specifications, and construction documents for building design.

ARCH 5513. Environmental Technology I: Thermal Design in Architecture. (3 cr; A-F or Aud. Prereq–M Arch major or #) Thermal and climatic issues in the design of small and mid-size buildings. Investigations in built and mechanical methods to modify climate. Evaluation of the impact of design techniques on energy use, the environment, and architectural meaning.

ARCH 5514. Environmental Technology II: Lighting and Acoustic Design. (3 cr; A-F or Aud. Prereq–M Arch major or #) Principles of daylighting, electric lighting, and acoustic design in architecture. Relationship between luminous and acoustic environments, human comfort and architectural experience. Analytical methods, design process, and modeling of daylighting.

ARCH 5525. Design in Masonry. (3 cr; A-F or Aud. Prereq–5515, M Arch major or #) Design principles, construction methods, and document production for masonry structures.

ARCH 5539. Daylighting and Architecture Design. (3 cr; A-F or Aud. Prereq–5514, M Arch major or #) Role of daylighting in architectural design: principles, strategies, energy and environmental issues, psychology of light, color, and integration of electric lighting. Design projects investigate qualitative and quantitative two-dimensional drawing, physical models, and photometric analysis.

ARCH 5550. Topics in Technology. (1-4 cr [max 12 cr]; A-F only. Prereq.–M Arch major) Selected topics in architecture technology, e.g., construction, environmental management, energy performance, lighting, materials.

ARCH 5561. Building Production Processes. (3 cr; Prereq. M Arch major or #) Document production, contract execution, building project management. Construction industry organization, consultant relations, legal/code restraints, contractual stipulations, budget/project resource allocations. Case studies, hands-on experiences.


ARCH 5572. Architectural Structures II: Concrete and Masonry Design. (3 cr; A-F or Aud. Prereq.–5571, M Arch major or #) Overview of advanced materials: reinforced fiberglass, structural glass, and structural tenseil fabrics. Impact of construction technology on architecture and methods of integrating knowledge of structural materials and construction methods into the design process.

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

ARCH 5621. Professional Practice in Architecture. (3 cr; A-F or Aud. Prereq.–M Arch major or #) Legal, ethical, business, and practical requirements of architectural practice. Contemporary and historical models of contract formation, business principles, accounting, project management, design services, and marketing.

ARCH 5631. Legal Contracts in Architecture. (3 cr; A-F or Aud. Prereq. M Arch major or #) Legal subject matter relevant to the work of architects and design professionals.

ARCH 5645. Real Estate Development in Architecture. (3 cr; Prereq.–For undergrads BA Arch major; for grad M Arch major or #) Fundamentals of real estate development and investment building. Processes and rules of specialists in development of investment projects. Topics includes market analysis, value and depreciation, tax shelter, feasibility, market analysis, appraisal, equity financing, design, construction, leasing, and property management.

ARCH 5650. Topics in Architectural Practice. (1-4 cr [max 8 cr]; Prereq.–5621, Arch major or 5621, M Arch major or #) Topics in architectural practice, methods of design production, marketing, and operations related among clients, architecture, and society.

ARCH 5670. Topics in Historic Preservation. (1-3 cr [max 3 cr]; Prereq.–Arch or M Arch major or #) Selected topics in the history, philosophy, research, and methods of architectural historic preservation.

ARCH 5671. Historic Preservation. (3 cr; Prereq.–3412 or 5671 or #) Philosophy, theory, and origins of historic preservation. Historic archaeology and research, descriptive analysis, and documentation of historic buildings. Government’s role in historic preservation, preservation standards and guidelines, preservation and building codes, neighborhood preservation, preservation advocacy, and future directions for historic preservation. Research on architectural and historical aspects of historic sites using primary and secondary resources and on controversial aspects of preservation.

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

ARCH 5673. Historic Building Research and Documentation. (3 cr; Prereq.–3412, 5672 or #) Philosophy, theory, and methods of historic building research, descriptive analysis of buildings, building documentation, historical archaeology, and architectural taxonomy.

ARCH 5711. Design Principles of the Urban Landscape. (3 cr; A-F or Aud. Prereq.–BED major or M Arch major or LA grad major or student or #) Art/design of city, neighborhood, and development plans. Public policies, planning tools/processes, and physical models used by design professionals and private/civic institutions to shape physical environment.

ARCH 5721. Promesmen in Metropolitan Design. (3 cr; A-F or Aud. [M Arch or #] ARCH 5721. Prereq.–5721 or equiv), enrolment in CMD prog or #) Reading seminar. Evolution of the contemporary city. Dynamics that created contemporary urban spatial patterns. Planning/design theories that have guided public interventions in the built environment. Thematic texts, classroom discussions.

ARCH 5750. Topics in Urban Design. (1-4 cr [max 4 cr]; A-F or Aud. Prereq.–Arch major) Special topics in theory/practice of urban design.

ARCH 5790. Special Topics in Metropolitan Design. (3 cr [max 6 cr]; A-F or Aud. Prereq. Enrollment in CMD prog or #)

ARCH 5993. Directed Study. (1-4 cr [max 3 cr]; A-F or Aud. Prereq.–#) Guided individual reading or study.

ARCH 8101. Subjects and Methods in Architecture. (2 cr; S-N or Aud. Prereq.–Grad Arch major or #) The discipline of architecture.

ARCH 8250. Advanced Topics in Design. (1-6 cr [max 6 cr]; S-N or Aud. Prereq.–Admitted to 3+ track for MArch prog or #) Design studio.

ARCH 8251. Graduate Architectural Design I. (6 cr; A-F or Aud. Prereq.–Grad Arch major or #) Fundamental architectural problems involving design as a creative inquiry. Individual and collaborative effort.

ARCH 8252. Graduate Architectural Design II. (6 cr; A-F or Aud. Prereq.–8251, grad Arch major or #) Fundamental architectural problems involving design as a creative inquiry. Individual and collaborative effort.

ARCH 8254. Graduate Architectural Design IV. (6 cr; A-F or Aud. Prereq.–8253, grad Arch major or #) Fundamental architectural problems involving design as a creative inquiry. Individual and collaborative effort.

ARCH 8255. Graduate Architectural Design V. (6 cr [max 12 cr]; A-F or Aud. Prereq.–8254, grad Arch major or #) Fundamental architectural problems involving design as a creative inquiry. Individual/collaborative effort.

ARCH 8256. Directed Graduate Architectural Design. (6 cr; A-F or Aud. Prereq.–8251, grad Arch major or #)

ARCH 8333. FTE: Master’s. (1 or 2 cr; No grade. Prereq.–Master’s student, adviser and DGS consent)

ARCH 8450. Topics in Theory. (1-3 cr [max 3 cr]; A-F or Aud. Prereq.–Grad Arch major or #) Theory and practice of visual representation in architecture.

ARCH 8450. Topics in Theory. (1-3 cr [max 3 cr]; A-F or Aud. Prereq.–Grad Arch major or #) Topics vary

ARCH 8494. Directed Research in Architectural History. (1-3 cr [max 3 cr]; A-F or Aud. Prereq.–Grad Arch major or #)

ARCH 8550. Topics in Technology. (1-3 cr [max 3 cr]; A-F or Aud. Prereq.–Grad Arch major or #) Special topics in theory/practice of architecture technologies.

ARCH 5653. Energy and Indoor Environmental Quality Issues in Sustainable Design. (3 cr; A-F or Aud. Prereq--[5513, grad MS or MArch] or #) Energy/IEQ aspects of sustainable design related to global environmental issues. Energy/IEQ strategies, methods and tools as applied to sustainable building design. Research projects, case studies.

ARCH 5656. Materials Performance in Sustainable Building. (3 cr; A-F only. Prereq--[5512, grad MS or MArch] or #) Building-material properties, resource conservation, fabrication/construction processes in production of high performance sustainable building designs. Application of assessment/evaluation tools (LCA, BEES, Athena or LEED) for IEQ, waste reduction and management with an emphasis on experimental/analytic methods. Aesthetic/technical solutions that integrate design selection processes, construction methods, commissioning processes, and facility management, maintenance, and decommissioning.

ARCH 5657. Site and Water Issues in Sustainable Design. (3 cr; A-F only. Prereq--[5512, grad MS or MArch student] or #) Site, water and site/building integration aspects of sustainable design. Ecological principles, site analysis. Water/site/building integration strategies, methods, and tools integrated with sustainable design issues such as energy, indoor environmental quality, and materials. Research projects, case studies, measurement methods.

ART 4850. Topics in Architectural Practice. (1-3 cr [max 3 cr]; A-F or Aud. Prereq--Grad Arch major or #) Field search for personal content as inspired by site. Field study relates body of work reflecting interaction of two/three critical/visual judgment. Development of cohesive personal sculptural imagery. Approached from discipline of painting, practice with attention to developing individual personal sculptural imagery.

ARTS 5310. Advanced Sculpture: Direct Metal. (4 cr [max 12 cr]; Prereq--3300 or #) Direct metal sculpture in steel, other metals. Studio practice, investigation of historical/contemporary methods/concepts. Development of personal sculptural imagery.


ARTS 5330. Advanced Sculpture: Metal Casting. (4 cr [max 12 cr]; Prereq--3303 or #) Metal casting of sculpture in bronze, iron, aluminum, other metals. Studio practice, investigation of historical/contemporary methods/concepts. Development of personal sculptural imagery.


ARTS 5360. Advanced Performance Art and Installation. (4 cr [max 12 cr]; Prereq--3306 or #) Studio practice in performance art and installation; investigation of historical and contemporary methods and concepts of interdisciplinary expression. Development of personal imagery.


ARTS 5402. Artists’ Books. (4 cr; Prereq--3402 or #) Advanced projects in creation of unique, handmade books using various structures, media, techniques. Critical, historical, theoretical issues surrounding contemporary book arts.

ARTS 5403. Women's Images and Images of Women. (3 cr; Prereq--3403. Prereq--1001 or #) Women’s place in Western art from the artist’s perspective. Women as artists and the imagery they have created. Women as the object of imagery and the social and political attitudes those images convey. Survey of women artists from late Renaissance through contemporary feminism; relevant issues.

ARTS 5405. Visual Narrative Structures. (4 cr; Prereq--[1001, one 1xxx art course] or #) Visual/verbal investigation of structures of visual narratives. Contemporary efforts to integrate cogent images in visual texts. Development of methods for personal visual communication of cultural, spiritual, aesthetic, environmental experiences. Historical/cultural focuses. Studio work.

ARTS 5441. Professional Practices. (3 cr; Prereq--Grad or #) Intensive writing seminar provides a context for theoretical issues, business practices, and professional skills required for career management and development in the visual arts.

ARTS 5444. Bachelor of Fine Arts Exhibition. (1 cr; S-N or Aud. Prereq--BFA candidate, sr, #) Final solo or small group exhibition and artist’s statement development in consultation with faculty adviser. Visual documentation of work and statement as appropriate to media.

ARTS 5490. Workshop in Art. (1-4 cr [max 12 cr]) Selected topics and intensive studio activities. Topics vary yearly.

ARTS 5510. Advanced Printmaking. (4 cr [max 12 cr]; Prereq--3510 or #) In-depth research of personal imagery using a broad range of historical and contemporary applications. Development of imagery using color, photo-mechanical, digital processes. Cross-media approaches.


ARTS 5550. Advanced Papermaking. (4 cr [max 12 cr]; Prereq--3505 or #) Distinct expressive qualities of handmade paper, its versatility as contemporary art form. Independent research pursued in consultation with instructor.


ARTS 5640. Advanced Animation. (4 cr [max 12 cr]; Prereq--3604 or #) Two/three-dimensional animation with digital technologies. Individual projects. Expansion of personal voice/visual clarity within framework of animated imagery and time-based artwork.

ARTS 5650. Advanced Sound Art. (4 cr [max 12 cr]; Prereq--3605) Sound art practice/theory. Emphasizes individual creative projects using sound as primary material. History of experimental sound art from early 20th century to present. Critiques, readings, writing, public presentations.

ARTS 5660. The Body Electric: Sensing New Domains for Creative Expression. (4 cr [max 12 cr]; S-N or Aud) Cultural conceptions of the most personal of new media’s hybrid domains of physical/virtual interplay. Readings of contemporary/historic conceptions of body/machine. Boundaries/membranes, response/reaction. The biological, the computational, the bionic. Advanced projects with interactive, sensing, and programmable technologies.

ARTS 5670. Interdisciplinary Media Collaborations. (3 cr [max 9 cr]; Prereq--Upper-department undergraduate or graduate student in art, creative writing, dance, music or theater) Interdisciplinary, collaborative artist teams explore modes of creative expression at intersections of the arts. Students collaborate to co-author/produce works of art for public presentation. Emphasizes integration of media arts with visual art, music, dance, and theater to produce interdisciplinary/collaborative art.

ARTS 5710. Advanced Photography. (4 cr [max 12 cr]; Prereq--Two semesters of 3000 photography or #) Design/implementation of individual advanced projects. Demonstrations, lectures, critique. Reading, writing, discussion of related articles/exhibitions.
ARTS 5810. Advanced Ceramics. (4 cr [max 12 cr]; Prereq—3802, 3810 or 3802 or #) Critical discourse of aesthetics. History, of contemporary issues in clay and criticism. Independent, advanced projects.

ARTS 5821. Ceramic Materials Analysis. (4 cr; Prereq—3801 or 3822 or #) Ceramic materials, their interrelationships. Advanced investigation of glazes, slip formulation, clay bodies in high/low temperature ranges. Individual interests related to students’ aesthetic needs.


ARTS 5990. Independent Study in Art. (1-4 cr [max 12 cr]; Prereq—major, #) Independent study project designed by student in consultation with instructor.

ARTS 8100. Drawing and Painting: Theory and Practice. (3 cr [max 12 cr]; Prereq—Art MFA student) Tutorial in drawing and/or painting.

ARTS 8300. Sculpture: Theory and Analysis. (3 cr [max 6 cr]) Theoretical and critical issues of sculpture as understood by practicing sculptors. Research on and discussion of current sculpture in light of historical precedent; personal work relative to contemporary practice.

ARTS 8333, FTE: Master’s. (1 cr; No grade; Prereq—Master’s student, advisor and DGS consent)


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

ARTS 8410, Studio Critique. (3 cr [max 6 cr]; A-F or Aud; Prereq—8400) Studio based critique to foster critical dialogue about art practice. Focus on medall/disciplines. Colloquium ideas/theories that migrate between artistic practices and influence studio work.

ARTS 8420, Seminar: Visiting Artists Program. (2 cr [max 4 cr]; Prereq—MFA student) Introduction to works/ideas of visiting artists/critics. Individual studio critiques, group discussion. Students connect/extend topics to their thesis and supporting paper.

ARTS 8500, Printmaking: Theory and Practice. (3 cr [max 12 cr]) Focus on the complexities and multi-disciplinary activities of printmaking. Development of concepts and personally significant imagery leading to thesis work.

ARTS 8600. Time and Interactivity: Theory and Practice. (3 cr [max 12 cr]; Prereq—major) Tutorial issues related to creative visual work using computer/other technologies. Interactivity, robotics, digitally based conceptual art, time-based art.

ARTS 8700. Photography: Theory and Practice. (3 cr [max 12 cr]; Prereq—major) Tutorial focusing on individual goals and directions. Discussion of aesthetics, history, theory, contemporary issues in clay, and criticism.

ARTS 8800. Ceramics: Theory and Practice. (3 cr [max 12 cr]; A-F or Aud) Tutorial emphasizing individual goals and directions. Discussion of aesthetics, history, theory, contemporary issues in clay, and criticism.


Art History (ARTH)

Department of Art History
College of Liberal Arts

ARTH 5010. Myths in Art: Cross-Cultural Comparison. (3 cr; A-F or Aud) Relationships of text/image, efficacy of each in conveying meaning. Properties of visual/verbal communication. Ways in which artists convey mythological meanings, how much these ways differ according to place/time. Students prepare/critique visual presentations through Web pages.

ARTH 5103. Hellenistic and Early Roman Art and Archaeology. (3 cr; §CNES 5103; Prereq—CLAS/ARTH 3008, jr or #) Sculpture, architecture, painting, and topography in developing centers of Hellenistic culture in the eastern Mediterranean, and in Etruscan and Roman towns from 400 B.C. to the beginnings of the Roman Empire.

ARTH 5108. Greek Architecture. (3 cr; §CNES 5108; Prereq—ARTH/CLAS 3008, jr or sr or grad, or #) Geometric through classical examples of religious and secular architecture and their setting at archaeological sites in Greece, Asia Minor, and Italy.

ARTH 5111. Prehistoric Art and Archaeology of Greece. (3 cr; §CNES 5111; Prereq—Jr or sr or grad student, Greek art/archaeology course or #) Prehistoric periods in the Aegean. Archaeological evidence as a basis for historical reconstruction.

ARTH 5112. Archaic and Classical Greek Art. (3 cr; Prereq—jr or sr or grad or #) Sculpture, painting, architecture, and minor arts in Greek lands from the 9th through 5th centuries B.C. Examination of material remains of Greek culture, archaeological problems such as identifying and dating buildings; analysis of methods and techniques.

ARTH 5112. Archaic and Classical Greek Art. (3 cr; Prereq—jr or sr or grad or #) Sculpture, painting, architecture, and minor arts in Greek lands from the 9th through 5th centuries B.C. Examination of material remains of Greek culture; archaeological problems such as identifying and dating buildings; analysis of methods and techniques. Emphasis on Periclean Athens.

ARTH 5120. Field Research in Archaeology. (3-6 cr [max 6 cr]; §ARTH 5120, CLCV 5120, CNES 5120; Prereq—#) Field excavation, survey, and research at archaeological sites in the Mediterranean area. Techniques of excavation and exploration; interpretation of archaeological materials.

ARTH 5172. House, Villa, Tomb: Roman Art in the Private Sphere. (3 cr; §CNES 5172; Prereq—One intro art history course or #) The architecture, painting, and sculpture of urban houses, country estates, and tombs in the Roman World. Relationships between public and private spheres, and literary and physical evidence; usefulness of physical evidence in illuminating gender roles.

ARTH 5182. Art and the State: Public Art in the Roman Empire. (3 cr; §CNES 5182; Prereq—One intro art history course or #) Origins of Roman public art; use in maintaining community; exploitation by the first Emperor, Augustus; development and diffusion through the later Empire; varying capabilities to adjust to the demands of a Christian Empire.

ARTH 5234. Gothic Sculpture. (3 cr; Prereq—jr or sr or grad or #) The origin, character, and development of Gothic sculpture in France, the German empire, and the Netherlands, 1150-1400. Emphasis on French sculpture of the cathedral age and the emergence of a court style in Paris and elsewhere in Europe (e.g. London, Prague).

ARTH 5252. History of Early Christian Art in Context. (4 cr; §CNES 5252; Prereq—One 3xxx ARTH course or #) The role played by art in the formation of early Christian and Byzantine communities, and in establishing their relationships with the Pagan world and early Islam.

ARTH 5301. Visual Culture of the Atlantic World. (3 cr; A-F or Aud) Visual culture of Atlantic world, from Columbus to American Revolution. Visual objects, practices considered in context of Europe’s colonization of Americas. Slavery, religious conflict, international commerce, production of scientific knowledge addressed in terms of their impact upon visual imagery.

ARTH 5302. Print Culture in Early Modern Europe. (3 cr; A-F or Aud) Cultural history of printed images in Europe from their emergence in the 15th century through about 1750. Book illustration, reproductive printmaking. History of print connoisseurship. Prints and scientific knowledge. Role of print culture in major social/political events such as Protestant Reformation.

ARTH 5324. 15th-Century Painting in Northern Europe. (3 cr; Prereq—jr or sr or grad or #) The origin, character, and development of painting in France, the Netherlands area, and the German Empire during the years 1350 to 1500. Emphasis on the Flemish school (e.g., Van Eyck brothers, Campin, Van der Weyden) and its influences.

ARTH 5340. Practicum in Archaeological Field and Computer Techniques. (3 cr; §ARTH 3340, CLCV 3340, CNES 3340, CNES 3340; Prereq—One course in ancient art/archaeology or #) Methods for excavation of Old/New World sites. Meets at archaeometry/computer lab for part of semester and at selected site in Minnesota for day-long sessions for 9 to 10 weeks.

ARTH 5411. Gender and Sexuality in Art Since 1863. (3 cr) History of art from late 19th to early 21st century. How gender/sexuality have been central to that period’s artistic production, art criticism, and aesthetic theorization. How gender/sexuality are important themes for artists. How the writing of history reveals assumptions about gender/sex. Critical reading/writing.

ARTH 5413. Alternative Media: Video, Performance, Digital Art. (3 cr; A-F or Aud; Prereq—3464 or #) In-depth examination of development of alternative media in 20th/21st century art. Video technologies. Performance, time based art. Digital art.

ARTH 5417. Twentieth Century Theory and Criticism. (3 cr; Prereq—3464 or #) Trends in 20th-century art theory, historical methodology, criticism. Key philosophical ideas of modernism/postmodernism: formalism, semiotics, poststructuralism, feminism, Marxism, psychoanalysis, deconstruction.

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

ARTH 5463. Early 20th-Century Painting and Sculpture. (3 cr)
Primary movements of early 20th century: fauvism, German expressionism, cubism, futurism, dadaism, surrealism, non-objective painting, constructivism, Orphism, and early abstraction. Framed against postimpressionism and internationalism at turn of century.

ARTH 5466. Contemporary Art. (3 cr; Prereq–3464 or #)
Survey of the art and important critical literature of the period after 1970. Origins and full development of postmodernism and subsequent aesthetic philosophies.

ARTH 5535. Style, Tradition, and Social Content in American Painting: Colonial Era to 1876. (3 cr)
America’s colonial, Revolutionary era, and 19th-century painters’ responses to the influence of European aesthetics. Key American painting types: portraiture, rural genre, and landscape from Copley and Gilbert Stuart to the Hudson River School and the chroniclers of the Western frontier.

ARTH 5536. Topical Studies in American Art. (3 cr)
Course description varies from year to year, depending on the current research interests of the instructor and the needs and interests of advanced undergraduate and graduate students in modern and American art.

ARTH 5546. American Architecture: 1840 to 1914. (3 cr)
American architecture from 1840 to 1914, examined in relation to European precedents and American sociohistorical conditions. Critical attention to problems of style, the architectural profession, vernacular vs. “high” architecture, technology, economics, urbanism, and social reform.

ARTH 5555. African American Cinema. (3 cr; #ART 4555)
African American cinematic achievements, from silent films of Oscar Micheaux through contemporary Hollywood and independent films. Class screenings, critical readings.

ARTH 5725. Ceramics in the Far East. (3 cr)
Selective examination of representative pottery and ceramic wares produced in China, Korea, and Japan from the Neolithic era to modern times. Nearly every major ceramic type is represented.

ARTH 5765. Early Chinese Art. (3 cr)
Develop a more effective way to understand the unique qualities of an individual work of art. Concentration is on accessible works of art in local private and museum collections.

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

ARTH 5767. Japanese Painting. (3 cr)
Japanese pictorial arts from the late tomb period to the modern era; special attention to the development of indigenous traditions.

ARTH 5769. Connoisseurship in Asian Art. (3 cr)
A selective examination of representative works of art produced in China from the Neolithic era to the Han Dynasty. Major archaeological sites and examples of art in local collections.

ARTH 5775. Formation of Indian Art: 2500 BCE to 300 CE. (3 cr)
Sculpture/architecture, from Indus Valley civilization through Kushana period.

ARTH 5776. Redefining Tradition: Indian Art, 400 to 1300. (3 cr)
India’s art/architecture, from earliest free-standing temples through 13th century. Focuses on temples, associated sculpture. Mural painting, beginnings of Islamic architecture in India.

ARTH 5777. The Diversity of Traditions: Indian Art 1200 to Present. (3 cr; Prereq–Art history course or #)
Issues presented by sculpture, architecture and painting in India from the prehistoric Indus Valley civilization to the present day.

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

ARTH 5785. Art of Islamic Iran. (3 cr)
Architecture, painting, and related arts in Iran from the inception of Islam (7th century) through the 20th century. Understanding the nature of Islam in Persian cultural settings and how artistic production here compares to the Islamic world.

ARTH 5925. History of Photography as Art. (3 cr)
Issues and development of photography, with attention to technology and cultural impact. Major aesthetic achievements in photography from its beginning to present.

ARTH 5927. Documentary Cinema. (4 cr)
History of nonfiction filmmaking, from early forms of reportage and birth of documentary to emergence of “film-verte” and “guerrilla television” and work by independents (e.g., Errol Morris, Michael Moore).

ARTH 5940. Topics: Art of the Film. (3 cr)
Topics in film history including individual directors (e.g., Hitchcock, Welles), genres (e.g., westerns, musicals), and other topics (e.g., American independent filmmaking, film noir).

ARTH 5950. Topics: Art History. (3 cr [max 9 cr])
Topics specified in [Class Schedule].

ARTH 5993. Directed Study. (1-4 cr [max 12 cr]; A-F or Aud. Prereq–#)

ARTH 5994. Directed Research. (1-4 cr; A-F or Aud. Prereq–#)

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

ARTH 8190. Seminar: Issues in Ancient Art and Archaeology. (3 cr [max 12 cr]; #CHNS 6190. Prereq–#)
Selected topics, with special attention to current scholarly disputes. Topics specified in [Class Schedule].

ARTH 8200. Seminar: Medieval Art. (3 cr [max 12 cr])
Focus on a major art historical theme, artist, period, or genre.

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

ARTH 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

ARTH 8340. Seminar: Baroque Art. (3 cr [max 12 cr]; Prereq–#)
Topics vary.

ARTH 8400. Seminar: Issues in 19th-Century Art. (3 cr [max 12 cr]; Prereq–#)

ARTH 8520. Seminar: American Art and Material Culture. (3 cr [max 12 cr]; #AMST 8520. Prereq–#)
Topics in American art, popular art, and material culture, emphasizing methods and techniques of inquiry: creation and use of archives, oral history, sources for pictorial evidence, and current approaches to interpreting traditional and non-traditional data.

ARTH 8866. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; a, for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

ARTH 8710. Seminar: Islamic Art. (3 cr [max 12 cr]; Prereq–#)
Focus depends on current research interests of the professor and needs and interests of graduate students in Islamic and Asian art history.

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

ARTH 8770. Seminar: Art of India. (3 cr [max 12 cr]; Prereq–#)
Selected topics and issues in history of South Asian art. Topics vary by offering.

ARTH 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 16 cr per semester or summer; 24 cr required)

ARTH 8920. Seminar: Film History and Criticism. (3 cr [max 12 cr]; Prereq–#)
Selected topics in film history and theory, including specific directors, genres, movements, periods, and critical issues (e.g., violence).

ARTH 8950. Seminar: Issues in the History of Art. (3 cr [max 12 cr]; Prereq–#)
Theoretical or topical issues. Topics vary.

ARTH 8970. Directed Studies. (1-3 cr [max 12 cr]; Prereq–#)

Asian American Studies (AAS)

Department of Asian Languages and Literatures

College of Liberal Arts

AAS 5200. Topics in Asian American Studies. (1-4 cr [max 9 cr])
Topics specified in Class Schedule.

Asian Languages and Literatures (ALL)

Department of Asian Languages and Literatures

College of Liberal Arts

ALL 5220. Pedagogy of Asian Languages and Literatures. (1-3 cr [max 9 cr]; A-F only. Prereq–Grad student)
Second language acquisition theory, methods, testing, and technology applicable to teaching of modern Asian languages/literatures.

ALL 5265. Traditional Poetics and Aesthetics in East Asia. (4 cr; A-F only. Prereq–Some knowledge of East Asian culture/literature suggested)
ALL 5276. Liberalism and Its Critics: Global Perspectives. (4 cr; A-F or Aud) Survey of liberal political thought and various critics of it that arose in extreme left/right political perspectives, including those in colonial contexts and within Western religious formations, especially Hindu and Muslim.

ALL 5333. Poetry and Power in Early China: Book of Songs and Songs of the South. (4 cr; A-F only, Prereq–Upper div or graduate student) How to read/analyze poems from early anthologies in terms of their display/invention of different types of cultural power. How poems that have held over Chinese literary tradition in subsequent millennia, their literary influence/position in intellectual/political lives of Chinese readers. Studies that relate to the poetry and social/material culture.

ALL 5334. Voices From Early China: Book of Songs and Songs of the South. (4 cr; Prereq–Undergraduate major in ALL or graduate student or Ph) Students read/analyze poems from Book of Songs and Songs of the South (ca. 1000-300 B.C.E.). Literary influence, position the poems have held in intellectual, emotional, and political lives of Chinese readers. Historical, cultural, and theoretical studies that relate to the poetry and the voices in it.


ALL 5356. Gender and Sexuality in Chinese Film. (4 cr; Prereq–Upper div or graduate student) How gender/sexuality have been depicted, constructed, and subverted in Chinese cinemas (including mainland China, Hong Kong, Taiwan) from 1930s to present. Weekly film screenings, readings on Chinese film, key works of feminist film theory.

ALL 5357. Chinese Cinematic Realisms. (4 cr) Various styles of realism in Chinese cinemas (mainland Taiwan) from silent era to present. Theories of realism, conceptions of “the Real” applied in close readings of major films, placed in historical context. China’s negotiation of modernity during 20th century.

ALL 5366. The Nation in Modern Chinese Film and Literature. (4 cr; Prereq–Jr or sr or graduate student) Chinese nationhood as represented/negotiated in films/literature from 19th to 20th Century to present. How China was re-imagined as a modern nation in culture, from Republican era to Mao era to the reform era. How alternative national visions of nationhood arose in Hong Kong and Taiwan.

ALL 5374. Representing the Past: Chinese Myth, Legend, and Ideology. (3 cr) Analysis of texts that contain early Chinese myths, legends, and historical narratives in their construction of an understandable world. How such materials have been incorporated into different cultural formations from later periods, including contemporary popular culture. How they have figured into the construction of China and Chineseess in 20th Century.


AST 5201. Methods of Experimental Astrophysics. (4 cr; Prereq–Upper div or Jr or Sr or grad or Ph) Contemporary astronomical techniques and instrumentation. Emphasizes data reduction and analysis, including image processing. Students make astronomical observations at O`Brien Observatory and use department’s computing facilities for data analysis. Image processing packages include IRAF, AIPS, IDL, MIRA.

AST 8001. Radioactive Processes in Astrophysics. (4 cr; Prereq–Ph) Introduction to classical/quantum physics of electromagnetic radiation as it applies to astrophysics. Emphasizes radioactive processes (e.g., emission, absorption, scattering) in astrophysical contexts (e.g., ordinary stars, ISM, neutron stars, active galaxies).

AST 8011. High Energy Astrophysics. (4 cr; Prereq–Ph) Energetic phenomena in the universe. Radiative processes in high energy regimes; supernovae, pulsars, and X-ray binaries; radio galaxies, quasars, and active galactic nuclei.

AST 8021. Stellar Astrophysics. (4 cr; Prereq–Ph) Stellar structure, evolution, and star formation. Emphasizes contemporary research.


AST 8041. Comparative Planetology. (4 cr; Prereq–Ph) Overview of current knowledge of the solar system. Formation history of protostellar nebula, physical properties of major planetary bodies/moons. Sun and Fossils of epoch of planetary system formation: comets, asteroids, minor bodies.

AST 8051. Galactic Astronomy. (4 cr; Prereq–Ph) Content, structure, evolution, and dynamics of Milky Way Galaxy. Emphasizes recent observations from space-ground-based telescopes.


AST 8081. Cosmology. (4 cr; Prereq–Ph) Role of gravity in cosmology. Background, recent research advances.

AST 8110. Topics in Astrophysics. (2-4 cr [max 4 cr]; Prereq–Ph) Topics specified in Class Schedule.

AST 8120. Topics in Astrophysics. (2-4 cr [max 4 cr]; Prereq–Ph) Topics specified in Class Schedule.

AST 8200. Astrophysics Seminar. (1-3 cr [max 3 cr]; Prereq–Ph)

AST 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser, DGS consent)

AST 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser, DGS consent)

AST 8666. Doctoral Pre-Thesis Credits, (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; 5 for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

AST 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade)

Astronomy (AST)
Department of Astronomy
Institute of Technology

AST 5012. The Interstellar Medium. (4 cr; Prereq–2001, PHYS 2811 or Ph) Survey of physical processes in the interstellar medium. Dynamic processes, excitation processes, emission and absorption by gas and dust. Hot bubbles, HI regions, molecular clouds.

AST 5022. Relativity, Cosmology, and the Universe. (4 cr; PHYS 5022, PHYS 2801 or Ph) Local-scale structure/history of universe. Introduction to Newtonian/relativistic world models. Physics of early universe, cosmological tests, formation of galaxies.
Courses

AST 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

AST 8990. Research in Astronomy and Astrophysics. (1-4 cr [max 4 cr]; Prereq–#) Research under supervision of a graduate faculty member.

Biochemistry (BIOC)
Department of Biochemistry, Molecular Biology, and Biophysics

College of Biological Sciences

BIOC 5001. Biochemistry, Molecular and Cellular Biology. (5 cr; §BIOC 5001. Prereq–undergraduate course in biochemistry, #) Integrated course in biochemistry, molecular biology, cell biology, and developmental biology.

BIOC 5309. Biocatalysis and Biodegradation. (3 cr; §MICE 5309. Prereq–chemistry through organic chemistry, knowledge of word processing, e-mail, access to World Wide Web, access to college-level science library) Assess validity of information on biocatalysis and biodegradation; learn fundamentals of microbial catalysis, mechanisms as it pertains to biodegradation of environmental pollutants; biocatalysis for specialty chemical synthesis; display of this information on the Web.

BIOC 5352. Microbial Biochemistry and Biotechnology: Proteins. (3 cr; AF or Aud. Prereq–[5301 or 4331 or BIOL 5301 or MSC 4111], [BIOL 5301 or MCD 5301] or #) Protein biotechnology. Microorganisms used as hosts for protein expression, protein engineering, and method engineering. Production of enzymes of industrial interest. Applications of protein biotechnology in bioelectronics. Formulation of therapeutic biopharmaceuticals.

BIOC 5353. Microbial Biochemistry and Biotechnology: Small Molecules. (3 cr; AF or Aud. Prereq–[5301 or 4331 or BIOL 5301 or MSC 4111], [BIOL 5301 or MCD 5301] or #) Small molecule biotechnology. Screening strategies for drug discovery. Secondary metabolite and antibiotic biosynthesis. Combinatorial methods for generating new pharmacologically active natural products. Production of organic acids and vitamins. Introduction to metabolic engineering.

BIOC 5381. Microbial Genomics and Bioinformatics. (3 cr; Prereq–College-level courses in [organic chemistry, biochemistry, microbiology]) Introduction to genomics. Emphasizes microbial genomics. Sequencing methods, sequence analysis, genomics databases, genome mapping, prokaryotic horizontal gene transfer, genomics in biotechnology, intellectual property issues.

BIOC 5401W. Advanced Metabolism and Its Regulation. (3 cr; Prereq–5301 or 4331 or BIOL 5301) Underlying principles that determine metabolism of compounds/unusual compounds in plants, animals, microorganisms. Regulation of carbon, energy flow in whole organisms.

BIOC 5444. Muscle. (3 cr; §PHSL 5444. Prereq–BIOL/BIOC 5301 or 4331 or PHSL 5301 or #) Muscle structure/function: molecular mechanism by which force is generated

BIOC 5527. Introduction to Modern Structural Biology. (4 cr; Prereq–Intro biochemistry, intro physics) Methods employed in modern structural biology to elucidate macromolecular structures. Primary focus on X-ray diffraction, nuclear magnetic resonance (NMR) spectroscopy and mass spectrometry. Principles underlying structural biology and structure/function relationships.

BIOC 5528. Spectroscopy and Kinetics. (4 cr; Prereq–Intro physical chemistry, intro biochemistry recommended) Biochemical dynamics from perspectives of kinetics and spectroscopy. Influence of structure, molecular interactions, and chemical transformations on biochemical reactions. Focuses on computational, spectroscopic, and physical methods. steadystate and transient kinetics. Optical and magnetic resonance spectroscopies.


BIOC 6001. Biochemistry: Structure, Catalysis, and Metabolism. (3 cr; Prereq–BMBB or MCDMFG grad student or #) Protein structure, methods to determine structure, protein folding, forces stabilizing macromolecular structure, protein engineering, design. Dynamic properties of proteins/enzymes, enzyme substrate complexes, mechanism of enzyme catalysis. Enzymology of metabolic regulation and cell signaling.

BIOC 8002. Molecular Biology and Regulation of Biological Processes. (3 cr; Prereq–BMBB or MCDMFG grad student or #) Structure/stability of nucleic acids, genome organization. Chromosome mechanics, including DNA replication, recombination, and transposable elements. Mechanisms/regularity of gene expression, including transcription, processing, and translation. Genetic/phylogenetic controls. Cell cycle controls. Regulation of development.

BIOC 8084. Research and Literature Reports. (1 cr [max 5 cr]; S-N or Aud. Prereq–Grad BMBB major or #) Current development research projects in the department.

BIOC 8184. Graduate Seminar. (1 cr [max 5 cr]; S-N or Aud. Prereq–Grad–BMBB major or DGS consent) Reports on recent developments in the field and on research projects in the department.

BIOC 8213. Selected Topics in Molecular Biology. (4 cr; §GCD 8213. Prereq–5301 or #) Current topics such as DNA replication, recombination and gene conversion, regulation of gene expression, chromatin structure and transcription, developmental gene regulation, organellar gene expression, RNA splicing, initiation and control of translation, animal viruses, transposable elements, somatic recombination, oncogenes.

BIOC 8216. Signal Transduction and Gene Expression. (4 cr; Prereq–5301 or #) Cell signaling, metabolic regulation in development. Procarboxyte/eucaryotic systems used as models for discussion. Literature-based course.

BIOC 8290. Current Research Techniques. (1-3 cr [max 9 cr]; S-N or Aud. Prereq–Grad–BMBB major) Research project carried out in laboratory of a staff member.

BIOC 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Master’s student, advisor and DGS consent)

BIOC 8566. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

BIOC 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

BIOC 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

Bioethics, Center for (BTHX)

Center for Bioethics

BTHX 5000. Topics in Bioethics. (1-4 cr [max 8 cr]; Prereq–Grad student or #) Bioethics topics of contemporary interest. Topics specified in Class Schedule.

BTHX 5010. Bioethics Proseminar. (2 cr; AF only; Prereq–Bioethics grad student or grad minor) Introduction to topics in bioethics.

BTHX 5100. Introduction to Clinical Ethics. (3 cr; Prereq–Jr or sr or grad student or #) Most frequent ethical problems faced by clinicians, patients/families, and ethics consultants. Forging lifelong sustainment, decision capacity, informed consent, treatment refusal, death/dying, pediatric ethics, reproductive issues, research ethics, psychiatric illness. Real cases.

BTHX 5210. Ethics of Human Subjects Research. (3 cr; Prereq–Grad student or #) Issues in ethics of human subjects research.

BTHX 5300. Foundations of Bioethics. (3 cr; Prereq–Grad student or #) Overview of major contemporary frameworks, foundational issues in bioethics.

BTHX 5325. Biomedical Ethics. (3 cr; Prereq–Grad student or #) Major topics/issues in biomedical ethics. Patients’ rights/duties, informed consent, confidentiality, ethical issues in medical research, initiation/termination of medical treatment, euthanasia, abortion, allocation of medical resources.

BTHX 5400. Introduction to Bioethics in Health Policy. (3 cr; Prereq–Grad student or professional student or #) Topics vary to reflect issues of current significance. Relates to law/politics as appropriate but focuses on moral analyses of policy issues.

BTHX 5453. Law, Biomedicine, and Bioethics. (3 cr; AF-F only) Law/bioethics as means of controlling important biomedical developments. Relationship of law and bioethics. Role of law/bioethics in governing biomedical research, reproductive decision making, assisted reproduction, genetic testing/screening, genetic manipulation, and cloning. Evolution of death. Use of life-sustaining treatment. Organ transplantation.

BTHX 5510. Seminar in Publication and Ethics Research. (1 cr; S-N or Aud. Prereq–Grad student or #) A seminar on publication practices. Selecting publication venues. Literature search for publication. Resolving ownership issues. Ethics in publication. Manuscript formatting, including structure abstract, paper sections, citations, footnotes, and acknowledgments. Letters of submission. Responding to peer review.

BTHX 5620. Social Context of Health and Illness. (3 cr; Prereq–Grad student or #) Social context in which contemporary meanings of health and illness are understood by providers/patients. Ethical implications. Readings from history, social science, literature, and first-person accounts.
Courses

BMEN 8402. New Product Design and Business Development. (4 cr; A-F or Aud. S&M 8222. Prereq–SME 8222; B401) Student teams work with IT and CSOM faculty and company representatives to develop a product concept for sponsoring company. Assignments include concept/detail design, manufacturing, marketing, introduction strategy, profit forecasting, production of product prototype.


BMEN 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

BMEN 8601. Biomedical Engineering Seminar. (1 cr; S-N or Aud) Lectures and demonstrations of university and industry research introducing students and faculty to methods and goals of biomedical engineering.

BMEN 8602. Biomedical Engineering Seminar. (1 cr; S-N or Aud) Lectures and demonstrations of university and industry research introducing students and faculty to methods and goals of biomedical engineering.

BMEN 8630. Biomedical Engineering Graduate Student Seminar. (1 cr [max 3 cr]; S-N or Aud. Prereq–Grad BMEn major) Student presentations of current thesis research or other areas of biomedical engineering.

BMEN 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

BMEN 8710. Directed Research. (1-3 cr [max 3 cr])

BMEN 8720. Internship in Biomedical Engineering. (3 cr; S-N or Aud. Prereq–Grad BMEn major) Supervised lab or industrial experience unrelated to student’s normal academic or employment experience.

BMEN 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

BMEN 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

BMEN 8900. Special Topics in Biomedical Engineering. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student, adviser and DGS consent)

Biophysical Sciences (BPHY) Department of Radiology

Medical School

BPHY 5138. Research Seminar. (1-5 cr [max 5 cr]; S-N or Aud) Topics introduce techniques/goals of biophysical sciences and medical physics. Lectures/demonstrations.

BPHY 5139. Seminar and Journal Club. (1 cr [max 2 cr]; S-N or Aud) Current research/topics related to goals/methods of biophysical sciences and medical physics. Lectures/discussions.


BPHY 5171. Medical and Health Physics of Imaging I. (3 cr; §TRED 7171. Prereq–#) Physics of diagnostic imaging: specification/quantification of image quality. X-ray production, image receptors, magnetic resonance imaging, radiation exposure and protection. Special imaging techniques, including mammography, computed tomography, and direct digital image capture.


BPHY 5187. Advanced Physics of Magnetic Resonance Imaging (MRI). (3 cr; Prereq–#) NMR (nuclear magnetic resonance) and MRI physics, spatial selection and encoding, imaging hardware and system engineering. Imaging sequences, associated contrast/resolution. Recent developments in MRI.


BPHY 6293. Directed Study in Biophysical Sciences and Medical Physics. (1-12 cr [max 12 cr]; Prereq–#) Individualized study under faculty direction.

BPHY 8294. Directed Research in Biophysical Sciences and Medical Physics. (1-12 cr [max 12 cr]; Prereq–#) Individualized research under faculty direction.

BPHY 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

BPHY 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

Biophysical Sciences (BPHY) Department of Radiology

Medical School

BPHY 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

BPHY 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

BPHY 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

Bioprocesses and Biosystems Engineering (BBE) Department of Bioprocesses and Biosystems Engineering

College of Food, Agricultural and Natural Resource Sciences/Institute of Technology

BEE 5001. Chemistry of Plant Materials. (4 cr; A-F or Aud. §BBE 4001. Prereq–Grad student or #) Chemical principles underlying structure, properties, processing, and performance of plant materials.

BEE 5023. Process Control and Instrumentation. (3 cr; §BBE 4023W. Prereq–Grad student or #) Fundamental principles in system dynamics/control. Emphasizes process systems and problems faced by process engineers.

BEE 5095. Special Problems. (1-5 cr [max 5 cr]; Prereq–#) Advanced individual study project. Application of engineering principles to specific problem.

BEE 5102. Residential Indoor Air Quality. (3 cr; A-F or Aud. §BBE 3102. Prereq–Grad student or #) Indoor air pollution issues found in residential structures, especially in the north central region of the United States. Pollutant descriptions, including measurement techniques and typical ranges of concentrations. Health effects. Pathways, transport mechanisms. Control strategies including mitigation and prevention.

BEE 5202. Wood and Fiber Science. (3 cr; A-F or Aud. §BBE 1002) Wood as a biomaterial. Wood’s anatomical/cellular structure compared with other plant-derived materials. Wood’s physical properties/characteristics in various applications. Non-wood fiber, bio-product characteristics.

BEE 5203. Environmental Impacts of Food Production. (3 cr; A-F or Aud. Prereq–intended for non-engineering students; Credit will not be granted if credit has been received for AGET 5203) Crop production intensity, animal raising options, food processing waste alternatives, pest control.

BEE 5212. Safety and Environmental Health Issues in Plant and Animal Production and Processing. (3 cr; A-F or Aud. Prereq–grad student or #; Credit will not be granted if credit has been received for AGET 5212) Safety/health issues in food production, processing and horticultural work environments using public health, injury control, and health promotion frameworks: regulation, engineering, education. Traumatic injury, occupational illness, ergonomics, pesticide health effects, biotechnology, air contaminants.

BEE 5301. Surface and Colloid Science in Bio-based Products Manufacturing. (3 cr; §BBE 4301. Prereq–Grad student or #) Principles of surface and colloid science, their application to manufacturing/performace of bio-based products.

BEE 5302. Organisms Impacting Bio-based Products. (3 cr; §BBE 4302. Prereq–Grad student or #) Organisms and their importance to bio-based products: deterioration, control, bioprocesses for benefit.
Courses

B7E 5303. Introduction to Bio-based Materials Science. (3 cr; §BBE 4303. Prereq—Grad student or #) Principles of materials science, their application to bio-based materials. Project required.


B7E 5320. Applied Statistics for Process Industries: Measurement, Analysis, and Control. (3 cr; §BBE 4320. Prereq—Grad student or #) Presented through the Internet. Basic concepts and most frequently used methods in statistical process control, analysis of variances, experiment design, and regression analysis. Online course.

B7E 5326. Pulping and Bleaching. (4 cr; §BBE 4362. Prereq—Grad student or #) Chemistry/technologies in producing paper-making raw material. Focuses on wood pulping/bleaching, including non-wood fibers and recycled fiber materials. Online course.

B7E 5401. Bioproduts Engineering. (3 cr; A-F or Aud. Prereq—Grad student or #) Unit operations of bioprocess engineering/manufacture. Project required.

B7E 5402. Bio-based Products Engineering Lab I. (1 cr; A-F or Aud. §BBE 4402. Prereq—Grad student or #) Laboratory exercises in bio-based products engineering.

B7E 5403. Bio-based Products Engineering Lab II. (1 cr; A-F or Aud. §BBE 4403. Prereq—Grad student or #) Laboratory exercises in bio-based products engineering.

B7E 5404. Bio-based Composites Engineering. (3 cr; A-F or Aud. §BBE 4404. Prereq—Grad student or #) Properties of bio-based composites.


B7E 5412. Manufacturing and Applications of Bio-based Products. (4 cr; §BBE 4412W. Prereq—Grad student or #) Manufacturing processes, end-use applications of bio-based products.

B7E 5413. A Systems Approach to Residential Construction. (3 cr; §BBE 4413. Prereq—Grad student or #) Dynamic/interrelated issues of energy, moisture control, indoor air quality in residential buildings. Emphasizes design, construction, and operational aspects to provide an energy efficient, durable structure, and healthy living environment. Interaction between moisture and wood products within building system.

B7E 5414. Advanced Residential Building Science. (3 cr; §BBE 4414. Prereq—Grad student or #) Building science theory, advanced applications for residential buildings. Focuses on heat/mass transfer.

B7E 5415. Advanced Residential Building Science Lab. (1 cr; A-F or Aud. §BBE 4415. Prereq—Grad student or #) Concurrent with 4334. Exercises on advanced applications of heat/mass transfer to predict performance of residential buildings.

B7E 5416. Building Testing & Diagnostics. (2 cr; §BBE 4416. Prereq—Grad student or #) Theoretical basis for performance testing. Diagnostics applications for residential structures. Focuses on existing structures and retrofit/ remedial applications. Digital differential pressure gauges, blowers doors, airflow hoods/grids, dust pressure testing, infrared thermography. Hands-on sessions for equipment use, problem solving.

B7E 5480. Special Topics. (3-4 cr [max 12 cr]; §BBE 3480. Prereq—Sr or grad student) Topics specified in Class Schedule.

B7E 5503. Marketing of Bio-based Products. (4 cr; A-F or Aud. §BBE 3503. Prereq—Grad student or #) Introduction to marketing and analysis as it relates to current/currenting bio-based products industries (building materials, paper, fuels, etc.). Product positioning, pricing, promotion, and channel management within strategic planning and environmental marketing management.

B7E 5504. Bio-based Products Development and Management. (3 cr; A-F or Aud. §BBE 4504W. Prereq—Grad student or #) Concepts of new product development and product management and their application to bio-based products.

B7E 5513. Watershed Engineering. (3 cr; A-F or Aud. Prereq—3203, upper div flip) Application of engineering principles to managing surface runoff from agricultural, range, and urban watersheds. Design of facilities and selection of land use practices for controlling surface runoff to mitigate problems of flooding and degradation of surface-water quality.

B7E 8001. Seminar. (1 cr; S-N or Aud. Prereq—#) Presentation and discussions on current research topics, research philosophy and principles, proposal writing, and professional presentations.

B7E 8002. Research Seminar I. (1 cr [max 2 cr]; S-N or Aud. Prereq—8001 or T8001 or equiv) Organization/critique of seminars on new developments in biosystems and agricultural engineering.

B7E 8003. Research Seminar II. (1 cr [max 2 cr]; S-N or Aud. Prereq—8002 or equiv) Moderate and critique seminars in biosystems and agricultural engineering.

B7E 8005. Supervised Classroom or Extension Teaching Experience. (2 cr; S-N or Aud. §AGRO 8005, HORT 8005, PLPA 8005, SOIL 8005. Prereq—#) Teaching experience is offered in the following departments: Biosystems and Agricultural Engineering: Agronomy and Plant Genetics; Horticultural Science; Soil, Water, and Climate; Plant Pathology. Discussions about effective teaching to technical and non-technical audiences. Seminar and laboratory sections, oral presentations, and the Internet.

B7E 8013. Parameter Estimation in Biosystems and Agricultural Engineering. (3 cr; A-F or Aud. Prereq—8301 or equiv, computer programming) Teaching experience is offered in the following departments: Biosystems and Agricultural Engineering: Agronomy and Plant Genetics; Horticultural Science; Soil, Water, and Climate; Plant Pathology. Discussions about effective teaching to technical and non-technical audiences. Seminar and laboratory sections, oral presentations, and the Internet. Evaluation of models presented in the literature and report on development and use of computer programming.

B7E 8303. Machinery Modeling. (3 cr; Prereq—AEM 2021, CE 3502) Machinery systems modeling using multibody dynamics simulation software (MBS). Students review models presented in the literature and report on development and use of computer programming. Models are developed in the students’ areas of interest.


B7E 8306. Graduate Seminar. (2 cr [max 6 cr]) Communication of scientific knowledge related to wood and paper science through the media of poster sessions, oral presentations, and the Internet.


B7E 8311. Mechanics of Wood and Wood Composites. (2 cr; Prereq—#) Advanced topics on behavior of wood composites.

B7E 8333, FTE: Master’s (1 cr; No grade. Prereq—Master’s student, adviser and DGS consent)

B7E 8444, FTE: Doctoral (1 cr; No grade. Prereq—Doctoral student, adviser and DGS consent)

B7E 8513. Hydrologic Modeling of Small Watersheds. (3 cr; Prereq—CE 3502, hydrology course) Study and representation of hydrologic processes by mathematical models: stochastic meteorological variables, infiltration, overland flow, return flow, evapotranspiration, and channel flows. Approaches for model calibration and evaluation.

B7E 8523. Coupled Heat, Moisture, and Chemical Transport in Porous Media. (3 cr; A-F or Aud. Prereq—(CSci 3501 or equiv), (Math 5512, Math 5513 or equiv), (Soil 5522 or equiv), computer programming) Mathematical study of coupled heat, moisture, and chemical transport in porous media. Derivation of governing equations for coupled heat, moisture, and chemical transport. Derivation of numerical solutions techniques to solve coupled equations. Comparison of numerical solutions to analytical solutions.

B7E 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]) No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr.; a for 3rd/4th registrations, up to 24 combined cr.; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr.)

B7E 8703. Managing Water in Food and Biological Systems. (3 cr; Prereq—Chum 3501 or FdSci 5451 or MAIS 3111 or #) Qualitative and quantitative analysis of water in foods and biological materials using NMR and MRI. Water and chemical reactivity, microbial activity, physiochemical properties and changes, and structural properties and changes in foods and biological materials.

B7E 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]) No grade. Prereq—Max 18 cr per semester or summer; 10 cr total required (Plan A only)

B7E 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]) No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

For definitions of course numbers, abbreviations, and symbols, see page 169.
Courses

**Business Administration (BA)**

**Curtis L. Carlson School of Management**

**BA 8444. FTE: Doctoral.** (1 cr; No grade. Prereq—Doctoral student, advisor and DGS consent)

**BA 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq—Doctoral student who has not passed prelim; no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

**BA 8888. Thesis Credit: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

**Business and Industry Education (BIE)**

**College of Education and Human Development**

**BIE 5001. Teaching Marketing Promotion.** (3 cr; A-F or Aud)

Materials, methods, and approaches to teaching marketing promotion. Covers the basic elements of the marketing mix: advertising, promotion, public relations, direct selling, visual merchandising, and direct marketing.

**BIE 5011. Introduction to Computer Applications.** (3 cr)

Instructional uses of computers and representative business/marketing education applications, including word processing, databases, spreadsheets, and graphics.

**BIE 5012. Advanced Word Processing.** (3 cr; Prereq—5011 or equiv)

Develop/apply solution methods for office problems using word processing software including advanced editing, printing, and desktop publishing capabilities.

**BIE 5013. Spreadsheet Analysis Using Computers.** (3 cr; Prereq—5011 or equiv)

Using spreadsheets to analyze data, monitor business records, and create models.

**BIE 5014. Database Computer Applications.** (3 cr; Prereq—5011 or equiv)

Business needs for computerized databases. Using database software to develop, maintain, and prepare reports.

**BIE 5015. Integrated Computer Applications in Business and Marketing Education.** (3 cr; Prereq—5011, 5012, 5013, 5014 or equiv)

Realistic business computer problems requiring integration of two or more application packages. Pedagogical issues of learning/teaching advanced computer applications.

**BIE 5080. Special Topics in Business and Industry Education.** (1-4 cr [max 4 cr])

Content varies by offering.

**BIE 5101. Technological Problem Solving.** (3 cr; A-F or Aud; Prereq—3112, 3121, 3122)

Capstone technology education course in which students research problems relative to various technological systems and develop solution(s) to the identified problems.

**BIE 5151. Technical Development: Specialized.** (1-12 cr [max 12 cr]; A-F or Aud. Prereq—#)

Students select/study technical processes/principles based on subjects they plan to teach, integrate specialized technical instruction in advanced/emerging areas.

**BIE 5321. Vocational Guidance in Business and Industry Education.** (2 cr; A-F or Aud)

Self assessment, use of occupational and labor market information, job seeking skills, work and work satisfaction. For industrial teachers and trainers in school and industry settings.

**BIE 5325. Foundations of Industrial Education.** (3 cr)

Social, economic, psychological, philosophical, legislative, and pedagogical foundations of industrial education in the United States. Comparison with selected foreign countries. Analysis of contemporary trends against backdrop of early foundations.

**BIE 5344. Facilities Management in Business and Industry.** (3 cr; A-F or Aud. Prereq—3112)

Planning, evaluating, and managing industrial education shop and lab facilities.

**BIE 5365. Curriculum Development in Technology Education.** (3 cr)

Conceptualization and derivation of content for the K–12 technology curriculum. Comparison of U.S. approaches to technology curriculum with selected countries.

**BIE 5440. Business and Industry Observation and Seminar.** (1-3 or [max 6 cr])

Current operating practices and career opportunities in business and industry. Planned experiences in work environments and related seminars.

**BIE 5452. Methods of Teaching Business and Marketing Concepts.** (3 cr; A-F or Aud)

Recent research/developments in teaching business concepts related to economics, business organization/management, business law, entrepreneurship, marketing, international business, information systems, accounting, risk management, and personal finance.

**BIE 5457. Methods of Teaching Business Employment and Marketing Employment.** (3 cr; A-F or Aud)

Recent research/developments in teaching for business employment. Administrative support positions, accounting/finance processing, marketing, sales, computer operations, other occupations using desktop computing.

**BIE 5463. Methods in Teaching Keyboarding and Word Processing.** (2 cr; A-F or Aud)

Implementing keyboarding and word processing: effective teaching strategies; expected learner outcomes; evaluation methods; selecting hardware; instructional materials (including print, software, Internet); organizing and managing labs.

**BIE 5475. Curriculum Development for Business and Marketing Education.** (3 cr; A-F or Aud)

Introduction to conceptual models for design/delivery of business/marketing education programs in secondary/postsecondary schools, in adult education settings, and in business/industry. Preparing programs of instruction for secondary/postsecondary level. Making decisions regarding course content.

**BIE 5596. Occupational Experience in Business and Industry.** (1-10 or [max 10 cr]; S-N or Aud. Prereq—#)

Observation/employment in business/industry to develop technical/occupational competencies. Includes 100 clock hours of supervised work experience per credit.

**BIE 5597. Internship: Business and Industry Education.** (1-8 or [max 12 cr]; S-N or Aud. Prereq—#)

Practical experience in business or industry as a professional educator or supervisor. Requires an integrative paper.

**BIE 5605. Critical Issues in Business and Industry.** (3 cr)

Identification and analysis of major current issues in business and industry education.

**BIE 5662. Computer Training in School and Industry Settings.** (3 cr; Prereq 5562; Prereq—5011 or equiv)

Alternative teaching practices for business applications software: word processors, spreadsheets, graphics, desktop publishing, databases, and communications; public school and industry settings.

**BIE 5796. Field Based Projects in Business and Industry.** (1-4 cr [max 4 cr]; A-F or Aud)

Curricular, instructional, developmental, or evaluative problems and projects applicable to local school or business and industry situations.

**BIE 5801. The Business of Tourism.** (3 cr; A-F or Aud)

Introduction to major theories, concepts, skills, and techniques influencing tourism business/industry.

**BIE 5802. Education and Human Resource Development Through Tourism.** (3 cr; A-F or Aud)

Policies/practices of education and human resource development in tourism industry.

**BIE 5803. Tourism Studies Capstone Seminar.** (3 cr; S-N or Aud. Prereq—Tourism studies maps)

Students present, critique, and discuss implications of supporting programs for tourism.

**BIE 5993. Directed Study in Business and Industry.** (1-4 cr [max 4 cr])

In-depth individual inquiry in the content areas related to business and industry.

**BIE 8995. Research Problems: Business and Industry.** (3-6 cr [max 6 cr]; S-N or Aud. Prereq—Advisor approval)

Individual research in business and industry education.

**Center for Spirituality and Healing (CSPH)**

**Health Sciences**

**CSPH 5000. Explorations in Complementary Therapies and Healing Practices.** (1-4 cr [max 12 cr]; Prereq— Jr or sr or grad student or #)

Research/practice on therapies, delivery of complementary therapies, regulatory issues.

**CSPH 5101. Introduction to Complementary Healing Practices.** (3 cr; Prereq—Jr or sr or grad student or #)

Contextual cultures of healing traditions.

Complementary therapies presented by practitioners, including traditional Chinese medicine, meditation, mind-body healing, spiritual practices, energy healing, naturopathy, herbalism, movement therapies, homeopathy, manual therapies, and nutrition.

**CSPH 5102. Art of Healing: Self as Healer.** (1 cr; Prereq—Jr or sr or grad student or #)

Introduction to individual transformational journey as part of health science education. Students become aware of their responsibility/resources to facilitate development of the self. Research data, experience of self that is part psychoneuroimmunology, mind-body-spirit approaches, Lecture, scientific literature, meditation, imagery, drawing, group interaction.

**CSPH 5111. Ways of Thinking about Health.** (2 cr; S-N only. Prereq—Jr or sr or grad student or #)


**CSPH 5115. Cultural Knowledge, Health, and Contemporary Cultural Communities.** (3 cr; Prereq—Jr or sr or grad student or #)

How personal cultural experience affects one’s view of health, illness, and healing and one’s professional practice. Wisdom of cultural communities. Cultural construct underpinning the medical system. Role of culture in interaction between practitioner and patient. Reconnecting to cultural heritage in healing.

**CSPH 5201. Spirituality and Resilience.** (2 cr; Prereq—Jr or sr or grad student or #)

Links between resilience and spirituality. Applications of resilience/health realization model to students’ personal/professional lives. Review of literature, theory, and research.

**CSPH 5211. Peacemaking and Spirituality: A Journey Toward Healing and Strength.** (2-3 cr [max 3 cr]; A-F or Aud. Prereq—Jr or sr or grad student or #)

Influence of spirituality upon process of resolving conflict and making peace in intense interpersonal/intercultural conflicts in multiple health care and social work settings, including in families, between patients/clients and nurses/social workers, within communities, among friends, between co-workers, or within ourselves.
CSPH 5215. Forgiveness and Healing: A Journey Toward Wholeness. (2 cr; Prereq–Jr or Sr or grad student or #) Impact of forgiveness on process of inter-/intrapersonal healing. Forgiveness/healing in health care and social work settings from multiple spiritual/secular traditions.

CSPH 5221. Significant Spiritual Texts of the 20th Century. (2 cr; Prereq–Jr or Sr or grad student or #) Diverse “spiritual classics” (i.e.,elements of western canon that have proven over time to be resources of values). Resources of meaning for inner-life healers. How to establish a personal library for life-long journey of spiritual development.

CSPH 5225. Meditation: Integrating Body and Mind. (2 cr; Prereq–Jr or Sr or grad student or #) Meditation as a physical, emotional, intellectual, and spiritual inquiry. Students examine a variety of texts and develop ability to enter a state of calm, meditative awareness.

CSPH 5226. Advanced Mediation: Body, Brain, Mind, and Universe. (1 cr; Prereq–[5225, Jr or Sr or grad student or #]) Students work to integrate meditation practice into daily life, cultivating awareness of the fundamental oneness of body, brain, mind, and universe. Mind-body interactions in health. “Hard problem” of consciousness in brain science. Emergence of complementary medicine, wisdom, and healing in non-discursive awareness.

CSPH 5301. Cultures, Faith Traditions, and Health Care. (2 cr; A-F or Aud. Prereq–Jr or Sr or grad student or #) Culturally/spiritually based health care practices of selected native/immigrant populations in Minnesota. Clinical implications. Personal/professional conflicts for delivery of competent care to culturally diverse groups by those trained in Western health care.

CSPH 5311. Introduction to Traditional Chinese Medicine. (2 cr; A-F or Aud. Prereq–Jr or Sr or grad student or #) Philosophical roots of Shanghan, Confucianism, Taoism, and Buddhism. Influence of these philosophies on Chinese medicine. Evolution of concepts of the tao, Yin Yang, microcosm, macrocosm. Development of herbal medicine. Tui Na, QI Gong, acupuncture, moxibustion. Traditional Chinese medicine etiology of disease, physiology, diagnosis, therapy, disease prevention, ethics, psychology, cosmology.

CSPH 5315. Traditional Tibetan Medicine: Ethics, Spirituality, and Healing. (2 cr; Prereq–Jr or Sr or grad student or #) Ethics, spirituality, and healing from perspective of traditional Tibetan medicine. Belief that illness results from a neglecting illness requires correcting underlying imbalance. How to apply these principles, integrate them into clinical practice, and consult with a traditional Tibetan doctor.

CSPH 5317. Yoga: Ethics, Spirituality, and Healing. (2 cr; Prereq–5311, 5313) Yoga, an ancient Indian discipline. Students test the claim that yoga’s philosophy, scientific evidence, practical application. Students propose research-based programs for integrating yoga into personal/professional life.

CSPH 5318. Tibetan Medicine, Ayurveda, and Yoga in India. (4 cr; Prereq–5318, 5317 or #) Students study with expert practitioners in India. Using critical thinking, philosophical knowledge, cultural practices, scientific evidence, and research-based programs to integrate these traditions into personal/professional life.

CSPH 5321. Public Health Priorities in the Developing World. (2 cr; S/NMD 7567. Prereq–Jr or Sr or grad student or #) Primary public health problems, priorities, and interventions in developing countries. Issues related to culture/indigenous health systems and of concern to health care providers who work abroad or with refugee communities in countries of resettlement.

CSPH 5325. Latinas: Culture and Health. (3 cr; Prereq–Jr or Sr or grad student or #) How Latino world view (cosmovision) affects health and compares with U.S. perspective. Differences in perception of time, family involvement, community “belonging,” gender roles, and communication styles. Folkloric beliefs. Specific issues such as AIDS, pregnancy, women’s issues, pharmacy, and nutrition. Health issues of workers. Cultural competency.

CSPH 5331. Foundations of Shamanism and Shamanic Healing. (2 cr; S/N or Aud. Prereq–Jr or Sr or grad student or #) 3-5-day retreat intensive. Shamanic philosophies/ritual etiquette. Core beliefs common to all shamanic healing practices. Cross-cultural healing beliefs/practices, unique psychology for understanding them, their use with contemporary healing practices and for personal growth.

CSPH 5332. Global Healing Traditions: Amazonia Plant Spirit Medicine. (2 cr; S/N or Aud. Prereq–[5331, grad student or Jr or Sr in health science or practicing health professional] or #) Non-biomedical traditional healing paradigms as practiced in other parts of the world. Focuses on indigenous healing practices in Peru as directed by a local shaman.

CSPH 5401. People, Plants, and Drugs: Introduction to Ethnopharmacology. (3 cr; Prereq–Jr or Sr or grad student or #) Biologically active substances used in traditional cultures. Ethnopharmacology’s past, current, and potential contributions to human knowledge. Concrete examples.

CSPH 5405. Plants in Human Affairs.(4 cr; Prereq–Jr or Sr or grad student or #) Twelve-week, intensive course. Introduction to ethnobotany/ethnopharmacology. Lectures, field trips, presentations by local experts.


CSPH 5421. Botanical Medicines in Complementary Health Care. (3 cr; Prereq–Jr or Sr or grad student or #) Widely-used botanical medicines from biomedical perspective. Antimicrobial system presented according to bodily systems/processes. Evidence for therapeutic use. Botanical characteristics, traditional uses, chemical properties, dosage, hazards/safety issues, quality control.

CSPH 5451. Functional Nutrition: An Expanded View of Nutrition, Chronic Disease, and Optimal Health. (2 cr; Prereq–[Jr or Sr or grad student] in Health Sciences or #) Principles of nutrition related to metabolic function. Model attempts to reduce chronic disease by looking for underlying causes/triggers and to intervene to restore function and achieve optimal health. Emphasizes importance of nutrition as a component of self-care.


CSPH 5505. Foundations of Homeopathic Practice. (1 cr; S/N-S only; Prereq–Jr or Sr or grad student; designed for students in health sciences or practicing health professionals) Homeopathic philosophy, core principles, homeopathic materia medica. Review of research on utilization/efficacy of homeopathy. How to use common homeopathic remedies in acute situations. When/how to refer patients for homeopathic treatment. Issues of co-management with allopathic health care providers.

CSPH 5511. Interdisciplinary Palliative Care: An Experimental Course in a Community Setting. (2 cr; Prereq–#) Palliative care student teams partner with interdisciplinary community hospice teams in delivery of care to patients in a variety of settings. Series of seminars employs self-analysis/case studies.

CSPH 5521. Therapeutic Landscapes. (3 cr; Prereq–Jr or Sr or grad student) in [health sciences or therapeutic recreation or horticulture or landscape architecture] or health professional or #) Principles of therapeutic design for specific population requirements. Therapeutic landscape design. Incorporates interdisciplinary interaction between horticulture, landscape architecture, and health science departments.

CSPH 5522. Therapeutic Horticulture. (3 cr; Prereq–5101 or Hort 5072 or #) Central elements of therapeutic horticulture in context of multiple health care settings. Evidence-based history, principles, precepts, and practical application of therapeutic horticulture. Various plant/plant-related modalities from current research findings are related to populations, using therapeutic horticulture as a treatment intervention.

CSPH 5523. Applications in Therapeutic Horticulture. (2 cr; Prereq–CSPH 5521 or CSPH 5522) Study of selected therapeutic program plans in therapeutic horticulture. Evidence-based principles, facilitation techniques in therapeutic horticulture. Systematic programming through documentation, assessment, program development techniques, and evaluation. Leadership training, program plan components, book reviews, reading assignments, comprehensive exam.

CSPH 5533. Introduction to Energy Healing. (2 cr; Prereq–Jr or Sr or grad student or #) Healing techniques that use energetic systems in body to enhance body’s ability to heal. Therapeutic touch, healing touch, Reiki, acupuncture, reflexology, magnets, homeopathy, other modalities. Scientific theories on mechanisms of energetic medicine and ways to measure energy. Students interact with practitioners of energy healing.

CSPH 5535. Reiki Healing. (1 cr; S/S only; Prereq–Jr or Sr or grad student or #) Healing principles, precepts, and practical application of Reiki energy healing. Alternative energy healing modalities, current research findings. Activation of the Reiki energy, hand positions to perform a treatment. Students provide Reiki treatments, discuss findings.

CSPH 5536. Advanced Reiki Healing: Level II. (1 cr; S/S only; Prereq–5535, #) Principles/application of Reiki energy healing. Four levels of healing. Emphasizes healing at spiritual level. Activation of Reiki energy. Symbols that allow for energy transfer through space/time. Using second level Reiki energy for both distance healing and standard Reiki treatment. Students provide Reiki treatments, discuss findings. Current literature, research findings.

CSPH 5541. Emotional Healing and Happiness: Eastern and Western Approaches to Transforming the Mind. (2 cr; Prereq–Sr or grad student or #) Experiential training in the cultivation of happiness, emotional health, and healing for multi-disciplinary professions. Ancient/contemporary, eastern/western approaches. How to increase positive emotions and mind states. Meditation, integrative approaches. Case examples.

CSPH 5545. Mind-Body Healing Therapies. (2 cr; A-F or Aud. Prereq–Grad student or Jr or Sr or #) Philosophies/paradigms. Four modalities commonly used in allopathic nursing, medicine and other health professions [biofeedback, hypnosis, imagery/ visualization, meditation]. Experiential and group discussion format.
Courses

CSPH 5555. Introduction to Body and Movement-Based Therapies. (3 cr; Prereq–Grad student or #) Theories/approaches of selected somatic therapies, including dance, movement, and body-based therapies. Historic/theoretical perspectives on use of movement, dance, and somatic re-education. Demonstrations of techniques. Application of techniques to specific populations/settings.

CSPH 5601. Music, Health and Healing. (2 cr; Prereq–Jr or sr or grad student or #) Music therapy, music medicine, music psychotherapy. Techniques/interventions. Hypotheses/ratios related to interventions. Related research.

CSPH 5611. Healthy Humor. (1 cr; Prereq–Jr or sr or grad student or #) Use of humor to enhance communication, treatment, and relationships with patients. How to create a positive work environment and outlook. Physiologic effects/benefits of humor/laughter. Humor and spirituality. Connection between positive outlook and health.

CSPH 5621. Foundations of Integrative Imagery, Phase I. (2 cr; A-F only; Prereq–Grad student in health sciences or licensed health care professional) Fundamental principles, core concepts of imagery. Current scientific research in the health sciences. Applications for pain/symptom relief, preparation for surgery, promotion of healing, and cancer care. Scope of clinical practice, precautions and safeguards.


CSPH 5702. Fundamentals of Health Coaching II. (4 cr; A-F only; Prereq–5701) Basic tenets of health coaching model. Tools for self development, deep listening, and effective communication. Core building blocks for optimal health from a holistic perspective. Identifying/benchmarking stages/patterns of change, interfacing with interdisciplinary health care providers, locating resources to assist clients in decision making, and educating clients on self-care practices.


CSPH 5711. Optimal Healing Environments. (3 cr; Prereq–Jr or sr or grad student or #) Development/implementations of optimal healing environments. Evidence base supporting structural, architectural, human, and care processes. Emphasizes identifying models of optimal healing environments and leadership strategies that support diffusion of innovation.

CSPH 5810. Special Topics in Complementary Therapy and Healing Practices. (1-6 cr; max 12 cr) Critiquing research on complementary therapies (e.g., design, methods, analyses). Synthesizing research findings for a therapy. Hypothesizing future directions for research on complementary therapies.

CSPH 8191. Independent Study in Complementary Therapies and Healing Practices. (1-6 cr; Prereq–Grad student in CSPH minor or #) Students propose area for individual study with faculty guidance. Students write proposal, which includes outcome objectives and work plan. Faculty member directs student’s work and evaluates project.

Central Asian Studies (CAS)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

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

CSP 5526. Islam and Communism. (3 cr; §CAS 5326, MELC 5326, MELC 5526) Development of medieval Islamic culture in Transoxiana; formation of Sufi orders; rise and development of Communist ideology; introduction of socialist principles into Central Asia; clash of Islamic principles with Communist dicta; Pan-Islamism; Pan-Turkism.

CSP 5532. Russia and Central Asia. (3 cr; §CAS 5332, MELC 5332, MELC 5532) Rise and fall of the Mongol Empire, formation of the Chaghatai Khanate and the Golden Horde. Russian expansion into Central Asia and rivalry with Britain. Russia and the Central Asian republics during and after the Soviet period.

CSPH 5601. Persian Fiction in Translation. (3 cr; §CAS 3601, MELC 3601, MELC 5601) Prereq–§ 3601, MELC 5601) Impact of westernization on Iran, from 1920s to present. Materials produced by Iranian writers, film makers, and intellectuals. Internal/external forces that bind contemporary Iranian society to world civilization. Works of Hadedayat (especially Blind Owl), Chubak, Al-i Ahmad, Daneshvar, and Behrangi are analyzed/interpreted.

CSPH 5662. Persian Poetry in Translation. (3 cr; §CAS 3602, MELC 3602, MELC 5602) Major poetic works of Iran dealing with life at the medieval courts, Sufic poetry, and “new” poetry are studied. Rudaki, Khayyam, Rumi, Hafiz, Yushij, and Farkhizad are among the poets whose works are examined.

CAS 5994. Directed Research. (1-10 cr; max 10 cr; Prereq–#) Directed Research

Chemical Engineering (CHEN)

Department of Chemical Engineering and Materials Science

Institute of Technology


CHEN 5221. Introduction to Polymer Chemistry. (3 cr; A-F or Aud. §CHEN 4221, CHEM 8221, MATH 5221, MATH 8221, Prereq–Chem 2302, Chem 3501) Condensation, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties.


CHEN 5595. Special Topics. (1-4 cr; max 4 cr) New or experimental special topics.

CHEN 5751. Biochemical Engineering. (3 cr; A-F or Aud. Prereq–4002, ¶4003, ¶4102) Chemical engineering principles applied to analysis/design of complex cellular/enzyme processes. Quantitative framework for design of cells for production of proteins, synthesis of antibodies with mammalian cells, or degradation of toxic compounds in contaminated soil.


CHEN 5754. Food Processing Technology. (3 cr; A-F or Aud. Prereq–4002) Introduction to food processing as it interfaces with engineering. Case studies. Engineering economics and practical design problems in food processing. Heat transfer; freezing, conduction (unsteady state); thermal processing; extruder design; protein processing; order-of-magnitude estimation; and economic concepts such as ROI, discounted cash flow, and capital estimating.

CHEN 5759. Principles of Mass Transfer in Engineering and Biological Engineering. (2 cr; A-F or Aud. Prereq–4002) Principles of mass transfer in gases, liquids, biological and macromolecular gels, solids, membranes, and capillaries. Porous solids interaction between mass transfer and chemical reaction. Applications in biological, environmental, mineral, and chemical engineering systems.

CHEN 8994. Directed Research. (1 cr; A-F or Aud. Prereq–Doctoral student or adviser and DGS consent)


CHEN 8602. Process Control. (3 cr; A-F or Aud. Prereq–Chemical Engineering grad major or #) For linear systems: stability, controllability, observability, pole-placement via state feedback state observers, output feedback, and robustness of control systems. For nonlinear systems: solution properties, stability analysis, singular perturbations, feedback linearization via state feedback, and direct synthesis via output feedback.

CHEN 8603. Chemical Rate Processes: Homogeneous Reactions. (3 cr; A-F or Aud. Prereq–Chemical engineering grad student or #) Description/characterization of chemically reacting systems. Theories of elementary reactions. Experimental methods for investigating elementary reactions. Applications of chemical kinetics to complex reactions, such as combustion, flames, and the atmosphere.

CHEN 8606. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; a, for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)


CHEN 8777. Thesis Credit: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

CHEN 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

CHEN 8900. Seminar. (1 cr; S-N or Aud) Presentation and discussion of papers concerning newer developments in chemical engineering, materials science, and related fields.

CHEN 8891. Seminar. (1 cr [max 9 cr]) Presentation and discussion of papers concerning the newer developments in chemical engineering.


CHEN 8993. Directed Study. (1-12 cr [max 12 cr])

CHEN 8994. Directed Research. (1-12 cr [max 12 cr])

CHEN 8995. Special Topics. (1-4 cr [max 4 cr]) New or experimental courses offered by department or visiting faculty.

Chemical Physics (CHPH) Institute of Technology

CHPH 8201. Applied Mathematics I: Linear Analysis. (3 cr; A-F or Aud. §CHEN 4701. Prereq–Chemical engineering grad student or #) Integrated approach to solving linear mathematical problems. Linear algebraic equations. Linear ordinary and partial differential equations using theoretical/numerical analysis based on linear operator theory.


CHPH 8302. Physical Rate Processes II: Mass Transfer. (3 cr; A-F or Aud. Prereq–Chemical engineering grad student or #) Applications of mass transfer. Membranes, including gas separation and reverse osmosis. Controlled drug release. Dispersion, including examples of pollution modeling. Adsorption/chromatography. Coupled heat/mass transfer, including cooling towers. Double-diffusive effects.

CHPH 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

CHPH 8602. Chemical Physics Seminar. (1 cr; Prereq–Grad student or #) Weekly seminar series on modern chemical physics and related topics.

CHPH 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; a, for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

CHPH 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

CHPH 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

Chemistry (CHEM) Department of Chemistry Institute of Technology

CHEM 5210. Materials Characterization. (4 cr; A-F or Aud. Prereq–grad student or #) Modern tools/techniques for both bulk- and thin-film characterization. Topics may include ion-solid interactions, Rutherford back scattering, secondary ion mass spectrometry, solid-state NMR, x-ray photoelectron spectroscopy, small-angle x-ray/neutron scattering, transmission/scanning electron microscopy, near-field scanning optical microscopy, porosimetry, adsorption techniques, and ellipsometry.


CHEM 5501. Introduction to Thermodynamics, Kinetics, and Statistical Mechanics. (3 cr; A-F or Aud. Prereq–1022 or 1032H, MATH 2263 or Math 2374, PHYS 1302 or PHYS 1402V) Chemical change, colloidal transformations, mass/heat transfer and limited signal-to-noise ratio. TEM/SEM digital imaging.

CHEM 5541. Dynamics. (3 cr; A-F or Aud. Prereq–CHEM 5502, CHEM 5542, PHYS 2111, PHYS 2311, or PHYS 2312) Molecular forces and potential energy surfaces. Molecular motions, including lattice vibration, zero-point energy, and limited signal-to-noise ratio. TEM/SEM digital imaging.
Courses

Data collection, correction/ refinement, structure solutions, generation of publication materials, use of Cambridge Crystallographic Structure Database.

CHEM 8011. Mechanisms of Chemical Reactions. (4 cr; Prereq–2302 or equiv)

CHEM 8021. Computational Chemistry. (4 cr; Prereq–5502 or equiv)

CHEM 8025. Introduction to Graduate Research. (1-2 cr [max 2 cr]; A-F or Aud. Prereq–Grad student in chem)
New areas of chemistry, hands-on exposure to graduate research. Students rotate through up to two different labs for seven weeks. Labs are run by chemistry graduate faculty members.

CHEM 8006. Professional Conduct of Chemical Research. (1 cr; S-N or Aud. Prereq–Grad chem student)
Builds sensitivity to ethical issues in chemical research. Readings/case studies, small-group/large-group discussion, summarizing comments from instructors/guests/past having special expertise. Weekly seminar.

CHEM 8081. M.S. Plan B Project I. (1-4 cr [max 4 cr]; A-F or Aud. Prereq–Grad–chem major)
Satisfies project requirement for Plan B master’s degree. May appear on M.S. degree program, but does not count toward 14-credit minimum in major field. Topic arranged by student adviser; written report required. 8081 required; 8082 optional.

CHEM 8082. M.S. Plan B Project II. (1-4 cr [max 4 cr]; A-F or Aud. Prereq–Grad–chem major)
Satisfies project requirement for Plan B master’s degree. May appear on M.S. degree program, but does not count toward 14-credit minimum in major field. Topic arranged by student adviser; written report required. 8081 required; 8082 optional.

CHEM 8151. Analytical Separations and Chemical Equilibria. (3 cr; Prereq–2301 or equiv; 8081 required)
Advanced treatment of principles of analytical chemistry, chemical equilibria, and dynamics. Chromatographic and other modern analytical scale separation techniques. Examines column dynamics and retention mechanisms.

CHEM 8152. Analytical Spectroscopy. (4 cr; Prereq–grad chem major or #)
Survey of analytical spectroscopic methods. Design/application of spectroscopic instruments, including signal generation, acquisition, and interpretation. May include nuclear magnetic resonance, electron paramagnetic resonance, infrared and ultraviolet/visible spectroscopy, and mass spectrometry.

CHEM 8153. Extracting Signal From Noise. (3 cr; A-F or Aud. Prereq–4101 or equiv; Prereq–diff. equiv. requirements)
Use of analog/digital electronics and computational methods in experiments. Passive circuits, operational amplifiers, filters, oscillators and Laplace transform techniques in analysis, domain conversion for data acquisition/control, statistics, experimental design. Introduction to chemometrics, Fourier analysis, convolution/convolution, curve fitting.

CHEM 8155. Advanced Electroanalytical Chemistry. (4 cr)
Thermodynamics/kinetics of electron/ion transfer, electric double layer, mass transfer by diffusion/migration. Ion-selective potentiometry, chronoamperometry, chronocoulometry, cyclic voltammetry, pulse voltammetry, ion-transfer voltammetry, impedance spectroscopy, bioelectrocatalysis, rotating disk electrodes, microelectrodes, chemically modified electrodes. Scanning (and ac electrochemical) microscopy. EC-STM, quartz crystal microbalance.

CHEM 8157. Bioanalytical Chemistry. (4 cr; A-F or Aud)
Theory and practical aspects of analytical methods used in determination/characterization of biologically important materials. Enzymatic/kinetic methods in study of proteins, carbohydrates, lipids, and nucleic acids.

CHEM 8159. Nuclear Magnetic Resonance Spectroscopy. (4 cr; Prereq–Sem of organic chem)
Detailed understanding of relaxation processes, chemical exchange, scalar interactions, NOE, 2D NMR, NMR hardware, and solid state NMR. NMR imaging and Pulsed Field Gradient (PGF) NMR are discussed.

CHEM 8180. Special Topics in Analytical Chemistry. (2-4 cr [max 4 cr]; Prereq–Grad–chem major or #)
Topics (and availability) vary by year depending on instructor and development of the field.

CHEM 8201. Materials Chemistry. (4 cr; A-F or Aud. §CHEM 4201. Prereq–4701, 3502 or #)
Crystal systems/unit cells, phase diagrams, defects/interfaces, optical/delectric properties, electrical/thermal conductivity. X-ray diffraction, thin film analysis, electronic structure, polymers/phonons, solid state chemistry, liquid/molecular crystals, polymers, magnetic/optical materials, porous materials, ceramics, piezoelectric materials, biomedical materials, catalysts.

CHEM 8211. Physical Chemistry of Polymers. (3 cr [max 4 cr]; §MATS 8211. Prereq–undergrad physical chemistry course)
Introduction to polymer physical chemistry. Chain conformations; thermodynamics of polymer solutions, blends, and copolymers; light, neutron, and X-ray scattering; dynamics in dilute solution and polymer characterization; dynamics of melts and viscoelasticity; rubber elasticity, networks, and gels; glass transition; crystallization.

CHEM 8221. Introduction to Polymer Chemistry. (4 cr; §CHEM 4221, CHEM 5221, MATS 5221, MATS 8221. Prereq–2302, 3501 or #)
Condensation, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties.

CHEM 8280. Special Topics in Materials Chemistry. (2-4 cr [max 4 cr]; Prereq–grad chem major or #)
Topics (and availability) vary by year depending on instructor and development of the field.

CHEM 8321. Organic Synthesis. (4 cr; Prereq–2302 or #)
Core course; fundamental concepts, reactions, reagents, structural and stereochemical issues, and mechanistic skills necessary for understanding organic chemistry.

CHEM 8322. Advanced Organic Chemistry. (4 cr; Prereq–2302 or #)
Modern studies. Topics, which vary by year, include natural products, heterocycles, asymmetric synthesis, and mechanistic chemistry. Theories of simple liquids, Monte Carlo, and molecular dynamics simulations. Reaction dynamics from microscopic viewpoint.

CHEM 8480. Special Topics in Chemical Biology. (4 cr; Prereq–grad chem major or #)
Topics (and availability) vary depending on instructor and development of the field.

CHEM 8541. Dynamics. (4 cr; §CHEM 5541. Prereq–Undergrad physical chemistry course)

CHEM 8551. Quantum Mechanics I. (4 cr; §CHEM 5551. Prereq–Undergrad physical chemistry course)
Review of classical mechanics. Postulates of quantum mechanics with applications to determination of single particle bound state energies and scattering cross-sections in central field potentials. Density operator formalism with applications to description of two level systems, two particle systems, entanglement, and Bell inequality.

CHEM 8552. Quantum Mechanics II. (4 cr; Prereq–8551)

CHEM 8561. Thermodynamics, Statistical Mechanics, and Reaction Dynamics I. (4 cr; Prereq–undergrad physical chemistry course)
Two-part sequence. Thermodynamics, equilibrium statistical mechanics, ensemble theory, partition functions, Applications, including ideal gases/crystals. Theories of simple liquids, Monte Carlo, and molecular dynamics simulations. Reaction dynamics from microscopic viewpoint.

CHEM 8562. Thermodynamics, Statistical Mechanics, and Reaction Dynamics II. (4 cr; Prereq–8561)
Two-part sequence. Thermodynamics, equilibrium statistical mechanics, ensemble theory, partition functions. Applications, including ideal gases/crystals. Theories of simple liquids, Monte Carlo, and molecular dynamics simulations. Reaction dynamics from microscopic viewpoint.

CHEM 8580. Special Topics in Physical Chemistry. (2-4 cr [max 4 cr]; Prereq–grad chem major or #)
Topics (and availability) vary depending on instructor and development of the field.

CHEM 8601. Seminar: Modern Problems in Chemistry. (1 cr; S-N or Aud. Prereq–Grad–chem major or #)
Weekly seminar series on modern chemical topics.
Courses

CHEM 5862. Seminar Presentation: Modern Problems in Chemistry. (1 cr; A-F or Aud. Prereq—grad chem major or #) Weekly seminar series on modern chemical topics presented by students.

CHEM 6866. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq—Doctoral student who has not passed prelimoral; no required consent for 1st/2nd registrations, up to 12 combined cr; A, for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)


CHEM 8715. Physical Inorganic Chemistry. (4 cr; Prereq—4701 or equiv, grad chem major or #) Physical methods and concepts applied to inorganic and organometallic systems, including many of the following methods: NMR, IR, UV-VIS, ESR, Mössbauer and mass spectroscopy, magnetic measurements, X-ray diffraction.

CHEM 8725. Organometallic Chemistry. (4 cr; Prereq—4701 or equiv, grad chem major or #) Synthesis, reactivity, structures, and other important properties of main group and transition metal organometallic compounds; treatment in terms of modern electronic and structural theory; emphasis on their use as stoichiometric and homogenous catalytic reagents in organic and inorganic systems.

CHEM 8735. Bioinorganic Chemistry. (4 cr; Prereq—4701 or equiv, grad chem major or #) Survey of role of metal ions in biology; emphasizes structure, function, and spectroscopy of metalloproteins and their synthetic analogs.

CHEM 8745. Advanced Inorganic Chemistry. (4 cr; Prereq—8715, grad chem major or #) Survey of topics in main group and transition metal chemistry; emphasizes synthesis, structure, physical properties, and chemical reactivity.

CHEM 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade. Prereq—Master's or semester; 10 cr total required [Plan A only])

CHEM 8780. Special Topics in Inorganic Chemistry. (2-4 cr [max 4 cr]; Prereq—Grad chem major or #) Topics (and availability) vary by year depending on instructor and development of the field.

CHEM 8880. Special Topics in Chemistry. (2-4 cr [max 4 cr]; Prereq—Grad chem major or #) Topics (and availability) vary depending on instructor and development of the field.

CHEM 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Master's or semester; 24 cr required)

Chicano Studies (CHIC)

Department of Chicano Studies

College of Liberal Arts

CHIC 5374. Migrant Farm Workers in the U.S.: Families, Work, and Advocacy. (3 cr) Social, economic, and legal realities of migrant workers. Demographic shifts, laws, and policies. Farm worker movements and other responses to conditions facing migrants in contemporary economy. Gendered nature of work. Way in which commodities are produced and resistance expressed within structures/traditions of an increasingly globalized system.

CHIC 5920. Topics in Chicana(o) Studies. (3 cr; Prereq—Sr or grad student) Multidisciplinary themes in Chicano studies. Issues of current interest.

CHIC 5939. Directed Studies. (1-3 cr [max 16 cr]; Prereq—#) Guided individual reading, research, and study for completion of the requirements for a senior paper or honors thesis.

Child and Adolescent Psychiatry (CAPY)

Department of Psychiatry

Medical School


CAPY 5624. Eating Disorders in Children and Adolescents: Medical and Psychological Perspectives. (1 cr; S-N only) Clinical characteristics of anorexia, bulimia nervosa in children/adolescents. Etiological factors, multidimensional treatment approaches.

CAPY 5629. Treatments for Children and Adolescents With ADHD and Disruptive Behavior Disorders. (3 cr; S-N only) Mechanisms, treatments. Behavioral management, cognitive-behavioral therapy, classroom accommodations, social skills training, coaching, pharmacological management.


CAPY 5632. Workshop: Competence Enhancement Training Programs for Children with Disruptive Behavior. (1 cr)


CAPY 5634. Workshop: Developmental Dyslexia: Theory, Research, and Clinical Differentiation. (1 cr)


CAPY 5636. Workshop: Disruptive Behavioral Disorders III. (1 cr)

CAPY 5638. Workshop: Prevention Science II. (1 cr)

CAPY 5639. Workshop: Behavior Problems in Preschool Children. (1 cr)

CAPY 5641. Workshop: Prevention Science I—Risk Factors, Protective Factors, and Models of Disorder. (1 cr)


CAPY 5645. Workshop: Innovative Methods in Psychotherapy. (1 cr)

CAPY 5646. Workshop: Methods of Measurement and Assessment in Psychopathology. (1 cr)

CAPY 5647. Workshop: Prevention Science III. (1 cr) Behaviors/mechanisms related to peer rejection. Social skills interventions for promoting positive relationships and for building meaningful friendships.

CAPY 5648. Workshop: Prevention Science IV. (1 cr)

CAPY 5649. Workshop: Personality and Social Development. (3 cr)


CAPY 5653. Introduction to Play Therapy. (1 cr; S-N only) Play explored from normal psychological perspective. Play as powerful modality in treatment of mental health problems in children and in families. Play Therapy with adults. Case Studies, group participation.

CAPY 5654. Summer Practicum in Prevention Science II: Building Friendships and Peer Relationship Skills. (1 cr; A-F or Aud. Prereq—#) Behavior/relations mechanisms related to peer rejection. Social skills interventions for promoting positive relationships and building meaningful friendships. Assignment worked out with instructor. Final exam.

CAPY 5660. ADHD Throughout the Life Span: Perspectives on Diagnosis, Assessment, and Developmental Course. (1 cr; S-N only) SCAPY 5620, CAPY 5669. Prereq—Upper divr ADHD, from its earliest presentation to its later adult manifestations. Clinical depression, diagnostic criteria. Disorders that commonly coexist with ADHD. Standard assessment procedures for making a diagnosis. Developmental changes in clinical procedures.


Courses


CAPY 5670. Preventing Violence and Antisocial Behavior in Children and Adolescents: Interventions, Practices. (1 cr; SCAPY 5662. Prereq–Community and school-based intervention programs aimed at the prevention of antisocial behavior are reviewed and evaluated) Community-/school-based intervention programs aimed at preventing antisocial behavior.

CAPY 5671. Suicide Prevention: Examining What Interventions Work. (1 cr; S-N only) Suicide is examined from a range of perspectives by understanding differences across sex, development, and culture. Suicide prevention techniques are discussed and priorities in the field will be highlighted. Group participation is encouraged.

CAPY 5672. Children’s Exposure to Domestic Violence: Effects on Child Functioning, Treatment Implications. (1 cr: S-N only) Effects of exposure to domestic violence in context of development, from infancy to late adolescence. Assessment strategies, best practices in intervention/prevention for vulnerable children and adolescents. Multidisciplinary approaches to working with children exposed to violence (e.g., judicial, medical, law enforcement partnerships).

CAPY 5673. Prevention Programming: Learning the Skills to Implement a Preventive Intervention. (1 cr; S-N only) Early intervention to reduce antisocial and risk taking behaviors (e.g., suicide, unsafe sex) in teenagers. “Early Risers Skills for Success” program as model for teaching techniques of early prevention. Social-emotional skill training, academic enrichment, monitoring/mentoring, behavioral management techniques group settings, techniques to support/educate parents of a risk children.


CAPY 5676. Suicidal Ideation: Examination of What Interventions Work. (1 cr; S-N only) Suicide is examined from a range of perspectives by understanding differences across sex, development, and culture. Suicide prevention techniques are discussed and priorities in the field will be highlighted. Group participation is encouraged.

CAPY 5677. Children’s Exposure to Domestic Violence: Effects on Child Functioning, Treatment Implications. (1 cr; S-N only) Effects of exposure to domestic violence in context of development, from infancy to late adolescence. Assessment strategies, best practices in intervention/prevention for vulnerable children and adolescents. Multidisciplinary approaches to working with children exposed to violence (e.g., judicial, medical, law enforcement partnerships).

CAPY 5678. Prevention Programming: Learning the Skills to Implement a Preventive Intervention. (1 cr; S-N only) Early intervention to reduce antisocial and risk taking behaviors (e.g., suicide, unsafe sex) in teenagers. “Early Risers Skills for Success” program as model for teaching techniques of early prevention. Social-emotional skill training, academic enrichment, monitoring/mentoring, behavioral management techniques group settings, techniques to support/educate parents of a risk children.

Child Psychology (CPSY)

Institute of Child Development

College of Education and Human Development

CAPY 5251. Social and Philosophical Foundations of Early Childhood Education. (3 cr; Prereq–MED student in ECE or ECSE) Surveys imagery, history, philosophy, and psychology of early childhood education. Analyzing/interpreting trends in early education, including diversity, special needs, legislation, public policy, and educationally appropriate programs.

CAPY 5252. Facilitating Social and Physical Learning in Early Childhood Education. (3 cr; Prereq–Student in early childhood ed or early childhood special ed) Current theoretical/empirical literature and developmental knowledge as basis for planning, implementing, and evaluating social/physical growth/development of young children. For students obtaining ECE/ECSE licensure.

CAPY 5413. Early Childhood and Public Policy. (3 cr) State, federal, and international policies and legislative activity touching first five years of a child's life. Family, community, and institutional roles in promoting children's social, cognitive, and emotional development. Issues related to health, mental health, poverty, developmental delays, and special needs.

CAPY 5414. Individualized Learning Experience in Early Childhood and Public Policy. (1-3 cr; max 3 cr) Prereq–Early Childhood Policy Certificate student. Environmental experiences to support/teaching preschool children. For individuals obtaining ECE license.

CAPY 5501. Foundations in Infant and Early Childhood Mental Health. (1 cr; A-F only. Prereq–Baccalaureate degree in an early-childhood-related field from an institution or documented experience) History, theory, research, concepts, and issues in infant mental health. Issues pertinent to difficulties in development. Readings, visual material. Expert guest lectures.

CAPY 5801. Research Methods in Child Psychology. (3 cr; A-F or Aud. Prereq–Doctoral student) Emphasizes field experiences focusing on intellectual and/or social development of children as individuals or members of groups; may include interactions with children in natural settings, or research on applied topics or with atypical populations.

Chinese (CHN)

Department of Asian Languages and Literatures

College of Liberal Arts

CHN 5011. Research Methods. (4 cr; Prereq–3032 or 3112) Introduction to the sources and approaches of research in language and literature.

CHN 5040. Readings in Chinese Texts. (3 cr; S-N only) Introduction to Chinese literature and culture. Reading of selected works.

CHN 5101. Chinese Survival Skills. (1 cr; S-N or Aud. Prereq–Certified or ECE student) Emphasizes field experiences focusing on intellectual and/or social development of children as individuals or members of groups; may include interactions with children in natural settings, or research on applied topics or with atypical populations.


CHN 5120. Topics in Chinese Linguistics. (4 cr; max 8 cr) Study of the structure and change in the Chinese language.

CHN 5211. Introductory Classical Chinese. (3 cr; max 24 cr) Study of the structure and change in the Chinese language.

CHN 5212. Introductory Classical Chinese. (3 cr; Prereq–3111 or 5211) Study of classical Chinese through reading and analysis of representative texts.

CHN 5393. Directed Study. (1-5 cr; max 18 cr) Reading of selected works.

CHN 8888. Thesis Credit: Doctoral. (1-24 cr; max 100 cr) No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required (Plan A only).

CHN 8996. Directed Field Experiences in Chinese Psychology. (1-6 cr; max 15 cr) Prereq–Doctoral student) Individual empirical investigation.

CHN 8999. Directed Field Experiences in Chinese Psychology. (1-6 cr; max 15 cr) Prereq–Doctoral student) Individual empirical investigation.

CHN 8999. Directed Field Experiences in Chinese Psychology. (1-6 cr; max 15 cr) Prereq–Doctoral student) Individual empirical investigation.
Civil Engineering (CE)
Department of Civil Engineering
Institute of Technology

For definitions of course numbers, abbreviations, and symbols, see page 169.
Courses

CE 8231. Advanced Pavement Engineering. (3 cr; Prereq–4231 or #)
Advanced concepts in pavement analysis and design; computation of stresses and strains in flexible and rigid pavement systems; review of Boussinesq theory, Burmister model, and Westergaard model; load transfer in rigid pavements; temperature induced stresses; mechanics of drainage.

CE 8323. Advanced Bituminous Materials Characterization. (3 cr; Prereq–[3402, grad student] or #)
Applications of viscoelasticity, rheology, elastoplasticity, and fracture mechanics to bituminous materials characterization. Lectures, discussions of advanced research reading assignments, laboratory assignments.

CE 8300. Seminar: Geomechanics. (1-3 cr [max 4 cr]; S-N or Aud; §GEOE 8300)
Presentations on various topics.

CE 8301. Fracture of Geomaterials. (3 cr; A-F or Aud; §GEOE 8301)

CE 8302. Soil/Rock Plasticity and Limit Analysis. (4 cr; A-F or Aud; §GEOE 8302)

CE 8311. Advanced Rock Mechanics. (3 cr; A-F or Aud; §GEOE 8311)
Prereq–IT grad student, 4311 or GeoE 4311 or #) Stress transformations; principal stresses and directions. Friction and behavior of rock joints; stability of frictional sliding. Elastic waves; acoustic emission and seismic measurements. Fragmentation and rock breakage.

CE 8321. Thermoporoelasticity. (4 cr; A-F or Aud; §GEOE 8321)

CE 8322. Storage and Flow of Granular Materials. (3 cr; A-F or Aud; §GEOE 8322)
Prereq–IT grad student, 4301 or #) Plasticity of granular media. Static and dynamic method of slices. Storage and flow of granular materials in bins and silos. Stress concentrations, arching, piping. Experiments on granular material properties and flow.

CE 8331. Modeling Geomechanical Processes. (3 cr; A-F or Aud; §GEOE 8331)

CE 8337. Boundary Element Methods II. (3 cr; A-F or Aud; §GEOE 8337)
Prereq–8336, GeoE 8336 or #) Transient and nonlinear problems.

CE 8341. Dynamics of Soils and Foundations. (4 cr; A-F or Aud; Prereq–Bachelor’s or Aud; GE 8341 in soil mechanics/dynamics or #) Vibration or single/multi-degree-of-freedom systems. Dynamic soil properties. Wave propagation in continuous media. Foundation dynamics. Liquefaction. Introduction to seismology/earthquakes.

CE 8351. Advanced Groundwater Mechanics I. (3 cr; A-F or Aud; §GEOE 8351)
Prereq–4351 or GeoE 4351, IT grad student or #) Solute transport; shallow flow in leaky aquifers; complex variable methods in groundwater flow. Analytic elements for line sinks, line doublets, line dipoles, area sinks, and special analytic elements; singular Cauchy integrals; analytic elements in domains with closed boundaries.

CE 8352. Advanced Groundwater Mechanics II. (3 cr; A-F or Aud; §GEOE 8352)
Prereq–4351 or GeoE 4351, IT grad student or #) Applying complex methods, including conformal mapping, in groundwater mechanics; solving problems with free boundaries using the hodograph method; drains in aquifers with free boundaries; superposition of solutions with drains; singular Cauchy integrals; boundary elements.

CE 8361. Engineering Model Fitting. (3 cr; A-F or Aud; §GEOE 8361)
Prereq–IT grad student or #) Parameter estimation and inverse modeling for civil and geological engineering. Formulating engineering model fitting problems; comparing and selecting various fit criteria; implementing numerical algorithms; analyzing and interpreting results using both statistical and qualitative tools; designing future measurement plans.

CE 8400. Seminar: Structures. (1 cr [max 3 cr]; S-N or Aud)
Content depends on instructor and student. Sample topics: theory of elasticity, optimization, reliability, wave propagation, soil dynamics, equipment, wind forces on structures, structural failures, modern construction practices.

CE 8401. Fundamentals of Finite Element Method. (3 cr; A-F or Aud; Prereq–4411 or #)
Elements of calculus of variations; weak and strong formulations of linear continuum and structural problems. Isoparametric elements and numerical integration. Basic concepts of error analysis and convergence. Analysis of plates and shells. Introduction to mixed methods and time dependent problems.

CE 8402. Nonlinear Finite Element Analysis. (3 cr; A-F or Aud; Prereq–8401 or #; offered alt yrs)

CE 8411. Plate Structures. (3 cr; A-F or Aud; Prereq–5411 or #; offered alt yrs)

CE 8412. Shell Structures. (3 cr; A-F or Aud; Prereq–IT grad or #) Static analysis of thin elastic shells based on Love’s postulates. Membrane and bending theorems. Static stresses in cylindrical and conical shells. Buckling of shells of revolution. Offered alternate years.


CE 8422. Earthquake Engineering. (3 cr; A-F or Aud; Prereq–8421 or #) Introduction to earthquake engineering; response spectra; energy absorption capacity of structures; estimation of damping; earthquake resistant design; seismic design; soil-structure interaction. Blast resistant design. Wind effects on structures.

CE 8431. Structural Stability. (3 cr; A-F or Aud; Prereq–IT grad student or #) Classification of discrete/continuous conservative/nonconservative systems. Buckling analysis of, e.g., structural members, frameworks, and plates by classical/numerical methods. Offered alternate years.

CE 8432. Analysis of Thin-Walled Members. (3 cr; A-F or Aud; Prereq–5411 or #) Analysis of thin-walled structural members based on Vlasov theory and its modifications. Members with open and closed cross sections. Second-order effects and buckling. Influence of inelastic material behavior on buckling.

CE 8441. Plastic Design of Steel Structures. (3 cr; A-F or Aud; Prereq–4413 or #; offered alt yrs) Plastic analysis and design of structures with applications to grillages, continuous beams, portal and gable frames. Collapse mechanisms and plastic deformations. Minimum weight design.

CE 8442. Nonlinear Analysis of Structural Systems. (3 cr; A-F or Aud; Prereq–4411, 4413 or #; offered alt yrs) Advanced theory and computational techniques for analyzing complex structural building systems. Using comprehensive geometric and material nonlinear analysis for designing steel and composite structures.

CE 8443. Fatigue and Fracture of Steel Structures. (3 cr; A-F or Aud; Prereq–4412 or #; offered alternate years) Fracture mechanics, ductile fracture, ferrous metallurgy, welding, S-N curves of steel structures. Emphasizes design/materials selection, evaluation, and repair of existing structures. Case studies such as fracture of steel structures during earthquakes, fatigue of large vehicular frames, and fatigue of bridge structures.

CE 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

CE 8451. Behavior of Reinforced Concrete Structures. (3 cr; A-F or Aud; Prereq–4412 or #) Advanced topics; experimental and theoretical background to design code provisions. Moment-curvature analysis of members. Shear; torsion; disturbed regions. Beam column joints; shear walls. Effects of earthquake loading. Limit analysis.


CE 8490. Special Topics. (1-3 cr [max 3 cr]; A-F or Aud; Prereq–#) Topics vary depending on faculty and student interests.

CE 8500. Environmental Seminar. (1 cr [max 3 cr]; S-N or Aud; Prereq–grad CE major or #) Broad coverage of topics in environmental engineering and science. Speakers consist primarily of graduate students in these areas, but presentations may also be given by University faculty and guest speakers.

CE 8501. Environmental Fluid Mechanics I. (4 cr; A-F or Aud; Prereq–3502 or equiv or #) Basic laws of mass, energy, and momentum transport in environmental fluid flow. Exact and approximate solutions for viscous flow. Irotational flow; gravity waves. Similitude and inspectional analysis. Laminar boundary layers and slender flows. Application to engineering and environmental problems.

CE 8502. Environmental Fluid Mechanics II. (4 cr; A-F or Aud; Prereq–8501 or #) Reynolds equations. Developed and developed turbulent boundary layers and slender flows, and their interaction with inviscid flow. Jets, plumes, wakes and shear layers. Statistical description of turbulence; data analysis.

CE 8503. Environmental Mass Transport. (4 cr; A-F or Aud; Prereq–3502, 3501 or equiv or #) Principles of intraphase and interfacial chemical transport and fate in the environment, specifically the
processes of diffusion, dispersion, and convection. Application to surface water and atmospheric mixing, dispersion in groundwater, and transport between these media.

CE 8504. Theory of Unit Operations. (4 cr; A-F or Aud. Prereq–4541, 4531) Theoretical basis, design, and operation of chemical and physical processes used in treating and controlling water quality, including adsorption, ion exchange, sedimentation, thickening, filtration, gas transfer, coagulation, flocculation, membrane processes, and disinfection.

CE 8505. Biological Processes. (3 cr; A-F or Aud. Prereq–4542, 4501 or #) Theoretical principles underlying chemical and biological wastewater treatment processes, including aerobic and anaerobic processes for organic carbon and nutrient removal. Mathematical models of microbial growth kinetics and mass transport in suspended growth and attached film applications are developed.

CE 8506. Stochastic Hydrology. (4 cr; A-F or Aud. Prereq–Stat 3021 or equiv or #) Analysis and synthesis of hydrologic series and systems; derived distributions; uncertainty and risk analysis; flood frequency analysis; multivariate time series analysis; correlation and spectral analysis; series of long-range dependence; linear estimation; geostatistics; sampling networks; hydrologic forecasting.


CE 8541. Aquatic Chemistry. (3 cr; A-F or Aud. Prereq–4541 or #) Advanced course on water chemistry; physical chemical principles and geochemical processes controlling the chemical composition of natural waters, soil- and sediment-water interactions. Emphasizes behavior of inorganic contaminants in natural waters and engineered systems and dissolved natural organic matter.


CE 8551. Environmental Microbiology: Molecular Theory and Methods. (3 cr; A-F or Aud. Prereq–Microbiol 2001 or equiv) Introduction to microbial genetics and molecular phylogeny. Application of nucleic-acid techniques in environmental microbiology and microbial ecology.

CE 8552. Groundwater Microbiology: Laboratory. (4 cr; A-F or Aud. Prereq–grad CE major or #, exposure to basic environmental microbiology) Subsurface microbial ecology, biogeochemical cycling, metabolic classification of subsurface bacteria, modeling bacterial transport, diagnosis of microbial induced fouling (MIF) events, bioremediation of contaminated aquifers. Lectures and four lab hours per week.


CE 8562. Analysis and Modeling of Aquatic Environments II. (3 cr; max 6 cr) Prereq–Grad CE 8553, grad student or #) Models for transport/transfer of pollutants, nutrients, particulates, ecosystems, etc., from recently completed theses, articles, or research in progress. Students review assigned recent papers, make presentations, and analyze a topic of their choice.

CE 8563. Industrial Waste Treatment. (3 cr; A-F or Aud. Prereq–3501, 4501, 4502 or equiv or #) Introduction to industrial waste treatment. Individual industries, emphasizing constituents of the waste-stream and how best to recycle, recover, or reduce wastes. Cost concerns and regulations. Field trips to various industries to gain first-hand knowledge of processes involved in treatment.

CE 8571. Hydraulic Measurements. (3 cr; A-F or Aud. Prereq–3502 or #) Lab and field methods and instruments for measuring hydraulic pressure, velocity, and discharge.

CE 8572. Computational Environmental Fluid Dynamics. (4 cr; A-F or Aud. Prereq–grad student in IT or COAFES or #) Finite difference methods, their application to solution of one-/two-dimensional problems in environmental fluid dynamics. Stability, convergence, consistency and accuracy of numerical schemes. NAVOS equations, their physical meaning, and their numerical solution. Turbulence modeling: RANS and LES.

CE 8581. Research and Professional Ethics in Water Resources and Environmental Science. (5 cr; S-N or Aud. Prereq–8551. Prereq–ENVI0ntal engineering or water resource science) grad student or #) Ethics of water resources science and environmental engineering research/practice. Professional responsibility, plagiarism, recording-keeping, authorship, confidentiality, conflicts of interest, professional relationships, fraud, reporting misconduct. Meets during first eight weeks of spring semester.

CE 8866. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed preliminary oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 6 combined cr)

CE 8877. Thesis Credits: Master’s. (1-18 or [max 50 cr]; No grade. Prereq–Grad 8518 18 cr per semester or summer; 10 or total required [Plan A only])

CE 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

Classical and Near Eastern Studies (CNES)

College of Liberal Arts

CNES 5013. Introduction to Roman Law. (3 cr) Survey of Roman law from social and historical perspectives. Basic concepts of Roman private law and legal procedure.


CNES 5070. Topics in Ancient Religion. (3 cr; max 18 cr) Prereq–Relt 5070. Prereq–Sr or grad student or #) Specific aspect of religion in Classical and Near Eastern antiquity, such as healing cults, magic/divination, Gnosticism, or prophecy/authority. Topics specified in Class Schedule.

CNES 5071. Greek and Hellenistic Religions. (3 cr; §CNES 3071, RELA 3071, RELA 5071. Prereq–#) Greek religion from the Bronze Age to Hellenistic times. Sources include literature, art, and archaeology. Homer and Olympian deities; ritual performance; prayer and sacrifice; temple architecture; death and the afterlife; mystery cults; philosophical religion; Near Eastern salvation religions. Meets with 3071.


CNES 5076. Apostle Paul: Life, Letters, and Legacy. (3 cr; §CNES 3076, RELA 3076, RELA 5076) How/what can we know about Paul. What his message was. What he was fighting. How he was later understood by friends/foes.

CNES 5080. New Testament Proseminar. (3 cr [max 18 cr]; § RELA 5080. Prereq–1082 or 3072 or equiv) Study of some specific aspect of the New Testament and related literature. The class is organized as a discussion seminar. Topics specified in Class Schedule.
Courses


CNES 5082W. Greek Tragedy in Translation. (3 cr) Origins of tragedy. Selected plays of Aeschylus, Sophocles, and Euripides

CNES 5083. Ancient Comedy. (3 cr) Greek/Roman comic drama (e.g., Aristophanes, Menander, Plautus, Terence).

CNES 5103. Hellenistic and Early Roman Art and Archaeology. (3 cr; §ARTH 5103. Prereq-Jr, CLS/ARTH 3308 or #) Sculpture, architecture, painting, and topography in developing centers of Hellenistic culture in eastern Mediterranean and in Etruscan and Roman towns, from 400 B.C. to the beginnings of the Roman Empire.

CNES 5108. Greek Architecture. (3 cr; §ARTH 5108. Prereq-Jr, CLS/ARTH 3308 or #) Geometric through classical examples of religious and secular architecture and their setting at archaeological sites in Greece; Asia Minor and Italy.

CNES 5111. Prehistoric Art and Archaeology of Greece. (3 cr; §ARTH 5111. Prereq-Jr, Greek art or archaeology course or #) Artistic and architectural forms of Neolithic period in Aegean area and Cycladic, Minoan, and Mycenaean cultures. Aims and methods of modern field archaeology; the record of human habituation in the Aegean area. Archaeological evidence as a basis for historical reconstruction.

CNES 5112. Archaic and Classical Greek Art. (3 cr; Prereq-Jr, CLS/ARTH 5111) Sculpture, painting, architecture and minor arts in Greek lands from the 9th through 5th centuries B.C. Examination of material remains of Greek culture; archaeological problems such as identifying and dating buildings; analysis of methods and techniques. Emphasis on Periklean Athens.

CNES 5120. Field Research in Archaeology. (3-6 cr [max 6 cr]; §ARTH 5120, CLCV 5120. Prereq—I) Field excavation, survey, and research at archaeological sites in the Mediterranean area. Techniques of excavation and exploration; interpretation of archaeological materials.

CNES 5172. House, Villa, Tomb: Roman Art in the Private Sphere. (3 cr; §ARTH 5172. Prereq—Intro art history course or #) Architecture, painting, and sculpture of urban houses, country estates, and tombs in Roman world. Relationships between public/private spheres and literary/physical evidence. Usefulness of physical evidence in illuminating gender roles.

CNES 5182. Art and the State: Public Art in the Roman Empire. (3 cr; §ARTH 5182. Prereq—Intro art history course or #) Origins of Roman public art. Use in maintaining community. Exploitation by first emperor, Augustus. Development/diffusion through later empire. Varying capabilities to adjust to demands of a Christian Empire.

CNES 5211. Archaeology of Herodian Israel. (3 cr; A-F or Aud. §RELA 5211, RELS 5211. Prereq—One course in archaeology or ancient history) Archaeological sites in Israel dating to era of Herod the Great (37-4 B.C.), Palaces and religious edifices. Remains from Jewish/gentile settlements throughout the kingdom. Course readings consist of contemporary literary sources and excavation reports.

CNES 5252. History of Early Christian Art in Context. (4 cr; §ARTH 5252. Prereq—Socs or intro art history course or #) Role played by art in formation of early Christian/Byzantine communities and in establishing their relationships with Pagan world and early Islam.

CNES 5340. Practicum in Archaeological Field and Computer Techniques. (3 cr; §ARTH 5340, ARTH 5340, CLCV 3340, CNES 3340. Prereq—CVic or major in art and archaeology course or #) Methods used for excavation of Old and New World sites. Meets at archaeometry/computer lab for 3 cr. of the semester and at a selected site in Minnesota for day-long sessions for 9 to 10 weeks. Meets with 3340.

CNES 5502. Ancient Israel: From Conquest to Exile. (3 cr; §CNES 5502, HIST 3502, RELA 3502. Prereq—Knowledge of Hebrew not required. 5561 recommended) Israelite history in context of what is known from Egyptian, Canaanite, and Mesopotamian sources. Focuses on issues raised by archaeological data related to Israelite conquest of Canaan.


CNES 5535. Death and the Afterlife in the Ancient World. (3 cr; §CNES 5535, RELA 5535, RELA 5535) Beliefs, attitudes, and behaviors related to death and afterlife found in cultures of ancient Mediterranean and Near Eastern literature. Archaeological and literary evidence for burial practices and care of dead.


CNES 5713. Introduction to Ugaritic. (3 cr; Prereq—Adv Hebrew, previous study of biblical texts or #) Ugaritic alphabetic cuneiform script, morphology, and syntax. Reading of representative samples of Ugaritic literature. Attention to linguistic and cultural issues and links to biblical and other Ancient Near Eastern texts.

CNES 5794. Introduction to Classical and Near Eastern Studies. (1 cr; S-N or Aud. Prereq—grad major, minor or #) Introduces core research materials and reference materials in the various disciplines which make up classical studies.

CNES 5996. Directed Instruction. (1-12 cr [max 12 cr]; Prereq—I, Δ, ∞) Guided individual research or study.

CNES 5994. Directed Research. (1-12 cr [max 12 cr]; Prereq—I, Δ, ∞) Guided individual research or study.

CNES 5994. Directed Research. (1-12 cr [max 12 cr]; Prereq—I, Δ, ∞) Guided individual research or study.

CNES 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq—Max 18 cr per semester or summer; 10 cr total required (Plan A only))

CNES 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

CNES 8950. Topics in Classical & Near Eastern Studies. (3 cr [max 12 cr]) Topics such as slavery, women in antiquity, pagans and Jews, the taboo, and modern study of myth.

Clinical Laboratory Science (CLS)

Department of Laboratory Medicine and Pathology

Medical School

CLS 5064. Introduction to Clinical Immunohematology. (2 cr; A-F or Aud. §MEDT 4084. Prereq—I) Principles of blood grouping, antibody identification, compatibility testing, serology, and immunology.

CLS 5065. Introduction to Clinical Immunohematology: Laboratory. (2 cr; A-F or Aud. §MEDT 4065. Prereq—I) Exercises illustrating techniques in blood grouping, antibody identification, compatibility testing, and detection of antibodies by serological and immunological methods.

CLS 5090. Special Laboratory Methods. (1-2 cr [max 2 cr]; A-F or Aud. §MEDT 4090) Assignment on an individual basis to one of a variety of special areas of experience in the clinical lab.


CLS 5104. Principles of Diagnostic Microbiology: Lecture. (2 cr; A-F or Aud. §MEDT 4104. Prereq—One microbiology course with lab, one biochemistry course, #) Current techniques used in lab diagnosis of infectious disease. Isolating/identifying bacteria and yeasts. Antimicrobial susceptibility testing. Lecture.

CLS 5105. Principles of Diagnostic Microbiology: Laboratory. (2 cr; A-F or Aud. §MEDT 4105. Prereq—One microbiology course with lab, one biochemistry course, #) Current techniques used in lab diagnosis of infectious disease. Isolating/identifying bacteria/yeasts. Antimicrobial testing. Laboratory.

CLS 5120. Seminar: Clinical Laboratory Science. (1 cr [max 3 cr]; S-N or Aud. Prereq—I) Current literature. Presentation/discussion of research.

CLS 5121. Journal Presentations. (1 cr [max 2 cr]; S-N or Aud. Prereq—1st yr CLS grad student) Critical analysis, evaluation, discussion of current journal articles in student’s specialty area.

CLS 5125. Practicum Teaching. (1-2 cr [max 2 cr]; A-F or Aud. Prereq—I) Supervised teaching experience, develop skills using instructional materials, tests, and measurements.

CLS 5127. Introduction to Management and Education I. (1 cr; A-F or Aud. §MEDT 4127W. Prereq—I) Leadership styles, employee selection and evaluation, communications, motivation, morale, discipline, job descriptions, record keeping, budgets, cost accounting, purchasing, product evaluation, lab safety, labor relations, government regulations.

CLS 5130. Practicum in Laboratory Administration. (2 cr; A-F or Aud. Prereq—I) Supervised experience and assignment of specific problems related to lab service and management in health care institutions.
CLS 5140. Techniques for Teaching. (2 cr; A-F or Aud. Prereq—#) Developing objectives, classroom activities, and evaluation criteria for medical technology education.

CLS 5165. Advanced Clinical Immunohematology. (3 cr; A-F or Aud. Prereq—#) Observation, study, and practice in special problems, advanced techniques, and methodology.

CLS 5251. Hematology I: Basic Techniques. (3 cr; A-F or Aud. §MEDT 4251. Prereq—#) Theory and application of basic principles and techniques in clinical hematology and hemostasis. Lecture and lab.

CLS 5252. Hematology II: Morphology and Correlation. (2 cr; A-F or Aud. §MEDT 4252. Prereq—#) Fundamentals of blood and bone marrow examination emphasizing microscopic identification of immature and abnormal cells. Clinical correlation of lab findings in hematology and hemostasis. Lecture and lab.

CLS 5253. Hemostasis. (1 cr; A-F or Aud. §MEDT 4253. Prereq—#) Theory and application of specific concepts and techniques in hemostasis and coagulation. Lecture and lab.


CLS 5311. Clinical Chemistry I: Laboratory Applications. (2 cr; A-F or Aud. §MEDT 4311. Prereq—One organic chemistry course with laboratory; one biochemistry course, #) Application of clinical chemistry principles and laboratory techniques in the analysis of urine, plasma, and body fluids. Emphasis on laboratory tests to evaluate renal function, electrolytes, and acid-base balance. Introduction to principles and processes for managing test quality, Laboratory.

CLS 5320. Clinical Chemistry II: Lecture. (2 cr; A-F or Aud. §MEDT 4320. Prereq—organic chem course with lab, biochem course, §310 or MEDT 4310, #) Principles and theory of clinical chemistry for assessing metabolic disease/dysfunction involving hormones, enzymes, lipids/proteins, cardiac function, liver, and digestive tracts. Emphasis on measurement methods and physiological significance.

CLS 5321. Clinical Chemistry II: Laboratory Applications. (2 cr; A-F or Aud. §MEDT 4321. Prereq—organic chem course with lab, biochem course, §310 or MEDT 4310, #) Application of clinical chemistry principles and lab techniques in analyzing serum, plasma, and urine. Focus on tests to evaluate selected disorders. Developing lab and instrumentation use skills with emphasis on quality control and technique.

CLS 5768. Advanced Hematology. (5-10 cr [max 30 cr]; A-F or Aud. Prereq—#) Practical experience collecting bone marrow from patients. Diagnosing hematological diseases by evaluating and interpreting cells from clinical specimens of bone marrow, peripheral blood, and, if applicable, lymph nodes.

CLS 5864. Research Seminar. (1 cr [max 10 cr]; S-N or Aud. Prereq—#) Departmental research seminar series.

CLS 5865. Departmental Seminar. (1 cr [max 10 cr]; S-N or Aud. Prereq—#) Departmental clinical lab research seminar series.

CLS 8193. Advanced Topics in Clinical Chemistry. (2 cr; Prereq—#) Includes use of molecular approaches to diagnosis and risk assessment of selected diseases.

CLS 8194. Research on Clinical Laboratory Problems. (1-3 cr [max 3 cr]; Prereq—#) Individual research project in a selected area.

CLS 8293. Educational Administration in Medical Technology. (2 cr; Prereq—#) Responsibilities of administration to students, faculty, and educational community. Curriculum planning, accreditation, staffing, student selection, finances. Sample administrative problems and decisions used as practice vehicles.

CLS 8333. FTE: Master’s. (1 cr. No grade. Prereq—Master’s student, adviser and DGS consent)

CLS 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq—Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Cognitive Science (CGSC) College of Liberal Arts


CGSC 8001. Prosemair in Cognitive Science. (2 cr; S-N or Aud. Prereq—Grad cogn sci minor or #) Survey of major topics, including theoretical assumptions, methods, and samples of current research.


CGSC 8380. Seminar: Topics in Cognitive Science. (1-3 cr [max 6 cr]; §PHIL 8460). Prereq—Grad cogn sci minor or #) Lectures and in-depth discussion on a topic.

CGSC 8410. Perspectives in Learning, Perception, and Cognition. (2 cr [max 24 cr]; S-N only) Lectures/discussions in cognitive sciences by local/visiting faculty.

College of Food, Agricultural and Natural Resource Sciences (CFAN) College of Liberal Arts

CFAN 5500. International Field Studies Seminar. (3 cr; A-F or Aud. Prereq—#) Interface of agriculture with natural resource, environmental, economic, food safety, public policy, ethical issues transcending national borders. Seminars take place in various countries/regions. Active learning, lectures, discussion tutorials, field trips, reports, exams.

Communication Studies (COMM)

Department of Communication Studies

College of Liberal Arts

COMM 5110. Special Topics in Communication Theory. (3 cr [max 6 cr]) Advanced theoretical problems. See department office for current offering.


COMM 5211. Critical Media Studies: Theory and Methods. (3 cr; A-F only. Prereq—#) Survey of theories, research methods, and scholars dominating critical media studies since late 1920s.


COMM 5233W. Electronic Media and National Development. (3 cr)

Use of electronic media to change social, political, economic, and cultural life. Use by developing nations to improve agricultural practices, hygienic standards, literacy, and awareness of civic responsibility.

COMM 5261. Political Economy of Media Culture. (3 cr; Prereq—#) Organizational practices of media communicators. Media content as link between communicators and audiences. How viewers use/process media content.

COMM 5271. Media Historiography. (3 cr; A-F only. Prereq—#) Critical media studies perspective (political economy, cultural, and technological) on history of mass media in the U.S., 1800s to present. Conceptual approaches to writing of media history. Skills/techniques for doing historical research in media studies.

COMM 5401. Advanced Theories of Communication. (3 cr; Prereq—#) Survey of major theoretical approaches to communication including, positivism, constructivism, and systems.

COMM 5402. Advanced Interpersonal Communication. (3 cr; Prereq—#) Social scientific approaches to interpersonal communication. Theory, research findings.


COMM 5406. Communication and Gender. (3 cr; §GWSS 3500. Prereq—One women’s studies course, #) How gender affects verbal communication. Development of analytical skills through readings, exercises, research that raise awareness of the power of language and the influence of gender prescriptions. Comparisons across languages where possible.


COMM 5411. Small Group Communication Research. (3 cr; A-F or Aud. Prereq—#) Survey of small group communication research: theory and practice. Group decision-making and leadership.

COMM 5421. Quantitative Methods in Communication Research. (3 cr; A-F or Aud. Prereq—#) Social scientific methods used in studying human communication. Optional data processing laboratory for additional credit.

COMM 5431. The Process of Persuasion. (3 cr; Prereq—#) Communication campaigns (e.g., advertising, political) illustrating persuasive processes and theories. Research paper required.

COMM 5441. Communication in Human Organizations. (3 cr; Prereq—#) Communication in organizational settings. Organizational structure and dynamics and their effect upon the communication process. Individual projects.
Courses

COMM 5411W. Intercultural Communication Processes. (3 cr)
Theory and research on cultural differences in values, norms, behaviors, and perceptions that affect communication across cultures internationally and domestically.

COMM 5461. Conversation Analysis. (3 cr; §LING 5461.
Prereq–Ling 3001 or Ling 5001)
Discourse processes in dyadic and multiparty conversation. Application of concepts through analysis of conversations.

COMM 5462. Field Research in Spoken Language. (3 cr; §LING 5462; Prereq–Ling 5001 or Ling 5001)
Tape recording and analyzing verbal communication and movement related to it. Applying concepts to recorded conversations.

COMM 5511. Survey of Rhetorical Theory. (3 cr; Prereq–1101)
Survey of rhetorical theory from ancient to contemporary period; application of theory to public discourse.

COMM 5515W. Introduction to Rhetorical Criticism. (3 cr; Prereq–1101; 3601 recommended)
Analysis of public discourse using various theoretical perspectives.

COMM 5517. History and Criticism of U.S. Public Discourse: 1600-1865. (3 cr; Prereq–1101)
How discourse has been used to establish or maintain power. Speeches and public debates used to examine American public address from 17th century (e.g., Puritan sermons) to the Civil War.

COMM 5518. History and Criticism of U.S. Public Discourse: 1865-1950. (3 cr; Prereq–1101)
How discourse has been used to establish or maintain power. Speeches and public debates used to examine U.S. public address from the mid 19th century to 1950.

COMM 5970. Directed Study. (1-3 cr [max 6 cr]; S-N or Aud.
Prereq–Nine 300-500 SPOT cr #, A, J)
Guided individual reading or study.

COMM 5994. Communication Research Practicum. (1-3 cr [max 9 cr]; S-N or Aud. Prereq–#)
Students participate in research group.

COMM 8110. Seminar: Advanced Speech Problems. (3 cr [max 15 cr]; Prereq–undergrad degree in spch-comm or equiv)
Evaluation of research methods in speech-communication.

COMM 8210. Seminar: Selected Topics in U.S. Electronic Media. (3 cr [max 6 cr]; Prereq–5210 or #; offered when feasible)
Literature survey; evaluating research on topics; conducting independent research project on a particular topic.

COMM 8211. Critical Communication Studies: History, Theory, Method. (3 cr)
Qualitative research methods for studying media institutions, texts, audiences, and contexts.

COMM 8231. Seminar: National and International Electronic Media Systems. (3 cr; Prereq–5421 or #)
Historical and contemporary aspects of national and international electronic media systems. Roles of national and international regulatory bodies. Approaches to programming and evidence of effectiveness.

COMM 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

COMM 8402. Seminar: Interpersonal Communication. (3 cr; Prereq–5402 or #)
Evaluate and develop new perspectives for analyzing, diagnosing, and managing interpersonal communication problems.

COMM 8403. Seminar: Emotion and Communication. (3 cr)
Major theories of emotion and the role of emotion in communication.

COMM 8406. Seminar: Language and Gender Research. (3 cr; Prereq–5406)
Readings and research on current issues. Data collected to test hypotheses and apply theory.

COMM 8411. Seminar: Small Group Communication Theory. (3 cr)
Research problems and methods.

COMM 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

COMM 8451. Seminar: Intercultural and Diversity Research. (3 cr; Prereq–#)
Development of ideas/methods for research project, M.A. Plan B project, or Ph.D. dissertation.

COMM 8452. Seminar: Methods of Intercultural/Diversity Facilitation. (3 cr; Prereq–5441 or 5452 recommended)
Theories of and techniques for managing effective intercultural communication and diversity. Intercultural training.

COMM 8502. Seminar: Communication Theory Construction. (3 cr; Prereq–5421 or #)
Logic of communication theory development and modification from a social scientific perspective. Types of communication theories.

COMM 8503. Historical and Descriptive Research in Speech-Communication. (3 cr)
Elements involved in conducting and analyzing historical and descriptive research; approaches to historical research, assessing primary and secondary sources; completing a major research project.

COMM 8504. Seminar: Rhetorical Criticism. (3 cr; Prereq–5610)
Rhetorical criticism theories and methods. Rhetoric as applied to literary studies and the growth of hermeneutics as vantage points for reassessing rhetorical methods.

COMM 8606. Seminar: Rhetorical Analysis of Campaigns and Movements. (3 cr; Prereq–5431, 5617 or 5618, 10 soc sci or #)
Literature and methodology in historical and contemporary rhetorical campaigns and movements.

COMM 8611. Seminar: Rhetoric. (3 cr [max 6 cr]; Prereq–5611 or #)
History/criticism of rhetorical theory. Research in rhetoric.

COMM 8625. Seminar: Communication Ethics. (3 cr; A-F or Aud. Prereq–Ethics course or #)
Independent research on communication ethics in interpersonal, group, organizational, intercultural, and media settings. Theories of ethics and methods of analysis.

COMM 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; Automatic registration, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

COMM 8777. Thesis Credits: Master’s. (1-18 cr [max 18 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 total required [Plan A only])

COMM 8868. Thesis Credits: Doctoral. (1-24 cr [max 24 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

COMM 8994. Directed Research. (1-3 cr [max 6 cr]; S-N or Aud.
Supervised research project.

Comparative and Molecular Biosciences (CMB)

College of Veterinary Medicine

CMB 5180. Ecology of Infectious Diseases. (3 cr; A-F only. §PUBH 6180. Prereq–AVMB or CMB or VMED grad student or #)
Ways in which host, agent, and environmental interactions influence transmission of infectious agents. Environmental dissemination, eradication/ control, evolution of virulence, analytical/molecular tools.

CMB 5200. Statistical Genetics and Genomics. (4 cr; A-F or Aud. §SANCS 5200)
Statistical issues in genomics. Gene detection, including statistical analysis/designs for linkage study and for mapping quantitative trait loci. Linkage analysis using pedigree data for codominant/dominant markers. Using radiation hybrid mapping and single cell typing. Design issues in linkage analysis, parentage testing, and marker polymorphism.

CMB 5335. Molecular Biotechnology Laboratory for the Novice. (2 cr; S-N only)
Five day course. Understanding/applying basic concepts of biotechnology. Lectures, hands-on lab experiments.

CMB 5381. Pathogenesis of Infectious Zoonotic Diseases. (3 cr; A-F only. Prereq–[Grad student, microbiology, biochemistry] course or #)
Introductory to mechanisms of transmission/pathogenesis for zoonotic infectious diseases. Lectures, review of current literature, student presentations, written reports.

CMB 5594. Directed Research in Comparative and Molecular Biosciences. (1-4 cr [max 8 cr]; Prereq–Jr)
Independent study as determined by instructor. Usual activity includes conduct of research in instructor’s lab.

CMB 6100. Research Rotation in Comparative and Molecular Biosciences. (3 cr; Prereq–1st yr CMB grad student)
Directed research lab rotations. Experimentation, supplemental reading, research presentations under guidance of faculty member who is potential thesis adviser. Taught by program faculty.

CMB 6706. Thematic Tutorial in Comparative and Molecular Biosciences. (1 cr; No grade. Prereq–Master’s student, DGS consent)
Theoretical tutorial in an area of interest. Course work consists of a review of published literature and discussions with faculty. Section is for students who have not completed a special project or thesis.

CMB 7110. Thesis Credit: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

CMB 7131. Thesis Credit: Doctoral. (2 cr; §SANCS or #)

CMB 7810. Independent Study in Comparative and Molecular Biosciences. (1-6 cr; A-F or Aud. Prereq–Grad student)
Independent study in an area of interest. Course work consists of a review of published literature and discussions with faculty. Section is for students who have not completed a special project or thesis.

CMB 8021. Seminar: Topics in Comparative and Molecular Medicine. (3 cr; Prereq–5617)
Research topics in an area of interest. Course work consists of a review of published literature and discussions with faculty. Section is for students who have not completed a special project or thesis.

CMB 8201. Pathogenesis of Infectious Zoonotic Diseases. (3 cr; A-F or Aud. Prereq–[Grad student, microbiology, biochemistry] course or #)
Introductory to mechanisms of transmission/pathogenesis for zoonotic infectious diseases. Lectures, review of current literature, student presentations, written reports.

CMB 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

CMB 8335. Molecular Biology Techniques. (3 cr; §SANCS 8313. Prereq–Biol 5001, Biol 5003 or equiv or #)
Basic theory and current methodologies of molecular biology and recombinant DNA technology. Lab work includes DNA and RNA hybridization, gene transfer, and polymerase chain reaction techniques. Primarily for students with limited exposure to molecular biology.

CMB 8344. Mechanisms of Hormone Action. (2 cr; Prereq–Course in biochemistry or cell biology or #)
Mechanisms of hormone/cytokine action. Focuses on major signal transduction/apoptosis. Topics incorporate pharmacology, biochemistry, and cell biology of hormone action in relevant physiological systems. Lectures on basic principles. Specialized lectures. Discussion of primary literature.
Courses

Department of Cultural Studies and Comparative Literature

College of Liberal Arts

CL 5331. Discourse of the Novel. (3 cr; §CSCL 5331) Comparative study of the novel (eighteenth century to present): its relation to ordinary language practices, emergent reading publics, technologies of cultural dissemination, problems of subjectivity; its role in articulating international cultural relations.

CL 5555. Introduction to Semiotics. (3 cr; §CSCL 5555) Problems of the nature of the sign; sign function; sign production; signifying systems as articulated in philosophy, linguistics, anthropology, psychoanalysis, and art theory. Applying semiotics to various signifying practices (e.g., literature, cinema, daily life).


CL 5910. Topics in Comparative Literature. (3 cr [max 24 cr]) Topics specified in Class Schedule.

CL 5992. Directed Reading in Comparative Literature. (1-3 cr [max 9 cr]; Prereq–) Guided individual reading and study.

CL 8001. Basic Seminar in Comparative Literature I. (3 cr; Prereq–CL or Germanic Studies grad major) Key texts, positions, and problematic issues in field of comparative critical theory. Historical precursors, influential contemporary debates, and disciplinary genealogies.

CL 8002. Basic Seminar in Comparative Literature II. (3 cr) Key texts, positions, and problematic issues in field of comparative critical theory. Special attention to historical precursors, influential contemporary debates, and disciplinary genealogies.

CL 8333. FTE: Master's. (1 cr; No grade. Prereq–Master's student, adviser and DGS consent) Directed research determined by student's interests, in consultation with faculty mentor.

CL 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

CL 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]) No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CL 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade) Prereq–Max 18 cr per semester or summer; 24 cr required

CL 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

Comparative Studies in Discourse and Society (CSDS)

CSDS 5301. Society, Ideology, and the Production of Art. (3 cr; §CSCL 5301) Recent critical theories of relation of arts to social/ideological forces. Selected artifacts from Western culture (e.g., Renaissance to 20th century; high, popular, mass culture). Music, visual art, literature.

CSDS 5302. Aesthetics and the Valuation of Art. (3 cr; §CSCL 5302) Society, ideology, aesthetic value in light of recent critical theories of visual art, music, literature, Mediations of place, social class, gender, ideology on aesthetic judgment in post-renaissance Western culture.

CSDS 5555. Introduction to Semiotics. (3 cr) Problems of the sign. Sign function/production. Signifying systems as articulated in philosophy, linguistics, anthropology, psychoanalysis, and art theory. Applying semiotics to various signifying practices (e.g., literature, cinema, daily life).

CSDS 5751. Basic Concepts of Cinema. (4 cr; §CL 5751, CSDS 5751) Cinema as object of theoretical/historical analysis. Emphasizes concepts that have transformed scope/aim of film analysis since 1960s. Readings of filmic/theoretical texts.

CSDS 5910. Topics in Comparative Studies in Discourse and Society. (3 cr [max 24 cr]) Themes in comparative, sociohistorical analysis of discursive practices. Individually or team taught. Topics specified in Class Schedule.

CSDS 5993. Directed Study. (1-3 cr [max 9 cr]; Prereq–) Guided individual reading and study.

CSDS 8001. Basic Seminar: Comparative Studies in Discourse and Society I. (3 cr; Prereq–CSDS or Germanic Studies Grad major) Key texts, positions, and problematic issues in field of comparative critical theory. Historical precursors, influential contemporary debates, and disciplinary genealogies.

CSDS 8002. Basic Seminar in Comparative Studies in Discourse and Society II. (3 cr) Key texts, positions, and problematic issues in field of comparative critical theory. Special attention to historical precursors, influential contemporary debates, and disciplinary genealogies.

CSDS 8333. FTE: Master's. (1 cr; No grade. Prereq–Master's student, adviser and DGS consent)

CSDS 8404. International Hierarchies. (3 cr; §POL 8404) Asymmetric structures and processes of international relations; systemic conditions and implications of informal empire and structures of dependency and hegemony.

CSDS 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

CSDS 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]) No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

CSDS 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

CSDS 8891. Pedagogy of Cultural Studies and Comparative Literature. (3 cr; §CL 8891, CSDS 8891) Prepare graduate majors for teaching. Issues of pedagogy. Preparing syllabi for specific courses that graduate instructors teach. Required for students planning to teach in Department of Cultural Studies and Comparative Literature.

For definitions of course numbers, abbreviations, and symbols, see page 169.
Courses

CSDS 8902. Methodologies Colloquium. (1 cr; max 2 cr; S-N only. Prereq–4021 or #) Presentations by CL/CSDS faculty. Methods in relation to field as a whole. Library component. Meetings with research librarians.

CSDS 8910. Advanced Topics in Comparative Studies in Discourse and Society. (3 cr; max 15 cr) Themes in comparative, sociohistorical analysis of discursive practices. Individually or team taught. Topics vary by instructor and semester.

CSDS 8920. Advanced Topics in Comparative Studies in Discourse and Society. (3 cr; max 15 cr) Practical applications of specific methodologies and theories to a determined area. Topics vary by instructor and semester.

CSDS 8993. Directed Study in Comparative Studies in Discourse and Society. (1-4 cr; max 12 cr; Prereq–#)

CSDS 8994. Directed Research in Comparative Studies in Discourse and Society. (1-4 cr; max 4 cr; Prereq–#)

Computer Engineering (CMPE)

Department of Electrical and Computer Engineering

Institute of Technology

CMPE 8333, FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

CMPE 6777. Thesis Credits: Master’s. (1-18 cr; max 50 cr; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only]

Computer Science (CSCI)

Department of Computer Science

Institute of Technology

CSCI 5103. Operating Systems. (3 cr; Prereq–4061 or #) Conceptual foundation of operating system designs and implementations. Relationships between operating system structures and machine architectures. UNIX implementation mechanisms as examples.

CSCI 5104. System Modeling and Performance Evaluation. (3 cr; Prereq–5103 or #) Techniques for modeling computing systems for performance evaluation through analytical/simulation techniques. How to model computing systems and communications protocols to evaluate their performance under different operating conditions.

CSCI 5105. Foundations of Modern Operating Systems. (3 cr; Prereq–5103 or #) Advanced concepts that build foundations of modern operating systems. Advanced scheduling algorithms, distributed communication/synchronization, consistency/replication models, distributed file systems, security, protection/virtualization, OS architectures.

CSCI 5106. Programming Languages. (3 cr; Prereq–4011 or #) Design and implementation of high-level languages. Course has two parts: (1) language design principles, concepts, constructs; (2) language paradigms, applications. Note: course does not teach how to program in specific languages.


CSCI 5109. Visualization. (3 cr; Prereq–1902, 4041 or equiv or #) Fundamental theory/practice in data visualization. Emphasizes programming applications. Volume visualization, vector field visualization, information visualization, multivariate visualization, visualization of large datasets, visualization in immersive virtual environments, and perceptual issues in effective data representation. Projects are implemented in C++ using VTK or similar visualization API.

CSCI 5115. User Interface Design, Implementation and Evaluation. (3 cr; Prereq–4041 or #) Theory, design, programming, and evaluation of interactive application interfaces. Human capabilities and limitations, interface design and engineering, prototyping and interface construction, interface evaluation, and topics such as data visualization and World Wide Web. Course is built around a group project.

CSCI 5116. GUI Toolkits and Their Implementation. (3 cr; Prereq–5115 or 5109 or #) Structure and design of user interface toolkits and frameworks. Aspects of GUI toolkits (e.g., window system protocols, event processing, geometry management, resource management, data management, constraints). Course is built around implementation assignments and case studies of toolkits.

CSCI 5125. Collaborative and Social Computing. (3 cr; Prereq–5115 or #) Introduction to computer-supported cooperative work, social computing. Technology, research methods, theory, case studies of group computing systems. Readings, hands-on experience.

CSCI 5131. Advanced Internet Programming. (3 cr; §CSCI 4131. Prereq–5106 or 5211 or #; 4081 or 5801, 5707 recommended) Issues in internet programming: Java programming, concurrent programming, workflow, distributed databases, security, collaborative computing, object-oriented architecture/design, network publishing, messaging architecture, distributed object computing, internets.

CSCI 5143. Real-Time and Embedded Systems. (3 cr; A-F only. Prereq–4041 or #, experience with C language) Real-time systems that require timely response by computer to external stimulus. Embedded systems in which computer is part of machine. Increasing importance of these systems in commercial products. How to control robots and video game consoles. Lecture, informal lab.

CSCI 5161. Introduction to Compilers. (3 cr; Prereq–4011 or #) Theories and mechanisms of programming language processing tools. General compiler organization: lexical scanner, syntax parser, symbol table, internal program representation, code generator. Relationship between design and implementation. Run-time memory management mechanisms.

CSCI 5204. Advanced Computer Architecture. (3 cr; Prereq–4203 or EE 4838) Instruction set architecture, processor microarchitecture, memory, I/O systems. Interactions between computer software and hardware. Methodologies of computer design.

CSCI 5211. Data Communications and Computer Networks. (3 cr; §CSCI 4211. Prereq–4041 or #, basic knowledge of [computer architecture, operating systems, probability]) Fundamental concepts, principles, protocols, and applications of computer networks. Layered network architectures, data link protocols, local area networks, network layer/routing protocols, transport, congestion/flow control, emerging high-speed networks, network programming interfaces, networked applications. Case studies using Ethernet, Token Ring, FDDI, TCP/IP, ATM, E-mail, HTTP, and WWW.

CSCI 5221. Foundations of Advanced Networking. (3 cr; Prereq–4211 or 5211 or equiv; intro course in computer networks recommended) Design principles, protocol mechanisms. Network algorithms, implementation techniques. Advanced network architectures, state-of-art/emerging networking technologies/applications, network modeling, simulation, experiments.

CSCI 5271. Introduction to Computer Security. (3 cr; Prereq–4041 or equiv or #) Concepts of computer, network, and information security. Risk analysis, authentication, access control, security evaluation, audit trails, cryptography, network/database/application security, viruses, firewalls.

CSCI 5283. Computer-Aided Design I. (3 cr; Prereq–2011 or #) CAD for digital systems. Emphasizes VLSI. Hardware description languages, synthesis, simulation, test generation.

CSCI 5302. Analysis of Numerical Algorithms. (3 cr; Prereq–2031 or #) Additional topics in numerical analysis. Interpolation, approximation, extrapolation, numerical integration/differentiation, numerical solutions of ordinary differential equations. Introduction to optimization techniques.


CSCI 5403. Computational Complexity. (3 cr; Prereq–4041 or #) Computational models, complexity measures in each model, and related complexity classes.


CSCI 5471. Modern Cryptography. (3 cr; Prereq–[2011, 4041, [familiarity with number theory or finite fields]] or #) Introduction to cryptography. Theoretical foundations, practical applications. Threats, attacks, and countermeasures, including cryptosystems and cryptographic protocols. Secure systems/networks. History of cryptography, encryption (conventional, public key), digital signatures, hash functions, message authentication codes, identification, authentication, applications.


CSCI 5523. Introduction to Data Mining. (3 cr; Prereq—[4041 or equiv or #)] Data pre-processing techniques, data types, similarity measures, data visualization/exploration. Predictive models (e.g., decision trees, SVM, Bayes, K-nearest neighbors, bagging, boosting). Model evaluation techniques. Clustering (hierarchical, partitional, density-based), association analysis, anomaly detection. Case studies from areas such as earth science, the Web, network intrusion, and genomics. Hands-on projects.

CSCI 5525. Machine Learning. (3 cr; Prereq—Grad student or #) Models of learning. Supervised algorithms such as perceptrons, logistic regression, and large margin SVMs (SVMs, boosting). Hypothesis evaluation. Learning theory. Online algorithms such as winnow and weighted majority. Unsupervised algorithms, dimensionality reduction, spectral methods. Graphical models.


CSCI 5551. Introduction to Intelligent Robotic Systems. (3 cr; Prereq—2031 or #) Transformations, kinematics/inverse kinematics, dynamics, control. Sensing (robot vision, force control, tactile sensing), applications of sensor-based robot control, robot programming, mobile robotics, microrobotics.


CSCI 5561. Computer Vision. (3 cr; Prereq—[5511 or #]) Issues in image and video analysis: edge detection, image filtering, image segmentation, and feature tracking. Complex problems in shape recognition, stereo, active vision, autonomous navigation, shadows, and physics-based vision. Applications.


CSCI 5801. Software Engineering I. (3 cr; Prereq—[1902, 2011] or #) Advanced introduction to software engineering. Software life cycle, development models, software requirements analysis, software design, coding, maintenance.

CSCI 5802. Software Engineering II. (3 cr; Prereq—5801 or #) Introduction to software testing, software maturity models, cost estimation, software reliability models, software complexity, quality control, and experience report. Student groups design, implement, and test partial software systems. Application of general software development methods and principles from 5801.

CSCI 5980. Special Topics in Computer Science. (1-3 cr [max 9 cr]; Prereq—#; may be repeated for cr) Lectures and informal discussions on current topics in computer science. Syllabus determined by faculty.

CSCI 5991. Independent Study. (1-3 cr [max 9 cr]; Prereq—#) May be repeated for cr.

CSCI 5994. Directed Research. (1-3 cr [max 9 cr]; Prereq—#) Directed research arranged with faculty member.

CSCI 5996. Curricular Practical Training. (1 cr [max 3 cr]; 5-Hr or Aud. Prereq—[CSCI or COMPE] major, #) Industrial work assignment involving advanced computer technology. Reviewed by faculty member. Grade based on final report covering work assignment.

CSCI 8001. Introduction to Research in Computer Science I. (1 cr; A-F only. Prereq—1st yr CS PhD student) First of two-part sequence course. Students must take both parts to complete course and grade receive. Conducting literature review. Identifying research questions. Writing a research proposal. Research areas in CS. Practical research skills. Research ethics. Resources.

CSCI 8002. Introduction to Research in Computer Science II. (2 cr; A-F only. Prereq—8001, 1st yr CS PhD student) Second of two-part sequence course. Students must take both parts to complete course and receive grade. Conducting literature review. Identifying research questions. Writing a research proposal. Research areas in CS. Practical research skills. Research ethics. Resources.

CSCI 8101. Advanced Operating Systems. (3 cr; Prereq—5103 or #) Successful research systems and existing theory of systems design. Goal is not merely to catalog systems or learn mathematics, but to develop a sense of elegance of design that leads to successful systems.

CSCI 8102. Foundations of Distributed Computing. (3 cr; Prereq—[8101 or #]) Fundamental principles underlying design of distributed and multiprocessor operating systems. Foundations of distributed computing systems; shared multiprocessor systems.

CSCI 8115. Human-Computer Interaction and User Interface Technology. (3 cr; Prereq—5101 or #) Current research issues in human-computer interaction, user interface toolkits and frameworks, and related areas. Research techniques, model-based development, gesture-based interaction, constraint-based programming, event processing models, innovative systems, HCI in multimedia systems.

CSCI 8161. Advanced Compiler Techniques. (3 cr; Prereq—[4061 or #]) Techniques for uniprocessors and parallel computers. Fundamental program analysis techniques such as data flow analysis and data dependence analysis. Variety of code generation and transformation techniques.


CSCI 8211. Advanced Computer Networks and Their Applications. (3 cr; Prereq—[5211 or #]) Current research issues in traffic and resource management, quality-of-service provisioning for integrated services networks (such as next-generation Internet and ATM networks) and multimedia networking.

CSCI 8271. Security and Privacy in Computing. (3 cr; A-F or Aud. Prereq—[5211, 5103] or [5471 or EE 5248 or Math 5248 or equiv recommended]) Recent security/privacy issues in computer systems/networks. Threats, attacks, countermeasures. Security research, authentication, network security, wireless security, computer system security, anonymous system, pseudonym, access control, intrusion detection system, cryptographic protocols. How to pursue research in security and design secure systems.

CSCI 8283. Research Problems in Computer-Aided Design for Electronic Design. (3 cr; Prereq—[5201 or 5283 or equiv #]) Open research problems in contemporary CAD for electronic design, approaches to their solution.

CSCI 8314. Sparse Matrix Computations. (3 cr; Prereq—[5304 or numerical linear algebra course or #]) Sparsity and sparse matrices. Data structures for sparse matrices. Direct methods for sparse linear systems. Reordering techniques to reduce fill-in such as minimal degree ordering and nested dissection ordering. Iterative methods. Preconditioning algorithms. Algorithms for sparse eigenvalue problems and sparse least-squares.

CSCI 8333. FTE: Master's. (1 cr; A-F or grade. Prereq—Master's student, adviser and DGS consent)

CSCI 8363. Numerical Linear Algebra in Data Exploration. (3 cr; Prereq—[5304 or #]) Computational methods in linear algebra, matrix decompositions for linear equations, least squares, eigenvalue problems, singular value decomposition, conditioning, stability in method for machine learning, large data collections. Principal directions, unsupervised clustering, latent semantic indexing, linear least squares fit. Markov chain models on the link structure.

CSCI 8404. Design and Analysis of Approximation Algorithms. (3 cr; Prereq—[5403 or 5421 or #]) Because an exact solution is often unfeasible for computationally difficult problems in important applications, approximation algorithms are a significant area of study. Introduces techniques for design of approximation algorithms; theory for evaluating the algorithms’ performance.
Courses

CSCI 8442. Computational Geometry and Applications. (3 cr; Prereq—5421 or #) Designing efficient algorithms and data structures for geometric problems. Models of computation, convex hulls, geometric duality, multidimensional search, Voronoi diagrams and Delaunay triangulations, linear programming in fixed dimensions, lower bound techniques. Applications, advanced topics.

CSCI 8444. FTE: Doctoral. (1 cr; No grade. Prereq—Doctoral student, adviser and DGS consent)

CSCI 8551. Intelligent Agents. (3 cr; Prereq—5511 or #) Theories of intelligent agents. Agent architectures; knowledge representation, communication, cooperation, and negotiation among multiple agents; planning and learning; issues in designing agents with a physical body; dealing with sensors and actuators; world modeling.

CSCI 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

CSCI 8701. Overview of Database Research. (3 cr; Prereq—5708 or #) Research papers from journals and conferences on current topics in databases, such as database research methodologies, relational implementation techniques, active databases, storage systems, benchmarking, distributed and parallel databases, new data models, prototype systems, data mining, and future directions.

CSCI 8703. Distributed and Parallel Databases. (3 cr; Prereq—5708 or #) Distributed database management systems (DBMS) architecture, including client-server, distributed DB design, distributed query optimization and processing; distributed transaction management (concurrency control and recovery); theories of space drawn from parallel databases; hardware and software architectures; parallel databases.

CSCI 8715. Spatial Databases and Applications. (3 cr; Prereq—4707 or 5707 or GIS 5571 or GIS 5573) Motivation, Models of spatial information, querying spatial data, processing strategies for spatial queries, multi-dimensional storage/access methods, spatial graph datasets, spatial data mining, trends (e.g., spatio-temporal databases, mobile objects, raster databases).

CSCI 8725. Databases for Bioinformatics. (3 cr; Prereq—4707 or 5707 or #) DBMS support for biological databases, data models. Searching integrated public domain databases. Queries/analyses, DBMS extensions, emerging applications.

CSCI 8735. Advanced Databases Systems. (3 cr; A-F or Aud. Prereq—4707 or 5707 or #) Database systems for emerging applications, nontraditional query processors, multi-dimensional data indexing. Current research trends.

CSCI 8760. Plan B Project. (3 cr; S-N or Aud. Prereq—CSCI MS student, #) Project arranged between student and faculty.

CSCI 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq—Max 18 cr per semester or summer; 10 cr total required [Plan A only])

CSCI 8801. Advanced Software Engineering. (3 cr; Prereq—5801 or #) Software reusability, internet/intranet programming, software reengineering, and software safety.

CSCI 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

CSCI 8970. Computer Science Colloquium. (1 cr [max 3 cr]; S-N or Aud) Recent developments in computer science and related disciplines. Students must attend 13 of the 15 lectures.

CSCI 8990. Special Advanced Topics in Computer Science. (1-3 cr [max 9 cr]; Prereq—#) Lectures and informal discussions.

CSCI 8991. Independent Study. (1-3 cr [max 3 cr]; Prereq—#)

CSCI 8994. Directed Research in Computer Science. (1-3 cr [max 9 cr]; Prereq—#)

Conservation Biology (CBIO)

College of Biological Sciences

CBIO 8001. Conservation Biology Seminar. (1 cr [max 6 cr]; S-N or Aud. Prereq—#) Topics vary.

CBIO 8004. Economic and Social Aspects of Conservation Biology. (3 cr; Prereq—CBIO student or #) Economic/social aspects of conservation biology. Ecological economics, human dimension of conservation biology, values of conserving species/ecosystems.

CBIO 8093. Directed Study Experience. (1-5 cr [max 6 cr]; S-N or Aud. Prereq—#) Directed Study Experience


CBIO 8103. Research in Support of Resource Management: a Dialog With Land-Manager. (2 cr; S-N only) Effective communication between researchers and natural resource managers. Organized around research needs of land managers. Students select topics of interest from these needs and, as small teams, prepare short research proposals to address each topic.

CBIO 8201. How to Excel in Graduate School. (1 cr [max 4 cr]; S-N only) Overview of history/philosophy of science as framework for writing thesis or dissertation. How to conduct research. Time management.

CBIO 8333. FTE: Master’s. (1 cr; No grade. Prereq—Master’s student, adviser and DGS consent)

CBIO 8444. FTE: Doctoral. (1 cr; No grade. Prereq—Doctoral student, adviser and DGS consent)

CBIO 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

CBIO 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq—Max 18 cr per semester or summer; 10 cr total required [Plan A only])

CBIO 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

Control Science and Dynamical Systems (CSDY)

Institute of Technology

CSDY 4444. FTE: Doctoral. (1 cr; No grade. Prereq—Doctoral student, adviser and DGS consent)

CSDY 6666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

CSDY 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

CSDY 8899. Seminar in Control Science and Dynamical Systems. (1-3 cr [max 9 cr]; S-N or Aud. Prereq—CSDY or IT grad) Current research and advanced topics.

Coptic (COPT)

Department of Classical and Near Eastern Studies

COPT 5001. Elementary Coptic. (3 cr) Introduction to Coptic grammar and vocabulary, chiefly in the Sahidic dialect.

COPT 5002. Elementary Coptic. (3 cr; Prereq—5001 or equiv) Reading a variety of Coptic literature, such as Gnostic, martyrological, or monastic texts.

Cultural Studies and Comparative Literature (CSCL)

Department of Cultural Studies and Comparative Literature

College of Liberal Arts

CSCL 5147. Teaching as Dialogue. (3 cr) Teaching and the teacher are the subject. Entering into dialogue is the method. Issues with the politics of teaching, the means of entering into dialogue, questions of judgment, and the idea of self-teaching as the goal of teaching.

CSCL 5154W. Theoretical Constructions of Space. (3 cr) Inquiry into theories of space drawn from various disciplines including anthropology, architecture, geography, history, landscape design, philosophy, planning, and sociology. Focus on sociopolitical interests that are served and sustained; emphasis on opportunities and implications for personal identity.

CSCL 5256W. Suburbia. (3 cr) Suburbia from origins in 18th-century England to the present. Historical changes and present challenges, especially in America. Ideology, mythology, planning, development, geography, transportation, the family. Specific sites and designs; representations in film, television, popular literature, and music.

CSCL 5301. Society, Ideology, and the Production of Art. (3 cr; §CSDS 5301) Recent critical theories on the relation of the arts to social and ideological forces; selected articles from Western culture (Renaissance to 20th century; high, popular, and mass culture). Music, visual art, literature.

CSCL 5302. Aesthetics and the Valuation of Art. (3 cr; §CSDS 5302) Society, ideology, and aesthetic value considered in light of recent critical theories of visual art, music, and literature. Meditations of place, social class, gender and ideology on aesthetic judgment in post-Renaissance Western culture.

CSCL 5331. Discourse of the Novel. (3 cr; §CQL 5331) Comparative study of the novel, 18th century to present. Its relations to ordinary language practices, emergent reading publics, technologies of cultural dissemination, problems of subjectivity, and its role in articulating international cultural relations.

CSCL 5555. Introduction to Semiotics. (3 cr; §CQL 5555) Problems of the nature of the sign; sign function; sign production; signifying systems as articulated in philosophy, linguistics, anthropology, psychoanalysis, and art theory. Application of semiotics to various signifying practices (literature, cinema, daily life).

CSCL 5711. Sociocriticism. (3 cr) Sustained consideration of the modern tradition of sociological reflection on literature. Early and late Birmingham School, Frankfurt School, Bakhtin circle, and the various French initiatives associated with both Les Temps Modernes and Tel Quel.
Curriculum and Instruction (CI)

Department of Curriculum and Instruction

College of Education and Human Development

CI 5006. Art Education: Practicum. (1-6 cr; max 6 cr; A-F or Aud.) Issues of art instruction, including teaching methods and evaluation, philosophical frameworks of pedagogy, and institutional issues concerning art programs in primary and secondary schools. Practicum requiring students to work in a public school setting.

CI 5007. Student Teaching in Art Education. (8 cr; S-N or Aud. Prereq–Licensure student in art ed) Observation of, participation in, and supervisory experiences with various types and levels of art classes.

CI 5111. Introduction to Elementary School Teaching. (3 cr; A-F or Aud. Prereq–Foundations of ed major or elem ed initial lic) Curriculum organization, instruction, management, assessment, professional decision making.

CI 5113. Classroom Management in the Elementary School. (3 cr) For teachers, administrators, and support staff working in elementary school programs. Focus on management of student behavior, instruction as it relates to student behavior, and teacher organizational tasks in the classroom.

CI 5133. Curriculum Planning and Design. (3 cr; A-F or Aud. Prereq–Grad student only) Application of the theoretical and practical bases of disciplinary and interdisciplinary curriculum design to the problem of designing, implementing and evaluating the quality of a course or program of study.


CI 5137. Multicultural Gender-Fair Curriculum. (3 cr; A-F or Aud. Prereq–Grad student only) Issues related to diversity in learning settings and the exploitation of culture in educational contexts.

CI 5145. Advanced Contemporary Crafts. (3 cr; A-F or Aud. Prereq–Grad student only) Material exploration of historical and contemporary craft ideas and techniques and their applications.

CI 5149. Issues of Diversity in Schools and Classrooms. (3 cr; max 4 cr; Prereq–Grad student or Teacher Leadership program) Examination of issues in schools and classrooms that affect people from diverse groups, using historical, communication, value, and intercultural frameworks.

CI 5150. Curriculum Topics. (1-8 cr; max 12 cr) Topics in curriculum, current trend in curriculum. Subject integration, curriculum contexts, development, implementation, evaluation.

CI 5155. Contemporary Approaches to Curriculum: Instruction and Assessment. (3 cr; A-F or Aud. Prereq–Grad student only) Current research/issues that cross disciplinary boundaries in curriculum development, instructional practices, and assessment methods. Interrelations among curriculum, instruction, and assessment within framework of constructivist learning theory. Individual classroom practices/theories.

CI 5162. Peer Coaching for Teachers. (1-2 cr; max 2 cr; A-F or Aud. Prereq–Teaching experience or #) Teachers coaching teachers; acquiring concepts, skills, and dispositions necessary for observing classroom instruction and providing constructive feedback.

CI 5172. Teaching Students with Learning Difficulties. (3 cr; A-F or Aud. Prereq–Elem teaching exp or #) Theory and practice in teaching students with learning difficulties across the curriculum.

CI 5177. Practical Research. (3 cr; A-F or Aud. Prereq–CI Med student, or CI or EDPA Teacher Leadership Med student) Preparation for identifying a research and development topic, reviewing the existing knowledge on the topic, planning and carrying out a project, further investigating the topic, and writing a report on the project.

CI 5178. Project in Teacher Leadership. (3-6 cr; EDPA 5361. Prereq–CI or EDPA teacher leadership Med student) Create, implement, evaluate, and present a leadership project designed to initiate positive change in educational environments. Review related literature, proposal development, project development, implementation/evaluation, critical reflection. Share learning outcomes.

CI 5181. Clinical Experience in Elementary School Teaching. (3-8 cr; max 15 cr; S-N or Aud. Prereq–Foundations of education and elem ed initial licensure only) Students spend full days in the elementary classroom gradually assuming responsibility for teaching the class. Students prepare a portfolio based on criteria given. One seminar per week.

CI 5183. Applying Instructional Methods in the Elementary Classroom. (1-2 cr; max 8 cr; S-N or Aud. Prereq–Foundations of ed major or elem ed initial licensure only) Supervised experience in elementary classrooms.

CI 5186. School-Related Projects. (1-4 cr; max 4 cr; A-F or Aud. Prereq–Med student) Research or evaluation project related to teaching, curriculum, or other aspect of schooling. Approved and supervised by faculty advisor.

CI 5187. Practicum: Improvement of Teaching in Elementary or Prekindergarten Schools. (2-3 cr; max 3 cr; S-N or Aud. Prereq–Med student in elem or early childhood ed) Elementary school classroom teaching project designed to improve specific teaching skills. Approved and directed by adviser.

CI 5190. Directed Individual Study in Curriculum and Instruction. (1-6 cr; max 12 cr; Prereq–Grad student only) Directs students to individual studies that focus on producing and evaluating curriculum materials; literature review of issues and problems; and assessing curriculum processes.

CI 5254. Kindergarten Methods. (2 cr; A-F or Aud. Prereq–Foundations of Education in Elementary Education or M.Ed./LP Elementary Education) Purpose of kindergarten, its place in elementary program. Curriculum appropriate for needs of age group, including children with special needs. Assessment procedures, role of classroom teacher.

CI 5321. Foundations of Distance Education. (3 cr; A-F or Aud) History, philosophies, technologies, and best practices related to distance learning environments. Distance education theories. Issues in distance education.
Courses

CI 5323. Online Learning Communities. (3 cr; A-F or Aud) Students design/research an online learning environment that promotes community. What community is, how it fosters learning in educational learning environments. Theories of distance learning instruction. Community models. Technological tools to develop online communities.

CI 5325. Designing and Developing Online Distance Learning. (3 cr; A-F or Aud. Prereq–5351 or 5362 recommended) Students research, use, and evaluate technologies for distance learning and design their own learning environments.

CI 5327. Designing Online Adventure Learning. (3 cr; A-F or Aud) Designing, developing, and integrating adventure learning environments in K–16. Examples of effective adventure learning environments.

CI 5330. Topics in Instructional Systems and Technology. (1-3 cr [max 12 cr]) Topics related to needs of in-service teachers. Topics, location, credits, and duration are flexible.

CI 5331. Introduction to Learning Technologies. (3 cr) Orientation to examination of various issues affecting use of technology. Students identify research topics for investigation in future courses and identify key literature in preparation for masters/dotalor examinations.


CI 5337. Planning for K–12 Technology Design and Integration. (3 cr; A-F or Aud) Developing technology-enhanced learning (TEL) lessons/units for K–12 instructional contexts (e.g., content areas across PK–12 grades). Contemporary perspectives on instruction/learning. TEL lesson categorization techniques.

CI 5342. School Technology Planning. (1 cr; A-F or Aud) How to establish plans for use of technology that support K–12 instruction and student learning. Facilitating ongoing comprehensive planning for technology integration. Identifying priorities for technology planning.

CI 5343. School Technology Funding. (1 cr; A-F or Aud. Prereq–[Mac or PC] with 128 MB RAM, [Windows NT or 2000 or XP] or Mac [Mac OS 9 or 10], [Pentium 2 or faster], Internet connectivity, up-to-date [Netscape, Internet Explorer], virus protection software; Certificate in School Technology Leadership or #) Developing a multi-year funding strategy for establishing K–12 technology integration in accordance with a technology vision/plan.

CI 5344. Facilitating Technology Integration in Classrooms I. (1 cr; A-F or Aud) Intersection of student learning theories and research base on effective technology practices. Video cases of technology-supported teaching, peer teaching exercise.

CI 5345. Facilitating Technology Integration in Classrooms II. (1 cr; A-F or Aud. Prereq–[5344 or #]. [Mac or PC] with 128 MB RAM, [Windows NT or 2000 or XP] or Mac [Mac OS 9 or 10], [Pentium 2 or faster], Internet connectivity, up-to-date [Netscape, Internet Explorer], virus protection software; Certificate in School Technology Leadership or #) Technology-supported teaching/learning at one’s educational site. Preparing a vision statement for technological change at one’s school. How to assume an advocacy role in establishing technology use for instruction/learning.

CI 5346. Staff Technology Development and Support. (1 cr; [DEPA 5336 or Prereq–Mac PC] with at least 256 MB of RAM, [Windows NT 2000 or XP or Mac OS 9 or 10], Pentium [2 or faster], Internet connection, up-to-date version of [Netscape, Internet Explorer], virus protection software; Certificate in School Technology Leadership or #) How to lead organization in designing, implementing, evaluating, improving, and sharing approaches to staff development. Technology-related staff development. Facilitating development through use of technology.

CI 5351. Technology Tools for Educators. (3 cr; A-F or Aud. Prereq–Basic knowledge of [Macintosh operating system and a working process program]) Develop skills in using selected technology applications to support teaching and learning. Internet applications, presentation software, multimedia authoring tools, desktop publishing software, Web page creation. May also include a field-site project.

CI 5361. Integrating the Internet into K–12 Schools for Learning, Instruction, and Professional Development. (3 cr; Prereq–Experience with computers recommended) Capabilities of the Internet for professional development and instructional use. Use of specific client/server software. Instructional issues/opportunities. Implications for K–12 student involvement and classroom management. Web page development by teachers and their students.

CI 5362. Introduction to Educational Multimedia. (3 cr; Prereq–Familiarity with basic computer operations) Issues influencing design/development of educational multimedia. Basic HTML/CDROM Internet delivery of Hardware/software for CD-ROM, Web-based delivery. Design, development, project management.


CI 5364. Computer-Based Instruction: Games and Simulation. (3 cr; A-F or Aud. Prereq–5363) Principles and procedures of computer simulation and game design. Types of computer simulation, the components common to simulation design, and the theory underlying educational simulation design.

CI 5365. Contemporary Software Development Issues and Tools. (2 cr; Prereq–Familiar with standard computer/Internet operations) Software used in multimedia design/development. Uses of the software, intricacies of interface, relevant programming principles. Introduction to developing multimedia/multimedia courseware and multimedia learning objects.

CI 5367. Interactive Multimedia Instruction. (3 cr; A-F or Aud. Prereq–Knowledge of principles and procedures of OI design and one multimedia authoring system) Principles of effective computer-based design; tools in multimedia development; contemporary issues and skills used in the design, development, and implementation of interactive multimedia instruction. Use multimedia development tools, create a multimedia portfolio, and investigate the issues surrounding its effective use.

CI 5391. Technology in the Postsecondary Development Curriculum. (3 cr) Examines ways in which use of technology is transforming learning environments, teaching practices, and the curriculum in developmental education for postsecondary students. Course taught on-line.


CI 5402. Introduction to Special Collections. (3 cr; A-F or Aud. Prereq–Children’s lit course) Uses Children’s Literature Research Collection as study material. Research of manuscripts, original art, and letters.

CI 5403. Creative Writing For and By Children. (3 cr; S-N or Aud. Prereq–Children’s lit course or #) Aspects of writing/illustrating children’s literature or children’s own writing. May feature authors/illustrators of children’s books.

CI 5405. Middle School Language Arts Methods. (2 cr; A-F only. Prereq–Elem ed licensure student) Introduction to the unique needs of middle school students in the language arts classroom. Language arts content and pedagogical skills. Adolescent development/psychology. Field placement in a middle school language arts-classroom.

CI 5410. Special Topics in the Teaching of Literacy. (1-3 cr [max 12 cr]) Topics related specifically to the needs of in-service teachers. Topics, location, credits, and duration will be highly flexible.

CI 5411. Teaching Reading in the Elementary School. (3 cr; A-F or Aud) Aids the inservice elementary classroom teacher in the development of knowledge of theory and practice in the teaching of reading.

CI 5412. Reading Difficulties: Instruction and Assessment. (3 cr; A-F or Aud. Prereq–5411) Causes, diagnosis and assessment, prevention and correction; intervention practices useful to the classroom teacher and special teacher of reading.

CI 5413. Teaching Students with Reading Difficulties. (3 cr; A-F or Aud. Prereq–5412) Assessment and tutoring of individual children who have difficulty reading in school.

CI 5415. Literacy Development in the Primary Grades. (3 cr; A-F or Aud. Prereq–Elem teaching exper or #) Theory/practice of integrated teaching of reading, literature, writing, and language in primary classroom settings. Uses national/state language arts standards and assessment protocols to examine primary literacy curricula.

CI 5416. Literacy Development in the Intermediate Grades. (3 cr; A-F or Aud. Prereq–Elem teaching exper or #) Theory/practice of integrated teaching of reading, literature, writing, and language in intermediate classroom settings. Uses national/state language arts standards and assessment protocols to examine primary literacy curricula.

CI 5418. Whole Language Teaching and Learning in the Elementary School. (3 cr; A-F or Aud. Prereq–MED or grad student, minimum one yr of teaching exper) Theory, research, and politics of whole language teaching. Applications for developing an elementary school whole language classroom.

CI 5422. Teaching Writing in Schools. (3 cr; A-F or Aud. Prereq–Initial licensure or MED or grad student) Theory/practice of teaching writing in schools. Focuses on how race, gender, and social class impact teaching/learning.


CI 5431. Introduction to Instructional Leadership in K–12 Reading. (3 cr; A-F or Aud. Prereq–Minnesota license valid for classroom teaching in pre-kindergarten, [adult basic education or grades kindergarten through 6 or 1 through 6 or 5 through 8 or 9 through 12 or kindergarten through 12]) K–12 curriculum in reading, major theories/research that motivate curriculum. Major instructional principles, alignments needed, resources available.

CI 5432. Instructional Leadership in Reading for the Middle and Secondary Grades. (3 cr; A-F or Aud. Prereq—5432) Curriculum/instruction for middle/secondary school students.


CI 5441. Teaching Literature in the Secondary School. (2-3 cr [max 3 cr]; A-F or Aud. Prereq—Fall, English initial licensure only, 2 cr; other sections, 3 cr) Current theories of teaching literature; critical approaches to analyzing literature; theory and research on response to literature; adolescents’ reading interests and attitudes; methods for devising response activities and units; incorporating multicultural literature; relating media and literature; linking writing of literature to understanding literature; designing literature curriculum; evaluating and assessing students. Growth in literary response.

CI 5442. Literature for Adolescents. (3 cr; A-F or Aud) Characteristics of literature written for adolescents; rationale for using adolescent literature; adolescents’ reading interests and attitudes; analysis of quality and appeal; individualized reading programs; methods of promoting reading; multicultural literature; developing teaching activities.

CI 5451. Teaching Reading in Middle and Secondary Grades. (3 cr; A-F or Aud. Prereq—Fall, English initial licensure) Methods of accommodating to students’ abilities and facilitating reading in regular content classes.

CI 5452. Reading in the Content Areas for Initial Licensure Candidates. (1 cr; A-F only. Prereq—Enrolled in Initial Licensure Program) Concurrent enrollment in licensure area methods course(s). Internet access, basic understanding of [computer use, Web browsers, e-mail, word-processing software] Web-based course for content disciplines whose primary responsibility is to foster students reading related to learning from text.


CI 5462. Evaluating and Assessing Writing. (3 cr; A-F or Aud. Prereq—5461) Methods of evaluating writing; identifying rhetorical and literary features of and explaining difficulties in writing; strategies for giving descriptive feedback to informal and formal writing; training for peer conferences; strategies for portfolio writing evaluation and assessment; methods for conducting large-scale writing assessments; issues of validity and reliability with writing assessments with particular application to the Minnesota Graduation Standards basic skills writing test.

CI 5472. Teaching Film, Television, and Media Studies. (3 cr; A-F or Aud) Methods of teaching film, video, and media studies at the secondary and college level; methods for eliciting critical responses; analysis of film/video techniques; analysis of cultural representations and genre characteristics; connecting and comparing film/video and literature; studying documentary and television news; developing media studies units.


CI 5496. Directed Experiences in Teaching English. (8 cr; S-N or Aud. Prereq—M.Ed./initial licensure students in English ed only) Student teaching/clinical experience for English post-baccalaureate students only.

CI 5500. Special Topics: Outdoor Science Education. (1-8 cr [max 12 cr]; Prereq—Elm ed initial licensure only) Classroom and fieldwork activities aimed at increasing the knowledge and interest of students in teaching outdoor in all seasons. Topics include snow and ice ecology, the timber wolf and white-tailed deer, pond ecology, Twin Cities’ geography, trees, and plants of Minnesota, and stargazing.

CI 5501. Teaching Science and Health in the Elementary School. (2 cr; A-F or Aud. Prereq—Elementary initial licensure only) Methods and materials for teaching science and health at the elementary school level.

CI 5504. Elementary School Science: Materials and Resources. (3 cr; Prereq—Elementary initial licensure) Examination of the teacher’s role in inquiry teaching; the current science curriculum; and resources for teaching science in the elementary school.

CI 5505. Middle School Science Methods. (2 cr; A-F only. Prereq—Elementary initial licensure) Methods of planning/instruction for middle school science. Students observe, analyze, and teach inquiry-based lessons.

CI 5531. Teaching Middle School Science. (4 cr; A-F or Aud. Prereq—initial licensure student in science ed) Methods of planning/teaching science to middle school students.


CI 5533. Current Developments in Science Teaching. (3 cr; A-F or Aud. Prereq—MED, initial licensure, grad student) Using curriculum standards to design science courses.

CI 5534. Studies in Science Education. (3 cr) Improvement of science teaching through the application of research findings.

CI 5535. Foundations of Science Education. (3 cr; A-F or Aud. Prereq—MED, grad student, or grad student) Analysis of present science teaching practices in light of historical and philosophical foundations of science education.

CI 5536. Equity, Policy, and Assessment in Science Education. (3 cr; A-F only. Prereq—MED or grad student) Nature of equity, diversity, and policy matters that influence schools/teachers involved in science teaching and scientific literacy. Classroom presentations, discussions, research in current research.

CI 5537. Principles of Environmental Education. (3 cr; A-F or Aud. Prereq—Enrolled in NRES or Ed. grad student in education or ed) Critical review of Environmental Education, its history, theories, curricula, teaching methods, and assessment practices. Development of an exemplary unit plan for teaching environmental studies.

CI 5538. Research-based Decision-making in Science Education. (3 cr; A-F only. Prereq—MED or grad student) Nature of research and data-driven decision-making in science education. Focuses on analysis, interpretation, and impact of research on science education. Developing/conducting research. Students discuss, analyze, and present research.

CI 5539. Improving Secondary Science Instruction: Surviving the First Two Years. (3 cr; A-F only. Prereq—MED science education student, in first three years of teaching) Students reflect on their instruction and student learning during first years of teaching. Monthly meetings, observations, online discussion. Classroom management, planning, inquiry-based teaching, assessment, equity in the classroom.

CI 5540. Special Topics: Science Education. (1-8 cr [max 12 cr]) Detailed examination and practice of the teaching of one area of science (e.g., geology, health, physical science) or one method of instruction (e.g., laboratories, demonstrations, Internet, simulations).

CI 5596. Clinical Experience in Middle School Science. (4 cr; A-F only. Prereq—initial licensure in science ed) Supervised clinical experience in middle school science teaching.


CI 5619. Teaching Second Languages and Cultures in Elementary Schools. (3 cr) Methods and materials for ESL and foreign languages; development of oral and written communication in a second language; alternatives in second-language program format; global awareness and cross-cultural experience; assessment of children’s language; children’s literature, games, and songs; planning and development of units and lessons.

CI 5631. Second Language Curriculum Development and Assessment. (3 cr; A-F or Aud. Prereq—SLC initial licensure only) Developing skills for selecting, organizing, providing, and assessing effective second language learning opportunities through study, practice, and reflection.

CI 5632. Communication and Comprehension in Second Language Classrooms. (3 cr; A-F or Aud. Prereq—SLC initial licensure only) Comprehension and communication processes in a second language focus on listening, speaking, reading and writing; techniques for initial to advanced literacy instruction; fundamental principles of effective second language instruction; the relationship of culture to proficiency in the four modalities; traditional and alternative approaches to assessing language proficiency; use of technology to enhance instruction.

CI 5634. Content-based Instruction in Second Language Settings. (3 cr; A-F or Aud. Prereq—SLC initial licensure only) Content-based language instruction: principles, models and methods; learning strategy instruction; developing content-based language curriculum; and alternative approaches to assessing cognitive-academic language proficiency; use of technology to enhance content-based instruction.

CI 5635. Culture and Diversity in Second Language Classrooms. (3 cr; Prereq—initial licensure program only) Developing skills for teaching a diverse student population in both foreign language and English as a second language instructional settings through study, practice, and reflection.

CI 5642. The Assessment of Learners with Limited English Proficiency. (3 cr; A-F or Aud) Explores policies, procedures, and instruments in use in assessing the English language proficiency and academic readiness of limited English proficient students in American public schools; academic competence, bilingualism and special needs populations; alternative assessment; preparation of students for mainstream classrooms.

For definitions of course numbers, abbreviations, and symbols, see page 169.
Courses

CI 5644. Working with Linguistically and Culturally Diverse Students. (3 cr; A-F or Aud) Benefits and challenges of working with linguistically and culturally diverse students; instructional practices and strategies; issues related to language learning, cultural considerations, and integration of culturally and linguistically diverse learners in the classroom.

CI 5646. Understanding and Teaching English Grammar. (3 cr; Prereq–Ling 5001 or #) English syntax from pedagogical perspective. Grammatical structures that challenge ESL learners. Analyzing learner errors. Issues/activities related to teaching grammar in ESL contexts.


CI 5651. Foundations of Second Languages and Cultures Education. (3 cr; A-F or Aud) Historical overview of second language teaching and learning in the U.S. Exploration of second language instructional settings across multiple contexts: elementary and secondary options for foreign language, bilingual education, immersion language programs, and English as a second language programs. Theoretical frameworks for language instruction are tied to practice.

CI 5652. Integrating Culture in the Second Language Classroom. (3 cr) Exploration of culture in second language contexts. Rationale for and process of implementing cultural awareness, culture learning, and the integration of language and culture instruction as integral to effective second language development.

CI 5656. Reading and Writing in a Second Language. (3 cr; A-F or Aud) Reading comprehension and composing processes in a second language; relationship between first and second language comprehension and composing processes; relationship between reading and writing; relationship of culture to reading comprehension and writing; politics of literacy; assessment of second language reading comprehension and writing proficiency; using technology to enhance literacy instruction.


CI 5658. Language-Focused Instructional Practices and Strategies. (3 cr; Prereq–#) Keeping a language development focus while teaching content in second language. Materials development, productive/receptive instructional techniques, choice of form. Linguistic complexity and developmental stage of student.

CI 5693. Directed Study in Second Languages and Cultures. (1-4 cr; max 4 cr; Prereq–#) Individual or group work on curricular, instructional, or assessment problems.

CI 5696. Practicum: Teaching World Languages and Cultures in Elementary Schools. (2 cr; Prereq–#5169, adviser approval; credits cannot be counted on a graduate degree program for endorsement candidates) Teaching and learning experiences in Second Languages and Cultures at the elementary-school level. Requires students to work in a public school setting.

CI 5697. Practicum: ESL in the Elementary School. (2 cr; Prereq–^Adviser approval) Teaching/learning experiences in an English as a Second Language setting at elementary school level. Requires students to work in a public school setting.

CI 5698. Student Teaching in Second Languages and Cultures. (2 cr; Prereq–Adviser approval; credits cannot be counted on a graduate degree program) Student teaching in Second Languages and Cultures at the secondary level for teachers already licensed in another field. Requires students to work in a public school setting.

CI 5699. Clinical Experiences in Second Languages, (6-8 cr; max 16 cr) (A-F or Aud, Prereq–SLG initial licensure program only) Teaching and learning experiences in elementary and secondary second language instructional settings. Includes a seminar held concurrently to support the student teaching experience.

CI 5701. Teaching Social Studies in the Elementary School. (2 cr; A-F or Aud, Prereq–#5111 or eqvq, elem ed initial licensure only) Content and organization of elementary social studies programs; programs of understanding, improving the learning situation, and effective use of materials.

CI 5705. Middle School Social Studies Methods. (2 cr; A-F or Aud, Prereq–Elem ed licensure student) Introduction to the unique needs of middle school students in the social studies classroom. Social studies content and pedagogical skills. Adolescent development/psychology. Field placement in a middle school social studies classroom.

CI 5711. Social Studies for the In-Service Elementary/ Middle School Teacher. (3 cr; A-F or Aud, Prereq–Elem/ middle school teaching exper or #) Content and organization of elementary and middle school social studies programs. Understanding and improving the long-term learning situation through the analysis of current trends and issues in the field. Integration with other subject areas where appropriate.

CI 5741. Introduction to Social Studies Education. (3 cr; A-F or Aud, Prereq–social studies initial licensure student) Broad issues and themes related to social studies education, including societal context, rationale, and scope and sequence. Analysis and evaluation of selected teaching strategies, methods, and resources.

CI 5742. Advanced Methods of Teaching the Social Studies. (3 cr; A-F or Aud, Prereq–Secondary social studies initial licensure student) Focus on developing a repertoire of instructional methods that support authentic pedagogy and assessment. Enhancing reading comprehension and writing skills in the social studies.

CI 5743. The Social Sciences and the Social Studies. (3 cr; A-F or Aud, Prereq–Secondary social studies initial licensure student) Development of instructional strategies and contexts for exploring the social sciences as disciplines at the secondary level; central concepts and generalizations; tools of inquiry; competing structures and theories; and the relative impact of multicultural and gender-fair perspectives on the nature of history and the social sciences.

CI 5744. Seminar: Reflecting on Professional Development in Social Studies Education. (1 cr; A-F or Aud, Prereq–Secondary social studies initial licensure student) Emphasis on reflecting on the teaching experience, developing a professional identity, and refining teaching skills.

CI 5747. Global and Environmental Education: Content and Practice. (3 cr; A-F or Aud) Prepares educators for leadership responsibilities in the area of global environmental education. Focus on the knowledge and process skills necessary to carry out a leadership role in the curriculum.


CI 5762. Developing Civic Discourse in the Social Studies. (3 cr; A-F or Aud, Prereq–Med or grad student) Philosophies, strategies, and research on developing civic discourse in the secondary social studies classroom: selecting issues, developing a democratic classroom climate, relating to social and cultural contexts. Applicable to all of the social sciences.

CI 5762. Developing Civic Discourse in the Social Studies. (3 cr; A-F or Aud, Prereq–Med or grad student) Philosophies, strategies, and research on developing civic discourse in the secondary social studies classroom: selecting issues, developing a democratic classroom climate, relating to social and cultural contexts. Applicable to all of the social sciences.


CI 5900. Special Topics in Family, Youth, and Community. (1-4 cr; max 20 cr) Topics not dealt with in regular courses. Topics vary by offering.

CI 5902. Family Education Perspectives. (3 cr; A-F or Aud) Origins, evolution, and critique of alternative perspectives on family education. Implications for educators, programs, and participants.

CI 5904. Contemporary Family Education. (3 cr; A-F or Aud) Contemporary conditions of and transitions in family life. Emphasizes implications for educators and educational programs.

CI 5906. Program Planning in Family Education. (3 cr; A-F or Aud) Curricular research/theory. Alternative perspectives, their concomitant implications for families. Development of and evaluation of family education curriculum/programs.

CI 5908. Family and Work Relationships. (3 cr; A-F only) Interactions of work/family roles, responsibilities, and aspirations. Resources, legal aspects, gender.

CI 5912. Sexuality Education. (3 cr; A-F only) Development, delivery, and evaluation of sexuality education curriculum/programs.

CI 5914. Education for Family Communication. (3 cr; A-F only) Development, delivery, and evaluation of curriculum/ programs related to family communication.

CI 5922. Family and Consumer Sciences Curriculum in Grades 5-12. (3 cr; A-F only, Prereq–LP student) Examination, development, and implementation of family and consumer sciences curriculum in grades 5-12.
Courses

CI 5923. Educational Strategies in Family Education. (3 cr; A-F or Aud.)
Examination, development, and implementation of a variety of educational strategies.

CI 5924. Family and Consumer Sciences Student Teaching I. (1 cr; S-N only; WSHRE 5696. Prereq—IILP student)
Initial experiences in family/consumer sciences teaching profession. Observations of school organization/administration, seminars, relationship building with cooperating teachers, reflections on personal involvement as beginning student teachers.

CI 5925. Family and Consumer Sciences Student Teaching II. (2 cr; Prereq—5924)
Part-time supervised teaching experience in family/consumer sciences programs. On-campus seminars emphasize reflective teaching practice and student learning in context of middle/high schools.

CI 5926. Family and Consumer Sciences Student Teaching III. (8 cr; Prereq—5925)
Full-time supervised teaching experience in family/consumer sciences programs. On-campus seminars.

CI 5927. Family and Consumer Sciences Student Teaching IV. (1 cr; Prereq—5926)
Full-time supervised student teaching experience in family/consumer sciences programs.

CI 5932. Introduction to Parent Education. (1 cr; A-F only)
Philosophy, history, and models of parent education. Ethical, critically reflective professional practice.


CI 5935. Practice of Parent Education II. (3 cr; A-F or Aud. Prereq—5934 or FE 5701 or A)
Development, practice, and teaching strategies, group facilitation skills, and assessment techniques. Observation of parent education classes/programs.

CI 5936. Advanced Practice of Parent Education. (3 cr; Prereq—5935 or FE 5702 or A)

CI 5937. Parent-Child Interaction. (3 cr; A-F only)

CI 5938. Reflective Dialogue in Parent Education. (3 cr; A-F or Aud.)

CI 5939. Parent Education Practicum. (1-4 cr [max 4 cr]; Prereq—5935 or FE 5702 or A)
Supervised parent education field assignments designed according to licensee requirements and individual student needs, interests, and prior competencies.

CI 5942. Everyday Experiences of Families. (2 cr; A-F only. Prereq—5932)
Everyday experiences of families, their relevance to parent education and to professional development of parent educators. Research/theory interwoven with observation/reflection. Strength-based approach to families and professional development.

CI 5943. Parent Learning and Development: Implications for Parent Education. (2 cr; A-F only. Prereq—5932, 5942)
Research/theoretical perspectives critiqued: Challenging assumptions, examining competencies.

CI 5944. Parent Education Curriculum. (2 cr; A-F or Aud. Prereq—5943)
How parent learning/development, child development, and family systems theories influence curriculum approaches/materials in parent education. Student develop construct, critique, and select curriculum.

CI 5945. Teaching and Learning in Parent Education. (2 cr; A-F or Aud. Prereq—5944)
Students select/use parent education teaching strategies/processes to meet needs of various populations of adult learners. Critical reflection, ethical practices, parent educator competencies.

CI 5946. Assessment and Evaluation in Parent Education. (2 cr; A-F or Aud. Prereq—5945)

CI 5949. Parent Education Practicum. (2 cr; A-F or Aud. Prereq—5946)
Supervised parent education practice to meet individual student needs/interests. Online discussion, reflection, and cooperative learning.

CI 5952. Everyday Lives of Youth. (3 cr; A-F or Aud. Prereq—YDL student or #)
How youth as idea and as lived-reality are understood in scholarship, public discourse, and professional practice. Building a critical practice of work with or on behalf of youth.

CI 5954. Experiential Learning: Pedagogy for Community and Classroom. (3 cr; A-F only) Relationship between experience and learning in community and school settings. Emphasizes intentional application of experiential learning theory/practice to educational program development.

CI 5956. Organizational Approaches to Youth Development. (3 cr; A-F or Aud. Prereq—YDL MeD student or #)
Historical context of frameworks, organizational practices, and public policies that shape nonformal educational experiences of youth in community-based or school-linked settings.

CI 5958. Community: Context for Youth Development Leadership. (3 cr; A-F or Aud.)
Issues/policies in family, school, and community that drive the professional practice of community-based youth work. Practical projects explore what it means to be local, to build social capital for youth, and to involve youth in community change.

CI 5960. Seminar in Youth Development Leadership. (1-4 cr [max 4 cr]; S-N or Aud. Prereq—YDL student or #)
Group study of topics/issues. Course proposal, educational program development. Students participate in co-created learning experience with a group of peers. Four-course sequence.

CI 5962. Leadership Field Experience: Youth Development. (4 cr; S-N only. Prereq—YDL student or #)
Demonstration of leadership in practice. Project on youth, experiential pedagogy, and community/program settings. Focuses on public policy, advocacy, evaluation, pedagogical issues, program design, curriculum development, or applied research.

CI 5972. Education in the Community. (3 cr)
Models of community/education, their intersections. Twentieth century practice of education in the community in the U.S. Examples from other cultures/times.

CI 5974. The Democratic Learning Community. (3 cr)
Historical/theoretical development of how leading thinkers have conceptualized education centered in the community. Colonial, Native American transcendentalist, progressive, experiential, critical, and feminist perspectives.

CI 5993. Directed Study in Family, Youth, and Community. (1-3 cr [max 9 cr]; A-F only. Prereq—A)
Self-directed study in areas not covered by regular courses. Specific program of study is jointly determined by student and advising faculty member.

CI 5995. Internship in Family, Youth, and Community. (1-6 cr max 6 cr)
Involvement in work experience focused on educational competencies in family, youth, and community settings. Nature/extent of responsibilities are defined by position the student assumes.

CI 8075. Seminar: Art Education. (2 cr; A-F or Aud. Prereq—Educ grad student or #)
Reports, evaluation of problems, and review of recent literature.

CI 8079. Research in Art Education. (3 cr; A-F or Aud. Prereq—Educ grad student or #)
Current research agenda. Helps students identify research questions and choose appropriate methodologies.

CI 8095. Problems: Art Education. (1-12 cr [max 12 cr]; Prereq—Grad art educ major or #)
Independent research under faculty guidance; may include advanced studio practice and educational issues requiring a research methodology.

CI 8111. Representations of Knowledge in Curriculum and Culture. (1-3 cr [max 3 cr]; Prereq—CI grad student or #)
Overview of research and theory on sociology of knowledge and education. Conceptions of knowledge in curriculum; connections between cultural conditions and curriculum design and implementation; influence of national political agendas, population, the mass media, and textbooks on curriculum in diverse educational settings.

CI 8115. Curriculum and Achievement Outcomes in a Diverse Society. (3 cr; A-F or Aud. Prereq—Doctoral student)
Analysis of American public school experiences for students of African-American, Hispanic, Asian, and American Indian background; social, political, regional, and educational variables that influence student outcomes; perspectives concerning ethnic student achievement; factors influencing school achievement, and prospects for change.

CI 8121. Curriculum Change: Perspectives, Processes, and Participants. (3 cr; Prereq—CI grad student or #)
Examination of curriculum within educational organizations; educational organization as mediator and transmitter of societal/cultural perspectives; implications of organizational context for curriculum change, change processes, and change participants.

CI 8127. Curriculum Theory and Research: Alternative Paradigms and Research Methods. (3 cr; Prereq—CI grad student or #)
Traditional inquiries, exemplary studies, and associated research methods; survey and assessment of topics and methods as applied to curriculum questions; and relationships between theory and research.

CI 8131. Curriculum and Instruction Core: Critical Examination of Curriculum in Context. (3 cr; A-F or Aud. Prereq—CI Phd or MA student or #)
Central concepts, ideas, and debates in professional field of curriculum. Curriculum in general education.

CI 8132. Curriculum and Instruction Core: Teaching Theory and Research. (3 cr; A-F or Aud. Prereq—CI Phd or MA student or #)
Overview of research on teaching: historical perspective, modern research/findings, implications for practice/research.

CI 8133. Research Methods in Curriculum and Instruction. (3 cr; A-F or Aud. Prereq—CI Phd or MA student or #)
Survey of educational research methods, comparison of underlying assumptions/procedures.

CI 8148. Conducting Qualitative Studies in Educational Contexts. (3 cr; Prereq—CI MA or PhD student or #)
Introduction to use of qualitative research methods. Ethnomethodology, sociolinguistics, symbolic interactionism. Emphasizes observation.

CI 8149. Qualitative Research: Coding, Analysis, Interpretation, and Writing. (3 cr; A-F or Aud. Prereq—[8133, 8148, 2011] grad student, completion of a qualitative research study) or #)
How to code/analyze field notes. Individual/group interviews, multimedia using NUDIST NVivo software. Students interpret analyzed material and
**Courses**

**CI 8150. Research Topics Curriculum and Instruction. (1-6 cr [max 12 cr]; Prereq–MA, Ed.D. or Ph.D.) student or #)**

Special topics, current research trends in curriculum/instruction. Research review, subject integration, curriculum contexts, development, implementation, data collection, analysis, evaluation.

**CI 8151. Paradigms and Practices in Teacher Preparation. (3 cr; A-F or Aud. Prereq–Grad student)**


**CI 8152. Teacher Learning and Professional Development. (3 cr; A-F or Aud. Prereq–Grad student)**

Theoretical/empirical work on teacher learning, professional communities, teacher inquiry, perspectives on outcomes of professional development, and policy recommendations for supporting teacher learning. Research methodologies.

**CI 8154. Culturally Relevant Pedagogy. (3 cr; A-F or Aud)**

Research on relationship between home and school cultures. Education of students of color. Culture, including experiences/practices of students homes. Cultural approaches for improving teaching, transforming society.

**CI 8155. Immigrant Families and U.S. Schools. (3 cr; A-F or Aud)**


**CI 8156. Asian American Education. (3 cr; A-F or Aud)**


**CI 8161. Seminar in Teaching in Colleges of Education. (3 cr; Prereq–CI PhD student or #)**

Goals, instructional strategies, evaluation procedures, and professional considerations.

**CI 8195. Problems: Improvement of Instruction. (1-6 cr [max 6 cr]; Prereq–#)**

Independent research in curriculum and instruction.

**CI 8196. Practicum in Teaching in Colleges of Education. (1 cr; Prereq–#)**

Supervised teaching in an education course at the University of Minnesota or other college or university.

**CI 8197. Problems: Curriculum Studies. (1-6 cr [max 8 cr]; A-F or Aud. Prereq–MA student)**

Directs students to completing Plan B paper for M.A. degree.

**CI 8198. Problems: Teacher Education. (1-6 cr [max 12 cr]; Prereq–#)**

Independent research.

**CI 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser approval, DGS approval)**

**CI 8361. Advanced Courseware and Design: Issues. (3 cr; A-F or Aud)**

Examination and critique of existing research. Students identify a research topic, write a literature review, plan a study, and present a research proposal.

**CI 8391. Instructional Systems Seminar. (1-3 cr [max 6 cr]; Prereq–CI grad student or #)**

Topics related to needs of the in-service teacher; topics, location, credits, and duration are highly flexible.

**CI 8395. Problems: Instructional Systems. (1-6 cr [max 12 cr]; Prereq–#)**

Independent research.

**CI 8400. Special Topics in Children’s and Young Adult Literature. (1-6 cr [max 6 cr]; Prereq–grade course in children’s or young adult lit)**

Overview of research and issues. Study of original manuscripts and artwork for children’s books; research in child and young adult response to literature. Topics vary by offering.

**CI 8410. Special Topics in Reading Research and Instruction. (1-6 cr [max 6 cr]; Prereq–#)**

Research at all levels; topics vary by offering and may include research designs, trends, and specific studies.

**CI 8412. Research in Reading. (3 cr; Prereq–#)**

Significant literacy research; critical analysis of methodology and findings, appraising research methods, population limitations, and educational implications.

**CI 8421. Research in Composition. (3 cr; Prereq–#)**


**CI 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, advisor approval, DGS approval)**

**CI 8470. Special Topics on Literacy. (1-6 cr [max 6 cr]; Prereq–CI PhD student or #)**

Current theories and research on literacy and literacy development; alternative methods of conducting literacy research; implications for literacy instruction.

**CI 8492. Readings in English Education and Reading. (1-2 cr [max 10 cr]; Prereq–#)**

**CI 8495. Problems: Teaching English and Reading. (1-6 cr [max 6 cr]; A-F or Aud. Prereq–#)**

Individual research.

**CI 8511. Seminar: Research in Science Education. (1 cr; Prereq–#)**

Current theories and research on literacy and literacy development; alternative methods of conducting literacy research; implications for literacy instruction.

**CI 8570. Advanced Topics in Science Education. (1-4 cr [max 6 cr]; A-F or Aud. Prereq–CI grad student or #)**

Examination/critique of current research topics, methods, and issues.

**CI 8571. Equity, Policy, and Social Justice in Science Education. (3 cr; Prereq–Science ed grad student or #)**

Interactions of issues of diversity, equity, policy, and social justice as related to science education. Diverse perspectives on purposes/ scope of science education. Consequences for diversity, equity, access, social justice, empowerment, and educational policy.

**CI 8594. Conducting Research in Science Education. (1-6 cr; Prereq–sci educ research course)**

Application of research methodology to a specific science education issue.

**CI 8595. Problems: Science Education. (1-6 cr [max 12 cr]; Prereq–CI grad student or #)**

Independent research.

**CI 8650. Seminar: Special Topics in Second Languages and Cultures Research. (1-3 cr [max 6 cr]; Prereq–CI grad student or #)**

Research topics vary.

**CI 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral students admitted before summer 2007 may register up to four times, up to 60 combined cr)**

**CI 8691. Readings in Second Languages and Cultures Education. (1-3 cr [max 3 cr]; Prereq–#)**

Independent reading.

**CI 8695. Problems: Second Languages and Cultures Education. (1-6 cr [max 12 cr]; Prereq–#)**

Independent research.

**CI 8742. Seminar: Research in Social Studies Education. (1-6 cr [max 12 cr]; Prereq–CI grad student or #)**

Critical review and analysis of seminal research studies; criteria for appraising research findings; educational implications.

**CI 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade)**

**CI 8795. Problems: Social Studies Education. (1-6 cr [max 12 cr]; Prereq–CI grad student or #)**

Independent research.

**CI 8796. Research Internship in Social Studies Education. (1-6 cr [max 6 cr]; A-F or Aud. Prereq–CI grad student)**

Internship with social studies education faculty member; experience in collecting and analyzing data; drafting and presenting reports; writing for publication.

**CI 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)**

**CI 8900. Family, Youth, and Community Colloquium. (1-4 cr [max 4 cr]; S-N only. Prereq–#)**

Therapies, philosophies, practices, pedagogies, epistemologies, and public policies not dealt with in regular courses. Content varies by offering.

**CI 8902. Family, Youth, and Community in Social, Political, and Economic Context. (3 cr; A-F only)**

Meanings of and relationships among family, youth, and community in social, political, and economic contexts across cultures/time. Realities/philosophies influencing these meanings/relationships. Implications/consequences for professional practice.

**CI 8904. Families, Youth, Communities, and Education: Historical and Contemporary Perspectives. (3 cr; A-F only)**

Teaching/learning in family/community settings and in formal education settings. Interrelationships, implications.

**CI 8913. Interpretive Research. (3 cr; A-F only)**

Hermeneutic, ethnographic, and phenomenological research methodologies. Ethics, evaluation, and usefulness of interpretive research. Practice in conducting interpretive research.

**CI 8914. Critical Science Research. (3 cr; A-F only)**

Origins, influences, characterics, and central concepts. Distinction between critical science and other action research. Requisite skills/knowledge for conducting critical science research, using that knowledge in a project.

**CI 8994. Directed Research in Family, Youth, and Community Education. (1-6 cr [max 6 cr]; A-F only. Prereq–Family, Youth, and Community student doing Plan B research)**

**Dance (DNCE)**

**Department of Theatre Arts and Dance**

**College of Liberal Arts**

**DNCE 5010. Modern Dance Technique 7. (2 cr [max 4 cr]; Prereq–#; audit registration not permitted)**

Continuation of technical development. Performance range/style. Students study with various guest artists.

**DNCE 5020. Modern Dance Technique 8. (2 cr [max 4 cr]; Prereq–#)**

Continuation of ballet technique. Muscularity, performance, stylistic differences. Practical work conducted within context of choreographic/aesthetic development of ballet.

**DNCE 5120. Ballet Technique 8. (1 cr [max 2 cr]; Prereq–#)**

Continuation of ballet technique. Muscularity, performance, stylistic differences. Practical work conducted within context of choreographic/aesthetic development of ballet.
DENT 5101. Physical Evaluation I. (3 cr; A-F or Aud) General concepts of diagnosis and patient evaluation for use during examination of patients in various adult clinical programs in the School of Dentistry.

DENT 5201. Pain and Anxiety Control. (2 cr; A-F or Aud) Didactic/clinical aspects of pain/anxiety control as pertains to dentistry. Emphasizes use of local anesthetic, consciousness sedation (nitrous oxide inhalation). Acute/chronic pain mechanisms, neuropathic pain, issues pertaining to narcotic/other drug abuse.

DENT 5301. Introduction to Oral Biology. (2 cr; S-N or Aud) Introduce the scientific foundation of dentistry. Oral microbiology, biochemistry, tissues, diseases, and pain will be related to clinical practice through lectures and discussions of current literature.

DENT 5302. Topics in Dental Biochemistry. (2 cr; A-F or Aud) Biological, chemical, and biochemical phenomenon occurring in the oral cavity and the interrelationships between these phenomenon. Biological and chemical basis of dental caries and how saliva, dental plaque, and plaque fluid interact and impact on the caries process. Metabolic handling and anticaries mechanisms of fluoride.

DENT 5303. Microbiology for Dental Students. (6 cr; A-F or Aud) Prereq.—(Dental) Biochemistry/Histology) General microbiology, bacterial pathogenesis, virology with specific emphasis on oral microflora ecology. Dental caries and periodontal diseases. Evaluation of current literature will be done by student essays. Discussions are based on assigned literature and focus on methodology.

DENT 5315. Oral Histology and Embryology and Medical Genetics. (3 cr; A-F or Aud) Embryologic development and histologic structure of tissues in the head, face, and mouth with emphasis on clinical correlations, principles of medical genetics, complex traits of the orofacial region, and genetic contributions to oral diseases.

DENT 5322. Applied Dental Biomaterials. (2 cr; A-F or Aud. Prereq.—Dental) Lectures on applications of dental materials, including areas of restorative dentistry, prosthodontics, orthodontics, and endodontics. Instruction in the scientific basis for selection and utilization of materials. Areas of current controversy, including replacement of traditional materials with new materials. Literature review seminars cover the evaluation principles for information sources on dental materials.

DENT 5351. Introduction to Dental Biomaterials. (1 cr; A-F or Aud only) Principles of biomaterials science as applied to dentistry. Effect of synthetic materials on body (biocompatibility). Effect of body on materials (e.g., mechanical, chemical, corrosion effects). Polymers, metallic materials, ceramics, composites, cements. Theory of adhesive interfaces. Mechanisms of adhesion in contemporary dental practice.

DENT 5352. Applied Dental Biomaterials . (2 cr; A-F or Aud) Principles of biomaterials science applied to practical usage. Prosthodontics, operative dentistry. Students apply scientific principles to selection/utilization of biomaterials and evaluate a recent research publication.

DENT 5401. Dental Care Delivery and Oral Epidemiology. (3 cr; A-F or Aud. §DH 4131) Dental public health. Epidemiology, biostatistics, professional ethics, financing of dental care, health economics, health policy. Students participate in site visits and search, manage, and evaluate dental information from various resources.


DENT 5411. Professional Problem Solving. (0 cr; A-F or Aud) Critical thinking in professional problems in dentistry. How to organize, analyze, and reflect on issues, rights, responsibilities, codes of behavior/ethics, and consequences.

DENT 5412. Professional Problem Solving. (1 cr; A-F or Aud) Critical thinking in ethical/professional problems in dentistry. How to organize, analyze, and reflect on issues, rights, responsibilities, codes of behavior/ethics, and consequences.

DENT 5441. Patient Management II. (3 cr; S-N or Aud) Introduction to management of dental patients. Process/development of comprehensive treatment plans. Students are exposed to treatment planning in private-practice setting.

DENT 5501. Pediatric Dentistry Pre-Clinic. (2 cr; A-F or Aud) Physical, emotional, dental, and language development; diagnosis, prevention, and management of oral diseases in children.

DENT 5601. Introduction to Clinical Preventive Dentistry. (2 cr; S-N or Aud) Application of principles of prevention through case-based small group learning format and clinical experiences. Clinical observation of preventive protocols/techniques. Students present/deliver presentation on preventive topic.

DENT 5611. Periodontology I Lecture. (1 cr; A-F or Aud. §DH 3131) Periodontal anatomy, physiology/pathology of periodontal diseases. Clinical, histopathological, and pathogenesis of gingivitis and periodontitis. Role of genetics, tobacco use, and systemic disorders.

DENT 5612. Periodontology Technique. (2 cr; A-F or Aud) Presurgical procedures in periodontics. Development of clinical skills to examine, diagnose, prevent, and treat periodontal patients.

DENT 5613. Periodontology Technique II. (1 cr; S-N or Aud; Prereq.—5612) Extension of Dent 5612. Closely supervised, students treat at least three periodontal patients during the summer semester. Students develop clinical skills to examine, diagnose, prevent, and treat periodontal patients before assuming responsibility for their comprehensive care.

DENT 5701. Introduction to Endodontics Lecture and Laboratory. (4 cr; A-F or Aud) Study of morphology, physiology, and pathology of the human dental pulp and periradicular tissues.

DENT 5801. Operative Dentistry I. (2 cr; A-F or Aud. Prereq.—Dental Anatomy, Biomaterials) Restoration of small caries lesions, cervical abrasion lesions, and attrition defects. Practical aspects of caries risk assessment, lesion identification, and comprehensive caries management. Emphasizes indications for surgical intervention, principles of restoration design, and rationale for various design features.

DENT 5802. Operative Dentistry I Laboratory. (3 cr; A-F or Aud. Prereq.—Dental Anatomy, Biomaterials) Restoration of small caries lesions, cervical abrasion lesions, and attrition defects in clinical simulation setting. Emphasizes designing/executing retentive/resistant restorations, conserving tooth structure, and operating in clinically relevant orientations. Self-evaluation techniques, discriminatory skills.

DENT 5803. Operative Dentistry II Laboratory. (2 cr; A-F or Aud. Prereq.—Operative Dentistry I) Diagnosis, treatment planning, and treatment of moderate to severe phase of dental caries. Use of dental amalgam, cast gold, composite resin, and cast porcelain. Aesthetic modification to tooth.

DENT 5005. Operative Dentistry III. (3 cr; A-F only. Prereq–Operative Dentistry II. 3 cr) Lab Integration/application of skills/knowledge in diagnosis, treatment planning, and treatment. Clinical setting.

DENT 5901. Oral Anatomy I. (2 cr; A-F or Aud) Tooth morphology, nomenclature, classification, charting, calculation, and eruption sequences; mouth growth and development.

DENT 5902. Oral Anatomy Laboratory I. (2 cr; A-F or Aud) Application of oral anatomy, fixed prosthodontic lab techniques, fundamentals of tooth preparation.

DENT 5903. Preclinical Prosthodontics Lecture II. (2 cr; A-F or Aud. Prereq–5901, 5902) Prosthetic procedures.

DENT 5904. Preclinical Prosthodontic Technique Laboratory II. (2 cr; A-F or Aud. Prereq–5901, 5902) Lab techniques, fundamentals of tooth preparation.

DENT 5905. Preclinical Prosthodontic Technique III. (2 cr; A-F or Aud. Prereq–5901, 5902, 5903, 5904) Fixed, removable, and occlusion topics.

DENT 5906. Preclinical Prosthodontic Technique Laboratory III. (2 cr; A-F or Aud. Prereq–5901, 5902, 5903, 5904) Fixed, removable, and occlusion topics.

DENT 5907. Preclinical Prosthodontics Lecture IV. (3 cr; A-F or Aud. Prereq–5901, 5902, 5903, 5904, 5905, 5906) Fixed, removable, and occlusion topics.

DENT 5908. Preclinical Prosthodontic Technique Laboratory IV. (3 cr; A-F or Aud. Prereq–5901, 5902, 5903, 5904, 5905, 5906) Fixed, removable, and occlusion topics.

DENT 5909. Preclinical Prosthodontic Technique Lecture V. (3 cr; A-F or Aud. Prereq–5901, 5902, 5903, 5904, 5905, 5906, 5907, 5908) Fixed, removable, and occlusion topics.

DENT 5910. Preclinical Prosthodontics Technique Laboratory V. (3 cr; A-F or Aud. Prereq–5901, 5902, 5903, 5904, 5905, 5906, 5907, 5908) Fixed, removable, and occlusion topics.


DENT 5931. Topics and Problems in Dental Education. (1-3 cr [max 3 cr]) Independent study student learning, instructional development, curriculum planning, student testing and evaluation, and academic administration, where these areas and their interfaces are applied directly to professional dental education. Provides opportunity for applying and extending concepts learned in Dent 7033.

DENT 6090. Evidence-based Clinical Pediatric Dentistry. (2 cr; A-F or Aud) Selected pediatric dentistry topics. In-depth literature review, seminar discussion.

DENT 6091. Interdisciplinary Care of the Cleft Palate Patient. (1 cr; S-N or Aud) Comprehensive surgical, dental, and speech and hearing evaluation and management of patients with cleft lip and palate.

DENT 8100. Topics in Advanced Periodontology: Literature Review. (2 cr) State-of-the-art information on a variety of topics concerning risk factors and therapeutic modalities for periodontal disease.

DENT 8101. Dental Implantology: A Multidisciplinary Approach. (2 cr) Dental implant therapy from perspective of several dental disciplines.

DENT 8120. Advanced Principles and Techniques of TMJ and Orofacial Pain Disorders. (3 cr; A-F or Aud. Prereq–Participation in TMJ and orofacial pain advanced education program) Interdisciplinary study of theory, principles, epidemiology, and mechanisms associated with TMJ and craniofacial pain disorders and a basis for scientific understanding of diagnostic and management strategies for them.

DENT 8121. Current Literature in TMJ and Craniofacial Pain. (1 cr; A-F or Aud) Review of current literature and of how it relates to past literature, theories on pain, and philosophies of management.

DENT 8123. Advanced Topics in Orofacial Pain. (3 cr; A-F or Aud. Prereq–Grad student in dentistry or other health sciences graduate student or #) Review of cutting edge research and clinical findings regarding etiology/treatment of acute/chronic orofacial pain conditions and related disorders.

DENT 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, advisor and GDS consent)

DENT 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Grad student per semester or summer; 10 cr total required [Plan A only])

Design Institute (DESI) School of Architecture

College of Design

DESI 5100. Design Institute Directed Study. (1-3 cr [max 9 cr; A-F or Aud]) Guided independent study in design.

Design, Housing, and Apparel (DHA)

Department of Design, Housing, and Apparel (DHA)

DHA 5111. History of Decorative Arts. (4 cr; A-F or Aud. Prereq–General art history survey course or #) In depth study of textiles, ceramics, metal, and glass from selected historical periods. Focus on the Goldstein Gallery collections.

DHA 5117. Retail Environments and Human Behavior. (3 cr; A-F or Aud. Prereq–Grad student or #) Theory/research related to designed environment across retail channels.


DHA 5389. Fundamentals of Game Design. (3 cr; A-F or Aud. Prereq–[DHA major or grad student] or #) Preliminary research, including theoretical, applied, and legal aspects. Planning/design models. Design prototyping, testing, and analysis.


DHA 5463. Housing Policy. (3 cr; A-F or Aud. §PA 5461. Prereq–2401, 2463 or #) The role of public sector policies in shaping the nation’s housing problems through public intervention in the market. Federal and local public sector responses to housing problems will be evaluated.

DHA 5467W. Housing and the Social Environment. (4 cr; A-F or Aud. Prereq–2401 or #) Housing choices in context of social environment. Emphasizes special needs of elderly, disabled, minorities, large families, female-headed households, and low-income households. Students conduct a post-occupancy evaluation of housing.
DHA 5469. Understanding Housing: Assessment and Analysis. (3 cr; A-F or Aud. Prereq—[2401, 2463] or #) How to formulate housing research problems and analyze/present information about housing characteristics/conditions. Students develop housing-related research/grant proposals, use/design cartographic/graphic information about housing, and give a presentation on a research project.

DHA 5471. Housing Studies Certificate Seminar. (2 cr; A-F or Aud. Prereq—Admitted to Housing Studies Certificate Program) Integrative seminar and “capstone” to Certificate program. Students prepare an individual career plan that focuses on application of housing studies to community/workplace.

DHA 5481. Housing for the Elderly and Special Populations. (3 cr; A-F or Aud. Prereq—[2401, or grad students]) Introduction to changing housing needs of individuals/families across life span. Emphasizes housing needs of children, older adults, and persons with disabilities.

DHA 5484. Rural Housing Issues. (3 cr; A-F or Aud. Prereq—2401, 2463 or #) Housing issues in nonmetropolitan areas. The housing concerns of specific rural populations (e.g., low income, elderly persons, American Indians, migrant workers) are identified and compared with urban housing issues are made.

DHA 8101. Philosophical Foundations of Design, Housing, and Apparel. (4 cr; A-F or Aud) The nature of thought underlying and within professional areas of the field.

DHA 8103. Methodological Orientations: Qualitative Research. (3 cr; A-F or Aud) Assessment of field research methods relevant to research regarding material culture. Relationship of selected research problem (and its theoretical framework) to practical problems of fieldwork. Rationale and plan for appropriate field methods of data collection.

DHA 8111. Analysis of Design Literature. (3 cr; A-F or Aud) Classic and contemporary literature; visualization, creativity, and design methods literature.

DHA 8112. Design Theory and Criticism. (3 cr; A-F or Aud) Students establish a framework for criticism by examining various theories used in design disciplines, study existing designed environments to explain the designer’s purpose, identify problem-solving processes, and describe interaction between humans and design. Field investigations.

DHA 8113. Teaching and Assessment. (4 cr; A-F or Aud. Prereq—#) Educational processes/methods used in design studio/lecture courses. Learning styles, best practices for grading, alternative methods of critique, interacting with students, active learning strategies, teaching with technology, Lecture, project.

DHA 8114. Design Studio. (3 cr; A-F or Aud. Prereq—#) Advanced problem analysis, design solution.

DHA 8164. Innovation Theory and Analysis. (3 cr; A-F or Aud) Theories and factors that influence adoption and diffusion of designed products. Methodologies used in analysis of diffusion process.

DHA 8166. Material Culture and Design. (3 cr; A-F or Aud. Prereq—#) Artifacts, from Goldstein collections, as material culture.

DHA 8170. Topics in Design, Housing, and Apparel. (1-3 cr [max 6 cr]; A-F or Aud. Prereq—Varies with topic) In-depth investigation of a topic announced in advance.

DHA 8180. Professional Seminar in Design, Housing, and Apparel. (1-3 cr; A-F or Aud) Professional development issues and trends.

DHA 8181. Ethics and Research. (1 cr; S-N or Aud. Prereq—Grad student) Overview of ethical concerns/questions in conducting/disseminating research. Mentoring relationships, use of human subjects, data handling, plagiarism, authorship, publishing, research funding, social responsibility of researchers, code of conduct.

DHA 8192. Readings in Design, Housing, and Apparel. (1-3 cr [max 8 cr]; A-F or Aud. Prereq—#) Independent study and review of books and periodicals under tutorial guidance.

DHA 8193. Directed Study in Design, Housing, and Apparel. (1-3 cr [max 8 cr]; A-F or Aud. Prereq—#) Directed Study in Design, Housing, and Apparel.

DHA 8222. Plan B Master’s Project. (3 cr; S-N or Aud. Prereq—DHA Master’s student, #) Plan B master’s project.

DHA 8262. Writings on Dress: Historical Perspectives. (3 cr; A-F or Aud) Dress as a significant factor in human interaction prior to 1940. Early social science and philosophical writing, beginning with Montaigne in 1537. These perspectives appraised for relevance to current research and theory.

DHA 8263. Writings on Dress: Contemporary Themes. (3 cr; A-F or Aud. Prereq—8101 or #) Current conceptualizations and thematic areas in literature of textiles and apparel.

DHA 8265. Dress: Race, Class, and Gender. (3 cr; A-F or Aud. Prereq—4212 or #) Dressing the body as a sociocultural and personal expression of an individual’s identity. Gender, race, and class differences in apparel explored to understand the global market, international and niche retailing, as related to clothing practices.

DHA 8266. Aesthetic Concepts Related to Apparel Design. (3 cr; A-F or Aud. Prereq—DHA major or #) Aesthetics of dress; application of a framework for visual analysis and evaluation.

DHA 8267. Dress and Culture. (3 cr; A-F or Aud. Prereq—4212 or #) Cultural factors of identity expressed through dress. Focuses on issues of cultural diversity through analysis of dress and textiles within a specific world region.

DHA 8268. Behavioral Aspects of Dress. (3 cr; A-F only) Research and social science theories as applied to appearance/dress as manifestations of human behavior.

DHA 8333. FTE: Master’s. (1 cr; No grade. Prereq—Master’s student, adviser and DGS consent)

DHA 8361. Color, Design, and Human Perception. (3 cr; A-F or Aud. Prereq—Basic color theory course or #) Perceptual and psychological aspects of color and design. Human factors of color variables and design strategies that can enhance human experience of, and interaction with, color.

DHA 8362. The Nature of Representation in Visual Communication. (3 cr; A-F or Aud. Prereq—Grad DHA major or #) Relationship of images to the design communication process. Aspects of representation and pictorial information modes. Human interaction with images and their role in increasing understanding, enhancing learning, and positively affecting human experience.

DHA 8444. FTE: Doctoral. (1 cr; No grade. Prereq—Doctoral student, adviser and DGS consent)

DHA 8463. Housing: Race and Class. (3 cr; A-F or Aud) Roles of difference (race, gender, class) in shaping distribution of housing, particularly in cities. Role of housing in patterns of social differentiation.

DHA 8467. Theoretical Perspectives in Housing Studies. (3 cr; A-F or Aud. Prereq—5467 or #) Investigation/evaluation of theories applied to study of housing. Levels of analysis. Links between theory, research questions, and methodological approaches.

DHA 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined; 4 cr; for 3rd/4th registrations, up to 24 combined; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined)

DHA 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq—Max 18 cr per semester or summer, 10 cr total required (Plan A only))

DHA 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

DHA 8990. MFA Creative Thesis. (6 cr [max 12 cr]; A-F or Aud. Prereq—Completed coursework requirements for MFA in DHA w/multimedia emphasis, #) MFA project.

Development Studies and Social Change (DSSC)

College of Liberal Arts

DSSC 8111. Approaches to Knowledge and Truth: Ways of Knowing in Development Studies and Social Change. (2 cr; S-N or Aud. Prereq—Grad DSSC minor or #) Approaches practiced by physical, biological, social science, and humanities scholars. “Ways of knowing” in different cultures/groups. Issues/methodological challenges facing interdisciplinary/international studies. Team taught by faculty from biological, social sciences, and humanities.


DSSC 8211. Doctoral Research Workshop in Development Studies and Social Change. (2 cr; S-N or Aud. Prereq—Grad DSSC minor or #) Identification of potential funding sources for field research and the writing of grant proposals. Preparing for and conducting field research. Taken during the year before undertaking field research, typically the third year of graduate study.

DSSC 8212. Doctoral Research Workshop in Development Studies and Social Change. (2 cr; S-N or Aud. Prereq—Grad DSSC minor or #) Identification of potential funding sources for field research and the writing of grant proposals. Preparing for and conducting field research. Taken during the year before undertaking field research, typically the third year of graduate study.

DSSC 8310. Topics in Development Studies and Social Change. (2-3 cr [max 6 cr]; Prereq—Grad DSSC minor or #) Offered in conjunction with MacArthur Program on Peace and International Cooperation workshop series.

Dutch (DTCH)

Department of German, Scandinavian, and Dutch College of Liberal Arts

DTCH 5490. Topics in Dutch Literature. (3 cr [max 9 cr]) Topic may focus on a specific author, group of authors, genre, period, or subject matter. Topics specified in Class Schedule.

DTCH 5593. Directed Studies. (1-4 cr [max 12 cr]; Prereq—#. A, D) Guided individual reading or study.

East Asian Studies (EAS) Institute of International Studies College of Liberal Arts

EAS 5940. Topics in Asian History. (1-4 cr [max 16 cr]; Prereq—Grad or instr consent) Selected topics such as cultural, economic, intellectual, political, and social history.

EAS 8333. FTE: Master’s. (1 cr; No grade. Prereq—Master’s student, adviser and DGS consent)
Courses

EAS 8777. Thesis Credits: Master’s. (1–18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 15 cr total required [Plan A only])

Ecology, Evolution, and Behavior (EEB)

Department of Ecology, Evolution and Behavior College of Biological Sciences

EEB 5001. Spatiotemporal Dynamics of Plant Communities. (3 cr; Prereq–[BIOL 3407, 4307] or #) Dynamic nature of plant communities in times of environmental changes. Emphasizes species invasion as key for structure/dynamics of plant assemblages. Observational, statistical, and experimental studies on spatiotemporal dynamics of plant communities under various changes in biological/environmental conditions, including human-induced Global Warming.

EEB 5008. Forest Response to Quaternary Climate Change. (2 cr; A-F or Aud. Prereq–BIOL 3407, EEB 4531 or Geo 4631 concurrent registration EEB 5009) Forest responses to past climate change at the population, community, and ecosystem level. Response to natural and human disturbance, range shifts and invasions. Limitations to the speed of response to rapid climate change.

EEB 5009. Quaternary Vegetation History and Climate. (3 cr; Prereq–[BIOL 4631 or Geo 4631], BIOL 3407 [or #]) History of vegetation change in Quaternary period. Importance of mechanistic understanding on interpretation of historical events. Vegetation distribution/climate. Mechanisms of climate change and long-term vegetation dynamics. Vegetation and climate reconstructions. Modeling in paleoecology and paleoclimatology. Case studies in North America and other parts of globe. Human impacts on vegetation and climate.

EEB 5011. Pollen Morphology. (2 cr; Prereq–BIOL 3007, PBIO 4321 or #) Morphology and nomenclature of pollen grains and pteridophyte spores, survey of pollen and spores of major plant families, lab techniques.

EEB 5013. Quaternary Plant Macrofossils. (2 cr; Prereq–PBIO 4321 or 4511 or #) Morphology of seeds, fruits, and other macroscopic remains likely to occur in Quaternary deposits, survey of fossils of major plant families, lab techniques.

EEB 5033. Population and Quantitative Genetics. (4 cr; A-F or Aud. Prereq.–[BIOL 4003 or GCD 3022], intro statistics) or #) Fundamentals of population genetics. Genetics/ environmental influences on expression of quantitative traits. Approaches to characterizing genetic basis of trait variation. Processes that lead to change in quantitative traits. Applied/evolutionary aspects of quantitative genetic variation.

EEB 5042. Quantitative Genetics. (3 cr; A-F only. Prereq.–BIOL 4003 or GCD 3022) or #; a course in statistics is recommended) Fundamentals of quantitative genetics. Genetic/ environmental influences on expression of quantitative traits. Approaches to characterizing genetic basis of trait variation. Processes that lead to change in quantitative traits. Applied/evolutionary aspects of quantitative genetic variation.

EEB 5051. Analysis of Populations. (3 cr; §FW 5051. Prereq–Intro biology, intro statistics or #) Factors involved in the regulation, growth, and general dynamics of populations. Data needed to describe populations, population growth, population models, and regulatory mechanisms.

EEB 5053. Ecology: Theory and Concepts. (4 cr; Prereq–BIOL 3407 or #) Classical and modern mathematical theories of population growth, competition, and evolutionary dynamics, ecosystem dynamics and functioning, with emphasis on underlying assumptions and on effects of added biological reality on robustness of predictions, stability, interspecific interactions, ecosystem structure and functioning.


EEB 5122W. Plant Interactions with Animals and Microbes. (3 cr; A-F or Aud. Prereq.–BIOL 2012 or 3002, 3407 or 3409) Ecological and environmental implications of mutualistic and antagonistic interactions between plants, animals and microbes at organismal, population, and community levels.


EEB 5221. Molecular and Genomic Evolution. (3 cr; A-F or Aud. Prereq.–[BIOL 4003 or GCD 3022], grad student) or #) Molecular basis of evolutionary change. Current studies of selection and neutral processes at molecular level. Evolution from gene to genome level: protein structure and function, multigene families, organelle genomes, genome organization. Lectures, discussions of current literature, and workshops where students practice analyses.

EEB 5321. Evolution of Social Behavior. (3 cr; A-F or Aud. Prereq–BIOL 3411 or #) Introduction to theories and concepts relating to behavior evolution, mating systems, and cooperative behavior in animals.

EEB 5322. Evolution and Animal Cognition. (3 cr; Prereq–BIOL 3411 or Pay 3061 or #) Animal cognitive abilities. Learning, perception, memory, navigation, and communication from evolutionary/comparative perspective. Cognitive abilities as adaptations that solve specific environmental problems. Empirical methods for assessing cognitive abilities. Emphasizes parsimonious interpretations of evidence. Controversial topics such as animal intelligence, animal language and whether non-human animals have a “theory of mind.”

EEB 5323. Neural and Endocrine Mechanisms Underlying Vertebrate Behavior. (2 cr; A-F or Aud. Prereq–BIOL 3411 or BIOL 3101 or #) Selected aspects of the physiological basis of vertebrate behavior with emphasis on neural and endocrine integration and the effects of evolutionary pressures on it. Hormones and sex behavior, sensory perception, neuroendocrinology of communication.

EEB 5327. Behavioral Ecology. (3 cr; Prereq–BIOL 3411 or #) Evolutionary principles applied to aggressive competition, mate choice, cooperation, and parental investment. Optimization models used to examine foraging strategies of both predators/prey interactions, and territory. Evolution of sex, sexual selection, dispersal. Evolutionary game theory.

EEB 5361. Visions of Nature: The Natural World and Human Nature. (4 cr; Prereq–Advanced studies in history, philosophy, or biology) Theories about the organization of nature, human nature, and their significance for the development of ethics, religion, political and economic philosophy, civics, and environmentalism in Western and other civilizations. Graduate credit requires paper on conceptual topic on human ecology.

EEB 5371. Principles of Systematics. (3 cr; Prereq–Grad student or #) Theoretical/practical procedures of biological systematics, Phylogeny reconstruction. Computer-assisted analyses, morphological and molecular approaches, species concepts/speciation, comparative methods, classification, historical biogeography, nomenclature, use/value of museums.

EEB 5501. Limnology. (3 cr; Prereq–Grad student or #) Advanced introduction to description/analysis of interaction of physical, chemical, and biological factors that control functioning of life in lakes and other freshwater aquatic environments.

EEB 5565. Limnology Laboratory. (2 cr; A-F or Aud. Prereq–4601 or #) Field and lab methods used to obtain information on environmental conditions in aquatic environments and measure the abundance of aquatic organisms especially plants, field and lab techniques, sampling devices, microscopy, water chemistry, data analysis.

EEB 5569. Ecosystem Ecology. (3 cr; Prereq–[BIOL 3407 or BIOL 5407]) Regulation of energy and elements cycling through ecosystems. Dependence of cycles on kinds/numbers of species within ecosystems. Effects of human-induced global changes on functioning of ecosystems.

EEB 5591. Decision Analysis and Modeling in Conservation Biology. (3 cr; Prereq–Grad student or #) Decision analysis/modeling in conservation biology. Techniques, concepts, software.

EEB 5593. Modeling Nature and the Nature of Modeling. (3 cr; §EEB 3963. Prereq–[Math 1281, Math 1282] or equiv or #) Hands-on modeling experiences in context of biological applications. Reviews calculus concepts. Students carry out modeling exercises, developing a model to, analytical analysis, to developing computer code, to running the models.

EEB 8010. Seminar in Paleoenecology. (1 cr [max 4 cr]; S-N or Aud. Prereq–#) Reading and discussion of recent literature on Quaternary paleoecology.

EEB 8020. Community Ecology Seminar. (1 cr [max 5 cr]; S-N or Aud. Prereq–#) Research topics in selected areas.

EEB 8050. Population Biology Seminar. (1 cr [max 5 cr]; S-N or Aud. Prereq–#) Research topics in selected areas.

EEB 8051. Empirical Ecology. (4 cr; Prereq–stat or biometry course or #) Overview of analytical methods in interpreting data collected from observational and experimental studies in ecology and related fields of evolution, behavior, and conservation biology. Univariate, bivariate, and multivariate methods, including computationally intensive methods, ordination, and hypothesis testing.

EEB 8060. Evolutionary Genetics Seminar. (1 cr [max 5 cr]; S-N or Aud. Prereq–#) Research topics in selected areas.

EEB 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

EEB 8360. Behavioral Biology Seminar. (1 cr [max 5 cr]; S-N or Aud. Prereq–#) Research topics in selected areas.

EEB 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

EEB 8601. Introduction to Stream Restoration. (3 cr; §GEO 6801. Prereq–Grad student in [EE or GEO or EEB or WR or FW or SNE or FR or HORT or ENR or LA or SIRE] or #) Science/policy behind stream restoration. How to evaluate/critiquing a stream restoration project. Assimilate geomorphic, hydrologic, and ecological data at watershed and reach scales to plan a restoration project. Developing a monitoring/assessment program for an existing or future restoration project.

EEB 8602. Stream Restoration Practice. (2 cr; S-N only. §GEO 8602. GEO 8602. Prereq–CE 8601 or GEO 8601) Field experience, group design project. Students provide a stream restoration context for each other’s elective coursework, comparative assessments of stream restoration projects, and design a stream restoration site.
ECON 8002. Microeconomic Analysis. (2 cr; Prereq–8001) Theories of consumer demand, producer supply, and market equilibrium; general equilibrium and welfare. Sample topics: externalities, economics of information and uncertainty, and game theory. This seven-week course meets with 4162.

ECON 8003. Microeconomic Analysis. (2 cr; Prereq–8002) Theories of consumer demand, producer supply, and market equilibrium; general equilibrium and welfare. Sample topics: externalities, economics of information and uncertainty, and game theory. This seven-week course meets with 4163.

ECON 8004. Microeconomic Analysis. (2 cr; Prereq–8003) Theories of consumer demand, producer supply, and market equilibrium; general equilibrium and welfare. Sample topics: externalities, economics of information and uncertainty, and game theory. This seven-week course meets with 4164.

ECON 8101. Microeconomic Theory. (2 cr; Prereq–5151 or equiv, Math 2243 or equiv, ¶Math 5615 or concurrent registration in Math 8601, grad econ major or #) Decision problems faced by the household and firm; theories of choice under conditions of certainty and uncertainty. Partial equilibrium analysis of competition and monopoly. General equilibrium analysis. Welfare economics: economic efficiency of alternative market structures, social welfare functions. Dynamics: stability of markets, capital theory. Seven-week course.

ECON 8102. Microeconomic Theory. (2 cr; Prereq–8101, ¶Math 5615 or ¶Math 8601, grad econ major or #) Decision problems faced by the household and firm; theories of choice under conditions of certainty and uncertainty. Partial equilibrium analysis of competition and monopoly. General equilibrium analysis. Welfare economics: economic efficiency of alternative market structures, social welfare functions. Dynamics: stability of markets, capital theory. Seven-week course.

ECON 8103. Microeconomic Theory. (2 cr; Prereq–8102, ¶Math 5615 or ¶Math 8602 or comparable abstract math course, grad econ major or #) Decision problems faced by the household and firm; theories of choice under conditions of certainty and uncertainty. Partial equilibrium analysis of competition and monopoly. General equilibrium analysis. Welfare economics: economic efficiency of alternative market structures, social welfare functions. Dynamics: stability of markets, capital theory. Seven-week course.

ECON 8104. Microeconomic Theory. (2 cr; Prereq–8103, ¶Math 5615 or ¶Math 8602 or comparable abstract math course, grad econ major or #) Decision problems faced by the household and firm; theories of choice under conditions of certainty and uncertainty. Partial equilibrium analysis of competition and monopoly. General equilibrium analysis. Welfare economics: economic efficiency of alternative market structures, social welfare functions. Dynamics: stability of markets, capital theory. Seven-week course.

ECON 8105. Macroeconomic Theory. (2 cr; Prereq–5152 or equiv, Math 2243, Math 2263 or equiv or #) Dynamic general equilibrium models: solving for paths of interest rates, consumption, investment, prices. Models with uncertainty, search, matching, indivisibilities, private information. Implications for measurement and data reporting. Overlapping generations and dynasty models. Variational and recursive methods. This seven-week course meets with 4165.


ECON 8111. Introduction to Mathematical Economics. (2 cr; Prereq–Math 2243 or equiv; ¶ECON 8101, ¶Math 5615 or equiv or #; Math 4242 recommended) Use of mathematical models in economic theory.

ECON 8112. Introduction to Mathematical Economics. (2 cr; Prereq–8111, 8112, ¶Math 5615 or comparable abstract math course) Use of mathematical models in economic theory. Standard techniques.

ECON 8113. Introduction to Mathematical Economics. (2 cr; Prereq–8112, Math 5616 or comparable abstract math course, ¶8103) Use of mathematical models in economic theory. May include special topics.

ECON 8117. Noncooperative Game Theory. (2 cr; Prereq–Math 5616 or equiv or #) Solution concepts for noncooperative games in normal form, including Nash and perfect equilibrium and stable sets of equilibria. Extensive form games of perfect and incomplete information, sequential equilibrium, and consequences of stability for extensive form. Applications including bargaining and auctions. Seven-week course.

ECON 8118. Noncooperative Game Theory. (2 cr; Prereq–8117) Solution concepts for noncooperative games in normal form, including Nash and perfect equilibrium and stable sets of equilibria. Extensive form games of perfect and incomplete information, sequential equilibrium, and consequences of stability for extensive form. Applications including bargaining and auctions. Seven-week course.

ECON 8119. Cooperative Game Theory. (2 cr; Prereq–8104, Math 5616 or equiv or #) Basics of cooperative game theory, emphasizing concepts used in economics. Games with and without transferable utility; the core, the value, and other solution concepts. Recent results, including potentials, reduced games, consistency, and noncooperative implementation of cooperative solution concepts. Seven-week course.

ECON 8124. History of Economic Thought. (2 cr; Prereq–8104, 8105 or #) Selected topics, emphasizing development of theoretical topics. Seven-week course.

ECON 8125. History of Economic Thought. (2 cr; Prereq–8124 or #) Selected topics, emphasizing development of theoretical topics. Seven-week course.

ECON 8181. Advanced Topics in Microeconomics. (2 cr [max 4 cr]; Prereq–8104 or #) Faculty and student presentations based on recent literature. Seven-week course.

ECON 8182. Advanced Topics in Microeconomics. (2 cr [max 4 cr]; Prereq–8104 or #) Faculty and student presentations based on recent literature. Seven-week course.

ECON 8185. Advanced Topics in Macroeconomics. (2 cr [max 4 cr]; Prereq–8108 or #) Faculty and student presentations based on recent literature. Seven-week course.
Courses

ECON 8186. Advanced Topics in Macroeconomics. (2 cr; [max 4 cr; Prereq–8402 or equiv] or Faculty and student presentations based on recent literature. Seven-week course.

ECON 8191. Workshop in Mathematical Economics. (1-3 cr; [max 10 cr; Prereq–8104 or #]) Students conduct research and present papers under faculty supervision.

ECON 8192. Workshop in Mathematical Economics. (1-3 cr; [max 10 cr; Prereq–8104 or #]) Students work on research and present papers under faculty supervision.

ECON 8201. Econometric Analysis. (2 cr; Prereq–[ECON 8101 or equiv], Math 1272 or equiv, Stat 5102 or #) Basic linear regression model, its variants. Panel data, censored/truncated regression, discrete choice models. Time series, simultaneous equation models.


ECON 8205. Applied Econometrics. (2 cr; Prereq–Math 4242 or equiv, ECON 8101, ECON 8105, Stat 5101 or #) Application in research, including classical and Bayesian approaches; formulation, comparison, and use of models and hypotheses; inference and prediction in structural models; simulation methods. Seven-week course.

ECON 8206. Applied Econometrics. (2 cr; Prereq–8205, Stat 5102, Stat 5106, Stat 5101 or #) Application in research, including classical and Bayesian approaches; formulation, comparison, and use of models and hypotheses; inference and prediction in structural models; simulation methods. Seven-week course.

ECON 8207. Applied Econometrics. (2 cr; Prereq–8206, Stat 5103, Stat 5107, Stat 5102 or #) Application in research, including classical and Bayesian approaches; formulation, comparison, and use of models and hypotheses; inference and prediction in structural models; simulation methods. Seven-week course.

ECON 8211. Econometrics. (2 cr; Prereq–ECON 5151, 5152, Math 4242 or equiv, Stat 5102 or #) Linear regression; general linear hypotheses; Gauss Markov theorem, generalized least squares and their applications. Decision-theoretic choice among estimators. Simultaneous equations models; identification and estimation. Asymptotic distribution theory. Applications, including multivariate time series models and/or limited dependent variables models. Seven-week course.

ECON 8212. Econometrics. (2 cr; Prereq–8211) Linear regression; general linear hypotheses; Gauss Markov theorem, generalized least squares and their applications. Decision-theoretic choice among estimators. Simultaneous equations models; identification and estimation. Asymptotic distribution theory. Applications, including multivariate time series models and/or limited dependent variables models. Seven-week course.

ECON 8213. Econometrics. (2 cr; Prereq–8212) Linear regression; general linear hypotheses; Gauss Markov theorem, generalized least squares and their applications. Decision-theoretic choice among estimators. Simultaneous equations models; identification and estimation. Asymptotic distribution theory. Applications, including multivariate time series models and/or limited dependent variables models. Seven-week course. Faculty and student presentations based on recent literature. Seven-week course.

ECON 8213. Econometrics. (2 cr; Prereq–8212) Linear regression; general linear hypotheses; Gauss Markov theorem, generalized least squares and their applications. Decision-theoretic choice among estimators. Simultaneous equations models; identification and estimation. Asymptotic distribution theory. Applications, including multivariate time series models and/or limited dependent variables models. Seven-week course.

ECON 8214. Econometrics. (2 cr; Prereq–8202) Linear regression; general linear hypotheses; Gauss Markov theorem, generalized least squares and their applications. Decision-theoretic choice among estimators. Simultaneous equations models; identification and estimation. Asymptotic distribution theory. Applications, including multivariate time series models and/or limited dependent variables models. Seven-week course. Faculty and student presentations based on recent literature. Seven-week course.
Courses

ECON 8666. Doctoral Pre-Thesis Credits. (1-6 cr; [max 12 cr]; No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; Δ for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

ECON 8681. Advanced Topics in Industrial Organization. (2 cr; max 4 cr) Prereq—E8803 or # Faculty and student presentations based on recent literature. Seven-week course.

ECON 8682. Advanced Topics in Industrial Organization. (2 cr [max 4 cr]; Prereq—E8803 or #) Faculty and student presentations based on recent literature. Seven-week course.

ECON 8691. Workshop in Applied Microeconomics. (1-3 cr [max 10 cr]; Prereq—#) Workshop in Applied Microeconomics.

ECON 8692. Workshop in Applied Microeconomics. (1-3 cr [max 10 cr]; Prereq—#) Economic role of principal financial institutions. Determinants of value of money. Principal problems of monetary policy. Seven-week course.

ECON 8701. Monetary Economics. (2 cr; Prereq—E8103, 8106 or #) Economic role of principal financial institutions. Determinants of value of money. Principal problems of monetary policy. Seven-week course.

ECON 8702. Monetary Economics. (2 cr; Prereq—E8701 or #) Economic role of principal financial institutions. Determinants of value of money. Principal problems of monetary policy. Seven-week course.

ECON 8703. Monetary Economics. (2 cr; Prereq—E8702 or #) Economic role of principal financial institutions. Determinants of value of money. Principal problems of monetary policy. Seven-week course.

ECON 8704. Financial Economics. (2 cr; Prereq—E8103, 8106 or #) Role of financial institutions in efficient allocation of risk; multiperiod and continuous-time securities markets; theory of firm under uncertainty; financial intermediation; derivation of empirical asset-pricing relationships; tests concerning alternative market structures. Seven-week course.

ECON 8705. Financial Economics. (2 cr; Prereq—E8704 or #) Role of financial institutions in efficient allocation of risk; multiperiod and continuous-time securities markets; theory of firm under uncertainty; financial intermediation; derivation of empirical asset-pricing relationships; tests concerning alternative market structures. Seven-week course.

ECON 8706. Financial Economics. (2 cr; Prereq—E8705 or #) Role of financial institutions in efficient allocation of risk; multiperiod and continuous-time securities markets; theory of firm under uncertainty; financial intermediation; derivation of empirical asset-pricing relationships; tests concerning alternative market structures. Seven-week course.

ECON 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq—Max 18 cr per semester or summer; 10 cr total required [Plan A only])

ECON 8781. Advanced Topics in Monetary Economics. (2 cr [max 4 cr]; Prereq—E8702 or #) Faculty and student presentations based on recent literature. Seven-week course.

ECON 8782. Advanced Topics in Monetary Economics. (2 cr [max 4 cr]; Prereq—E8702 or #) Faculty and student presentations based on recent literature. Seven-week course.

ECON 8791. Workshop in Macroeconomics. (1-3 cr [max 10 cr]; Prereq—#) Workshop in Macroeconomics.


ECON 8801. Public Economics. (2 cr; Prereq—E8103, 8106 or #) Theories of public choice and role of government in economy. Economic effects of taxes, public debt, and public expenditure. Current problems in economics of public sector, including political economy. Seven-week course.

ECON 8802. Public Economics. (2 cr; Prereq—E8801 or #) Theories of public choice and role of government in economy. Economic effects of taxes, public debt, and public expenditure. Current problems in economics of public sector, including political economy. Seven-week course.

ECON 8803. Public Economics. (2 cr; Prereq—E8802 or #) Theories of public choice and role of government in economy. Economic effects of taxes, public debt, and public expenditure. Current problems in economics of public sector, including political economy. Seven-week course.

ECON 8881. Advanced Topics in Public Economics. (2 cr [max 4 cr]; Prereq—E8803 or #) Faculty and student presentations based on recent literature. Seven-week course.

ECON 8882. Advanced Topics in Public Economics. (2 cr; Prereq—E8803 or #) Faculty and student presentations based on recent literature. Seven-week course.

ECON 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

ECON 8891. Workshop in Public Economics and Policy. (1-3 cr [max 10 cr]; Prereq—#)

ECON 8892. Workshop in Public Economics and Policy. (1-3 cr [max 10 cr]; Prereq—#)

ECON 8990. Individual Graduate Research. (1-7 cr [max 7 cr]; Prereq—#) Individual Graduate Research.

Education (EDUC)

College of Education and Human Development

EDUC 8333. FTE: Master’s. (1 cr; No grade. Prereq—Master’s student, adviser and DOG consent)

EDUC 8444. FTE: Doctoral. (1 cr; No grade. Prereq—Doctoral student, adviser and DOG consent)

EDUC 8666. Doctoral Pre-Thesis Credits. (1-8 cr [max 12 cr]; No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; Δ for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 80 combined cr)

EDUC 8677. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq—Max 18 cr per semester or summer; 10 cr total required [Plan A only])

EDUC 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

Education and Human Development (EDHD)

College of Education and Human Development

EDHD 5001. Learning, Cognition, and Assessment. (3 cr; A-F or Aud. Prereq—Jr or Sr or post-bac or Med/initial licensure or GLA music ed or preteaching major or FOE or agriculture or kinesiology or #) Emphasizes dynamic systems perspective. Developmental transitions in childhood/adolescence. Interactions between student, environment, and task. Accommodations/adaptations for students in special education.

EDHD 5005. School and Society. (2 cr; A-F or Aud. Prereq—Jr or Sr or Med/initial licensure or GLA music ed major or preteaching major or #) Readings in history, philosophy, social sciences, and law revealing diverse educational values in a pluralistic society. Multiple expectations of schools. Civil liberties, rights, community. Varying cultural backgrounds of students, family circumstances, exceptional needs.

EDHD 5007. Technology for Teaching and Learning. (1.5 cr; A-F or Aud. Prereq—Med/initial licensure or GLA music ed major or preteaching major or #) Basic computer skills Diverse educational technology in K–12 classrooms. Effective use of technology. Computer technologies used to stimulate personal productivity/communication and to enhance teaching/learning processes.

EDHD 5009. Human Relations: Applied Skills for School and Society. (1 cr; A-F or Aud. Prereq—Med/initial lic or GLA music ed or preteaching or #) Issues of prejudice/discrimination in terms of history, power, social perception. Knowledge/skills acquisition in cooperative learning, multicultural education, group dynamics, social influence, leadership, judgment/decision making, prejudice reduction, conflict resolution, teaching in diverse educational settings.

Educational Policy and Administration (EDPA)

Department of Educational Policy and Administration

College of Education and Human Development

EDPA 5001. Formal Organizations in Education. (3 cr) Classical/current theories of organizations. Applications to education and related fields.

EDPA 5021. Historical Foundations of Modern Education. (3 cr; # EDPA 3021, HUM 3021, HUM 4021) Analysis and interpretation of important elements in modern education derived from pre-classical sources: Greeks, Romans, Middle Ages, Renaissance, Reformation, Enlightenment, and Industrial Revolution.

EDPA 5023. History of Western Educational Thought. (3 cr; # EDPA 3023, HUM 3023, HUM 4023) Great educational classics of Western civilization: Plato, Aristotle, Quintilian, Montaigne, Milton, Locke, Rousseau, and others.


EDPA 5028. Education Imagery in Europe and America. (3 cr) Images and ideas of education expressed in the visual arts of Western civilization (antiquity to 20th century) in relation to concurrent educational thought and practice; symbolism, myth, propaganda, didactics, genre, caricature.

EDPA 5032. Comparative Philosophies of Education. (3 cr) Exploration of the principal philosophies in educational thought today, e.g., realism, idealism, pragmatism, and postmodernism. Practice in philosophical critique.

For definitions of course numbers, abbreviations, and symbols, see page 169.
EDPA 5036. Ethics, Morality, and Values in Education. (3 cr)
Application to key issues of professional practice. Moral education, virtues, principles.
EDPA 5041. Sociology of Education. (3 cr; §SOC 5455)
Structures and processes within educational institutions; linkages between educational organizations and their social contexts, particularly related to educational change.
EDPA 5044. Introduction to the Economics of Education. (3 cr)
Costs and economic benefits of education, with a focus on K–12; educational markets, prices, and production relationships; investment and cost-benefit analysis.
EDPA 5048. Cross-Cultural Perspectives on Leadership. (2-3 cr [max 3 cr])
Introduction to cultural variables of leadership that influence functioning of cross-cultural groups. Lectures, case studies, discussion, problem-solving, simulations. Intensive workshop.
EDPA 5052. Ethnic Groups and Communities: Families, Children, and Youth. (3 cr)
EDPA 5056. Case Studies for Policy Research. (3 cr; A-F or Aud)
Qualitative case study research methods and their applications to educational policy and practice. Emphasis on designing studies that employ open-ended interviewing as primary data collection technique.
EDPA 5057. Research in International Education. (3 cr)
EDPA 5061. Ethnographic Research Methods. (3 cr)
Practice in aspects of field methodology below the level of full field study; detailed reading; analysis of studies in anthropology and education for methodological content.
EDPA 5064. Divergent Perspectives in Educational Policy and Practice. (3 cr)
Examines fundamental and current issues in the field of education. Participants learn how to approach an issue from multiple perspectives, develop skills to identify and analyze its component parts, and examine personal belief systems to place a given issue within a personal context.
EDPA 5070. Special Topics: School Leadership. (1-5 cr [max 15 cr]; Prereq-QBA or BS or other baccalaureate degree)
Skills/knowledge necessary to respond to multiple challenges of reduced budgets, increased accountability requirements, and growing concerns about impact of technology investments in education.
EDPA 5080. Special Topics: Educational Policy and Administration. (1-3 cr [max 24 cr])
Topical issues in educational policy/administration.
EDPA 5087. Seminar: Educational Policy and Administration. (1-3 cr [max 24 cr])
Shared responsibility of students/instructor in presentation of topics.
EDPA 5095. Problems: Educational Policy and Administration. (1-3 cr [max 24 cr])
Course or independent study on specific topic within department program emphasis.
EDPA 5096. Internship: Educational Policy and Administration. (1-3 cr [max 24 cr])
Internship in elementary, secondary, general, or postsecondary administration, or other approved field related setting.
EDPA 5311. Data-Driven Decision Making II. (1 cr; Prereq—Broadband Internet access, a newer computer) Continuation of 5310. Data-driven decision making for schools/administrators. Hands-on training in students’ own organizations in using technology to analyze data to make educational decisions.

EDPA 5312. School Technology Policy Issues. (1 cr; Prereq—Broadband Internet access, a newer computer) Various state/national policy issues related to educational technology. Focuses on “digital divide” in schools/communities, federal educational technology policy initiatives, and state/federal educational technology legislation.

EDPA 5313. Legal and Ethical Issues in School Technology. (1 cr; Prereq—Broadband Internet access, a newer computer) Social, legal, and ethical issues related to school technology. How to model responsible decision-making related to these issues.


EDPA 5315. School Technology Leadership Multimedia Project. (1 cr; Prereq—[Mac or PC] with 256 MB RAM. [Windows: 2000 or XP or Mac OS 9 or 10, Pentium 2 or faster], internet connection, [Net scape or Internet Explorer], virus protection software, School Technology Leadership or #) Students focus on individualized school technology leadership topics, deliver a multimedia presentation of project results. Regular consultation with faculty, peer mentors, and outside mentors.

EDPA 5321. The Principalship. (3 cr) Role of the principal: qualifications, duties, and problems.

EDPA 5322. School Superintendency. (3 cr) Role/responsibility of the superintendent in district school. Emphasizes real life experiences, leadership potential as CEO. Purposes, power, politics, practices of position. Interplay of internal school forces, external community forces analyzed in multiple contexts. Manifestations of leadership in public, high-profile appointment.

EDPA 5323. Women in Leadership. (3 cr; Prereq—technology access) Women in leadership, in context of larger systems and their own lives. Supporting equity/equality across areas of difference.

EDPA 5324. Financial Management for Elementary-Secondary Education. (3 cr) Provides an overview of state-local school finance systems, budgeting, governmental fund accounting, and interpretation of financial information. For graduate students pursuing licensure as elementary-secondary principals and superintendents.


EDPA 5326. Data Analysis for Educational Leadership. (2 cr; Prereq—5323 or equiv.) Advanced technological/analytical tools associated with data-driven decision-making processes in K–12 school environments.

EDPA 5328. Introduction to Educational Planning. (3 cr) Principles, tools, comparative practices, and emerging issues in K–12 and higher education settings; decision making in strategic and project planning; barriers to effectiveness; and change management processes.

EDPA 5332. Leadership Development Seminar. (3 cr) Assessment and development of skills required of the educator in planning, decision making, and human relations. Introduction to contemporary issues in educational administration.

EDPA 5336. Laboratory in Decision Making. (3 cr) Contributions of recent research and theory to effective administrative decision making. Analysis of administrative behavior in realistic settings; relations of administration to human behavior.

EDPA 5341. The American Middle School. (3 cr) Focus on the uniqueness of the early adolescent and appropriate learning situations. For educators working with middle-level students.

EDPA 5344. Legal Aspects of Elementary and Secondary Education. (3 cr) Overview of legal foundations of elementary/secondary education. Statutory themes, relevant case law, emergent policy issues. Implications for educational organizations and for administrative practice.

EDPA 5346. Politics of Education. (3 cr; A-F or Aud. Prereq—postbac, MED, or grad student) Political dimensions of policy formulation/imposition in education. Use of power/influence in shaping educational policies and in resolving conflicts over educational issues. Analysis of consequences/cross-impacts.

EDPA 5348. Administration of Human Resources in Education. (2 cr; Prereq—Designed for students working on licensure for dir of community educ or superintendent or K–12 principal or dir of special educ) Effective personnel practices. Skills required for effective administration/leader. Emphasizes human resources administration, including employee recruitment, selection, orientation/support, supervision, and performance appraisal of school district personnel.

EDPA 5352. Projective Leadership for Strategic Learning Communities. (3 cr) Explores many trends and changes facing society, culture, and education from a strategic learning perspective. Helps students “futurate the present.”

EDPA 5356. Disability Policy and Services. (3 cr) Policy, research, and current practices related to education, health, and social services that support children, youth, and adults with special needs, that support their families. Federal, state, and local perspectives.

EDPA 5361. Project in Teacher Leadership. (3 cr [max 6 cr]; S-N or Aud. §0 5178. Prereq—MED student in Teacher Leadership Program) Create, implement, evaluate, and present a leadership project designed to improve positive change in educational environments. Review of related literature, proposal development, project development, implementation, assessment, critical reflection, sharing learning outcomes.

EDPA 5364. Context and Practice of Educational Leadership. (3 cr; A-F or Aud) Current research/practice on educational leadership. Focuses on changing school cultures conducive to continuous improvement/change. Strategies for personal/organizational leadership in PK–12 settings.

EDPA 5368. Special Services Policy and Administration. (3 cr) Legislative, procedural, administrative, and judicial actions that affect services, families, and children with special needs at all levels of government: federal, state, and local. For administrators, supervisors, and other professionals responsible for managing general, special, and alternative education programs.

EDPA 5372. Youth in Modern Society. (3 cr) Youth in advanced societies and as a social entity; functions and roles in industrial society, family, education, politics and government, economy and work, welfare and religion; organizations, social movements, and subcultures; empirical research and cross-cultural perspectives.

EDPA 5374. Leadership for Professional Development. (4 cr; Prereq—Postbaccaleaurate, at least 3 yrs teaching experience) Designing, implementing, evaluating staff development in preK–12 settings. Research-based standards for effective staff development. Need for embedded time for collaborative learning, evaluating staff/student outcomes.

EDPA 5376. Organizational Approaches to Youth Development. (3 cr) Defining youth development within framework of formal and informal organizations; organizational systems responsible for youth development in the community; policy issues surrounding these systems.


EDPA 5381. The Search for Children and Youth Policy in the U.S. (3 cr) Review of contemporary policy issues affecting children and youth in the U.S. and South Africa; identify national standards, norms and principles of youth development; conflicting expectations facing policy-makers; and search for the critical content of youth policy.

EDPA 5384. Collaboration in Heterogeneous Classrooms and Schools. (3 cr; A-F or Aud) Policy, research, practice base for addressing range of student abilities/backgrounds in diverse schools. Collaborative approaches to curricular, instructional, social support.

EDPA 5385. Licensure Seminar. (1 cr; S-N or Aud) Preparation for licensure programs. Program overview, preassessment, reflective practice, APA writing, exit panel review, administrative employment interview.

EDPA 5386. Portfolio Seminar. (1 cr; S-N or Aud) Development of electronic administrative licensure portfolio as part of process to earn endorsement for license as a school superintendent, K–12 principal, direct of special education, or director of community education.

EDPA 5387. Administration of Teaching and Learning. (2 cr; Prereq—Undergraduate degree) Administration of inclusive/coherent systems of teaching/learning. Design principles, best practices, exemplary programs. School/district administrator roles as leaders of learning systems.

EDPA 5388. Master’s Schedule Building. (2 cr; Prereq—5387) Scheduling models. Strategies for personalizing schools. Hands-on “infinite campus student system.” Master schedule is built online.

EDPA 5389. Administration of Community and Alternative Education Programs. (3 cr) Competencies of leadership, community relations, communication, community assessment, program development, program evaluation. Philosophy/administration of community/alternative education programs.

EDPA 5391. Special Education Law. (1 cr; Prereq—Designed for students working on licensure in PK–12 administration) Competencies of leadership, policy, and political influence. Legal/regulatory applications focusing on special education law.

EDPA 5396. Field Experience in PK-12 Educational Administration. (3 cr [max 12 cr]; S-N or Aud. Prereq—Field experience or internship arrangement for students seeking licensure as PK–12 principal/superintendent. Content/credit depend on licensure requirements specified in individual field experience agreement.

EDPA 5501. Principles and Methods of Evaluation. (3 cr) §EPSY 5243) Introduction to program evaluation. Planning an evaluation study, collecting and analyzing information, reporting results; evaluation strategies; overview of the field of program evaluation.

EDPA 5521. Cost and Economic Analysis in Educational Administration. (3 cr) Cost-utility, and cost-feasibility in evaluation of educational problems and programs.
EDPA 5254. Evaluation Colloquium. (1 cr; [max 24 cr]; S-N or Aud. (EPsy 5245 or EPsy 5249)^)
In informal seminar of faculty and advanced students. Issues/problems of program evaluation.

EDPA 5256. Focus Group Interviewing Research Methods. (3 cr)
Skills needed to conduct focus group interviews. Students provide population of focus group study and report results at final class session.

EDPA 5701. U.S. Higher Education. (3 cr)
U.S. higher/postsecondary education in historical/contemporary perspective. Emphasizes structure, history, and purposes of system as a whole.

EDPA 5704. College Students Today. (3 cr; [EPsy 5451])

EDPA 5721. Racial and Ethnic Diversity in Higher Education. (2-3 cr [max 3 cr])
Review of research. Theoretical frameworks, methodological perspectives, and research strategies used to study students, staff, and faculty; historical perspectives.

EDPA 5724. Leadership and Administration of Student Affairs. (2-3 cr [max 3 cr]; [EPsy 5421])
Scope, administration, coordination, and evaluation of programs in college and university student affairs.

EDPA 5727. Developmental Education Programs and Postsecondary Students. (2-3 cr [max 3 cr]; Prereq-Bachelor’s degree)

EDPA 5728. Two-Year Postsecondary Institutions. (2-3 cr [max 3 cr])
Present status, development, functions, organization, curriculum, and trends in postsecondary, but nonbaccalaureate, institutions.

EDPA 5732. The Law and Postsecondary Institutions. (3 cr)
Analysis of court opinions and federal regulations affecting postsecondary educational institutions.

EDPA 5734. Institutional Research in Postsecondary Education. (2-3 cr [max 3 cr]; A-F or Aud. Prereq—[5701, EPsy 5231 or EPsy 8261], grad student) or #
Scope, role, administration, research strategies, and evaluation of institutional research in postsecondary institutions. Overview of research methodologies, disciplinary foundations of institutional research. Use of institutional, state, and national databases in addressing full range of institutional missions/functions.

EDPA 5795. Plan B Research Design. (3 cr [max 6 cr]; A-F or Aud. Prereq—Grad student)
Foundation to design Plan B research project relevant to student’s professional interests. Literature review strategies to establish conceptual framework for project. Relates research question to design alternatives and to associated qualitative/quantitative analysis techniques. Issues such as human subjects and APA guidelines for preparing research papers.

EDPA 8002. Critical Issues in Contemporary Education. (3 cr; Prereq—EdD or PhD student)
Meanings of difference from sociological, psychological, and philosophical perspectives as related to current and emerging critical issues in education. Participants help design, facilitate, and present the course.

EDPA 8011. Doctoral Research Seminar I. (1 cr; S-N or Aud. Prereq—EdD doctoral student)
Introduction to planning for individual program development, preliminary examinations, and dissertation prospects. Modes of inquiry used in current research in education, databases relating to education, recent writings/perspectives/synthesis, key contributions to education literature.

EDPA 8012. Doctoral Research Seminar II. (1 cr; S-N or Aud. Prereq—EdD doctoral student)
Introduction to quantitative/qualitative research approaches/methods. Nature of research, role of researcher, perspective on research, ethical issues in conducting research.

EDPA 8013. Doctoral Research Seminar III. (1 cr; S-N or Aud. Prereq—EdD doctoral student)
Introduction to most important quantitative/qualitative approaches employed in educational policy research.

EDPA 8014. Doctoral Research Seminar IV. (1 cr; S-N or Aud. Prereq—EdD doctoral student)
Preparation of thesis prospectus.

EDPA 8015. Research Design and Educational Policy. (3 cr; A-F only. Prereq—8011, EdD PhD student)
Logic of research design, from research questions and audience considerations to selection of a suitable design for collecting/analyzing quantitative, qualitative, and mixed-method data.

EDPA 8020. Leadership: From Theory to Reflective Practice. (3 cr; A-F or Aud. Prereq—[5001 or equiv], doctoral student) or #
Leadership theory. Emphasizes seminal scholars’ work from related social science disciplines. Implications of theory for practice of leadership. Knowledge, behaviors, values, and skills needed in educational and other public settings.

EDPA 8087. Seminar: Educational Policy and Administration. (1-3 cr [max 24 cr])
Seminar on issues of educational policy and administration.

EDPA 8095. Problems: Educational Policy and Administration. (1-3 cr [max 24 cr])
Independent study on issues of educational policy/administration. Arranged with instructor.

EDPA 8096. Internship: Educational Policy and Administration. (1-9 cr [max 24 cr])
Internship on issues of educational policy/ administration. Arranged with instructor.

EDPA 8104. Innovative Systems Thinking in Education and Culture. (3 cr)
Critical aspects of historical/contemporary systems philosophy, thinking, and analysis. Development of concepts/skills applicable to coping with evolutionary/chaotic environment. Modeling/simulation of learning systems in rapidly changing national/international contexts.

EDPA 8121. Doctoral Seminar: Comparative and International Development Education. (1-6 cr [max 6 cr]; S-N or Aud. Prereq—EdD PhD candidate)
Focuses on needs of students while writing the dissertation; general guidance in how to construct the thesis.

EDPA 8124. Classic Readings in Anthropology and Education. (3 cr; A-F or Aud.)
Major contributions to theory or working paradigms.

EDPA 8143. Integrative Seminar in Global Youth Policy and Leadership. (1 cr; max 3 cr; A-F only. Prereq—CIDE student or #)
Integrates ideas/concepts from 5141 and 5142 into major contributions to theory or working paradigms.

EDPA 8302. Educational Policy Perspectives. (3 cr)

EDPA 8303. Modeling the Learning Organization. (3 cr [max 4 cr])
Computer software, perspectives on learning organization used to study global education, human service organizations.

EDPA 8304. Leadership and Ethics. (3 cr)
Review of major leadership theories, their application to problems of practice in educational organizations. Studies of leadership behavior illustrate major emerging issues in educational management.

EDPA 8321. Data Analysis for Educational Management. (3 cr)
Managers of educational organizations are faced with problems that require analysis of a wide range of information. Outlines a frame for data analysis and introduces a set of computer-based tools suited to the practice of educational administration.

EDPA 8333. FTE: Master’s. (1 cr; No grade. Prereq—Master’s student, adviser and DGS consent)

EDPA 8444. FTE: Doctoral. (1 cr; No grade. Prereq—Doctoral student, adviser and DGS consent)

EDPA 8502. Program Evaluation Theory and Models: Qualitative and Quantitative Alternatives. (3 cr; Prereq—5501 or EPsy 5243)
Concepts, approaches, models, and theoretical frameworks for program evaluation that have developed since the 1960s.

EDPA 8595. Evaluation Problems. (1-6 cr [max 24 cr]; [EPSY 8295. Prereq—[5501 or EPsy 5243]. #)
Independent study of an issue in theory or practice of program evaluation.

EDPA 8596. Evaluation Internship. (1-9 cr [max 24 cr]; [EPSY 8295. Prereq—5501 or EPsy 5243]. #)
Hands-on experience in conducting a program evaluation in a real-world setting under supervision of an evaluation professional.

EDPA 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr];
No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

EDPA 8702. Administration and Leadership in Higher Education. (3 cr; A-F or Aud. Prereq—5001, 5701)
Leadership, governance, and administration in higher education through theoretical perspectives and practical analysis. Planning, change, decision making, organizational culture, budgets, conflict.

EDPA 8703. Public Policy in Higher Education. (3 cr; A-F or Aud. Prereq—5001, 5701)
Theories, analytic methods, and critical issues in postsecondary education policy at national/state levels. Equality of educational opportunity, affirmative action, system governance/coordination, research funding, student financial aid, public accountability.

EDPA 8721. Instruction and Learning in Higher Education. (2-3 cr [max 3 cr])

EDPA 8724. Strategic Planning in Higher Education. (2-3 cr [max 3 cr]; Prereq—5701)
Strategic planning principles, their application to higher education, pitfalls encountered by planners in higher education. Selected tools of strategic planning/management, strategic planning case studies.

EDPA 8728. Economics of Higher Education. (2-3 cr [max 3 cr])
Institutional responses to changing external economic factors. Economic effects resulting from higher education’s output in teaching, research, and service. Research on institutional and governmental policies.

EDPA 8732. Financing Higher Education. (3 cr; Prereq—5701)
Theories and critical issues in financing postsecondary education. Budgeting, cost-effectiveness, state/federal funding policies, tuition policies, student financial aid, financing educational opportunity.
**EDPA 8777. Thesis Credits.** Master’s, (1-18 cr [max 50 cr]; No grade. Prereg-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

**EDPA 8888. Thesis Credit: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereg-Max 18 cr per semester or summer; 24 cr required)

## Educational Psychology (EPSY)

### Department of Educational Psychology

#### College of Education and Human Development

**EPSY 5101. Intelligence and Creativity.** (3 cr; A-F or Aud.)

Contemporary theories of intelligence and intellectual development and contemporary theories of creativity and their implications for educational practices and psychological research.

**EPSY 5112. Knowing, Learning, and Thinking.** (4 cr; A-F or Aud.)

Principles of human information processing, memory, and thought; mental operations in comprehension and problem solving; developing expertise and automaticity; emphasis on applied settings.

**EPSY 5113. Psychology of Instruction and Technology.** (3 cr)

Introduction to adult learning and instructional design. Application of core foundational knowledge to development of effective learning environments for adults. Topics include philosophy, learning theories, instructional models, development and experience, individual differences, evaluation, assessment, and technology.

**EPSY 5114. Psychology of Student Learning.** (3 cr; A-F or Aud.)

Principles of educational psychology: how learning occurs, why it fails, and implications for instruction. Topics include models of learning, development, creativity, problem-solving, intelligence, character education, motivation, diversity, special populations.

**EPSY 5115. Psychology of Adult Learning and Instruction.** (3 cr)

Survey of adult learning/instruction. Emphasizes instructional design, learning theories, experience, individual differences, evaluation, tests/measurement, technology. Implications for curricular/instructional design in higher education, continuing education, professional/business related training.

**EPSY 5117. Problem Solving and Decision Making.** (3 cr; A-F or Aud.)

Strategies, rules, methods, and other cognitive components involved in problem solving and decision making, implications for educational practices, and applied domains.

**EPSY 5118. Language: Psycholinguistic Research and Educational Application.** (3 cr; A-F or Aud.)

Psycholinguistic study of language. Psychological processes involved in language use, mechanisms that guide these processes. Failures of these mechanisms. How language operates.

**EPSY 5135. Human Relations Workshop.** (4 cr)

Experiential course addressing issues of prejudice and discrimination in terms of history, power, and social perception. Includes knowledge and skills acquisition in cooperative learning, multicultural education, group dynamics, social influence, effective leadership, judgment and decision-making, prejudice reduction, conflict resolution.

**EPSY 5141. Aggression in Schools.** (3 cr; A-F or Aud.)

Prereq—spxx course in [developmental or educational] psychology.

Development of aggression in schools. Aggression defined, compared to cooperative/prosocial behavior. Theories, methods, gender/individual differences.

**EPSY 5151. Cooperative Learning.** (3 cr)

Participants learn how to use cooperative learning in their setting. Topics include theory and research, teacher’s role, essential components that make cooperation work, teaching social skills, assessment procedures, and collegial teaching teams.

**EPSY 5152. Psychology of Conflict Resolution.** (3 cr)

Overview of the theory and techniques of conflict resolution. Major theories, research, major figures in the field, factors influencing quality of conflict resolution are covered. The nature of conflict, the history of field, and intrapersonal, interpersonal, intergroup conflict, negotiation, mediation are discussed.

**EPSY 5154. Organization Development and Change.** (3 cr)

Overview of organizational development and change. Normative models of effective organizations, entry and contracting skills, diagnosis procedures and intervention procedures (data feedback, skills training, continuous improvement, mediation).

**EPSY 5155. Group Dynamics and Social Influence.** (3 cr)

Overview of the field of group dynamics with emphasis on social influence. Major theories, research, and figures in the field are covered. Group goals, communication, leadership, decision making, problem solving, conflicts, power, uniqueness theory, deindividuation, and minority influence will be covered.

**EPSY 5157. Social Psychology of Education.** (3 cr; A-F or Aud.)

Overview of social psychology and its application to education. Participants study the major theories, research, and major figures in the field. Class sessions include lectures, discussions, simulations, role-plays, and experiential exercises.

**EPSY 5158. Using Power and Influence to Effect Change.** (3 cr; Prereq—3xxx course in social sciences or #)

How people can influence others and avoid manipulation. Factors that shape extent to which influence is successful. Indirect/direct influence processes, minority influence, motivation, behavior management, conformity, followership, group dynamics.

**EPSY 5191. Education of the Gifted and Talented.** (3 cr; A-F or Aud.)

Theories of giftedness, talent development, instructional strategies, diversity and technological issues, implications for educational practices and psychological inquiry, and international considerations.

**EPSY 5200. Special Topics: Psychological Foundations.** (1-4 cr [max 30 cr])

Focus on special topics in psychological and methodological-technological tools. Techniques and case studies of advanced educational theory, research, and practice not covered in other courses.

**EPSY 5216. Introduction to Research in Educational Psychology and Human Development.** (3 cr; A-F or Aud. Prereq—5261 or intro statistics course)

Designing/conducting a research study. Reviewing literature, formulating research problem, using different approaches to gather data, managing/analyzing data, reporting results.

**EPSY 5221. Principles of Educational and Psychological Measurement.** (4 cr; Prereq—V-5261 or equiv)

Concepts, principles, and methods in educational/psychological measurement. Reliability, validity, item analysis, scores, score reports (e.g., grades), Modern measurement theories, including item response theory and generalizability theory. Emphasizes construction, interpretation, use, and evaluation of assessments regarding achievement, aptitude, interests, attitudes, personality, and exceptionality.

**EPSY 5222. Measurement and Analysis: K-12 Education Accountability.** (4 cr; Prereq—5231 or 5221, 5261 or [Psy 3305, Psy 5862] or #)

Methods of educational accountability. Meaning of student/school accountability. Measurement of educational inputs, processes, and results. Data analysis, data use for school improvement.

**EPSY 5231. Introductory Statistics and Measurement in Education.** (4 cr; EPSY 3264, EPSY 5281)

Students develop an understanding of basic statistics and measurement concepts and tools and apply them to the collection, analysis, and interpretation of data.

**EPSY 5243. Principles and Methods of Evaluation.** (3 cr; EPSY 5501)

Introductory course in program evaluation; planning an evaluation study, collecting and analyzing information, reporting results; overview of the field of program evaluation.

**EPSY 5244. Survey Design, Sampling, and Implementation.** (3 cr; Prereq—5221 or 5231 or 5261 or equiv. [CEHD grad student or MEd student])

Survey methods, including mail, phone, and Web-based/email surveys. Principles of measurement, constructing questions/forms, pilot testing, sampling, data analysis, reporting. Students develop a survey proposal and a draft survey, pilot the survey, and develop sampling/data analysis plans.

**EPSY 5246. Evaluation Colloquium: Psychological Foundations.** (1 cr [max 8 cr]; S-N or Aud. [EPSE 5224, EPSY 5243 or EPSY 5260])

Informal seminar of faculty and advanced students interested in the issues and problems of program evaluation.

**EPSY 5247. Qualitative Methods in Educational Psychology.** (3 cr; Prereq—Grad student)

Introduction to qualitative methods of inquiry. Contrasting different research traditions (e.g., case study, phenomenology, ethnography, social interactionism, critical theory). Practice with field notes, observations, and interviewing. Use of NVIVO to track/code data.

**EPSY 5261. Introductory Statistical Methods.** (3 cr; EPSY 3264, EPSY 5231)


**EPSY 5262. Intermediate Statistical Methods.** (3 cr; Prereq—3264 or 5261 or equiv)


**EPSY 5271. Becoming a Teacher of Statistics.** (3 cr; Prereq—5261 or equiv)

Current methods of teaching first courses in statistics. Innovative teaching methods, materials, and assessment strategies. Classroom management, conformity, followership, group dynamics, influencing quality of conflict resolution are covered. The nature of conflict, the history of field, and intrapersonal, interpersonal, intergroup conflict, negotiation, mediation are discussed.

**EPSY 5272. Statistics Teaching Internship.** (3 cr; S-N or Aud. Prereq—Grad student, #)

Supervised teaching experience.

**EPSY 5273. Methodology Teaching Internship.** (1 cr [max 2 cr]; S-N or Aud. Prereq—Grad student, #)

Supervised teaching experience as part of a course in statistics, measurement, or evaluation.

**EPSY 5281. Introduction to Computer Operations and Data Analysis in Education and Related Fields.** (3 cr; S-N or Aud.)

Introduction to computer literacy course to familiarize students with personal computers and computing resources at the University. Applications include electronic communications, spreadsheets, graphical presentation, and data analysis.

**EPSY 5300. Special Topics in Educational Psychology.** (1-9 cr [max 9 cr])

Current issues in educational psychology or related areas not normally available through regular curriculum offerings.

**EPSY 5400. Special Topics in Counseling Psychology.** (1-4 cr [max 8 cr])

Theory, research, and practice in counseling and student personnel psychology. Topics vary.

For definitions of course numbers, abbreviations, and symbols, see page 169.
EPSY 5401. Counseling Procedures. (3 cr; Prereq–Upper div student) Emphasis on the counseling relationship and principles of interviewing. Case studies, role playing, and demonstration. For individuals whose professional work includes counseling and interviewing.

EPSY 5412. Introduction to Developmental Counseling and Guidance. (2 cr; Prereq–4) Contemporary models of counselors as advocates for all students. Emphasizes prevention and systems intervention with counselors involved in the developmental guidance curriculum, school change, staff and community collaboration, individual student planning, and learning success with diverse populations.


EPSY 5421. Leadership and Administration of Student Affairs. (3 cr; EDPA 5724) Theoretical approaches, administrative structure, and evaluation methods used in college/university student affairs.

EPSY 5422. Principles of Group Work: Theory and Procedures. (3 cr; Prereq–Advanced undergrad or grad student in the helping professions) Principles of evaluation of group work for educators and the helping professions. Discussion of various types of groups (e.g., counseling support, task, psychoeducational). Applications to various settings and populations (e.g., schools and community agencies).

EPSY 5432. Foundations of Individual/Organizational Career Development. (3 cr; Introduces individual and organizational career development theory and practice. Examines critical issues in work patterns, work values, and workplaces in a changing global society, with implications for career planning, development, and transitions, emphasizing personal and organizational change. For nonmajors serves students in adult ed. HED, IR, college student advising, and other related fields.

EPSY 5433. Counseling Women Over the Life Span. (3 cr; Prereq–Counseling or career development course) Counseling skills and interventions to facilitate career development of different life stages and backgrounds (school girls to older women); developmental issues from a systematic integrative life planning framework; facts, myths, and trends regarding women’s changing roles.

EPSY 5434. Counseling Adults in Transition. (3 cr; Prereq–Advanced undergrad or grad student in the helping professions) Psychological, physical, and social dimensions of adult transitions (e.g., family and personal relationships, career). Adult development theories, stress and coping, and helping skills and strategies as they relate to adult transition.

EPSY 5451. College Students Today. (3 cr; EDPA 5704) Issues involving diverse populations of students in colleges/universities. Student development theory, students’ expectations/interests, how college affects student outcomes. Role of curricular/extracurricular activities and of student–faculty interactions.


EPSY 5601. Survey of Special Education. (2 cr) Introduction to programs and services provided to people with disabilities in school and community settings. Emphasis on the needs of families, to the roles and responsibilities of teachers, and to related service providers.

EPSY 5604. Transition From School to Work and Community Living for Persons With Special Needs. (3 cr) Use of strategies/models for improving transition of youth from school to work and community living. Course content that specifically addresses all phases of student assessment/transitions planning. Parent, family, and student involvement in designing post school options. Community-based services (employment, residential living, social and recreational services, etc.). Comprehensive interagency approaches.


EPSY 5612. Understanding of Academic Disabilities. (3 cr; A–F or Aud) Introduction to issues related to the education of students with academic disabilities (learning disabilities, mild mental intellectual disabilities, and emotional/behavorial disabilities) including history, definition, assessment, classification, legislation, and intervention approaches.

EPSY 5613. Foundations of Special Education I. (3 cr; A–F or Aud. Prereq–Child development course, 5601 or equiv) Emphasis on the organization of educational programs and services for people with disabilities and their families. First course for students seeking to become licensed teachers in special education.

EPSY 5614. Foundations of Special Education II. (3 cr; A–F or Aud. Prereq–5613) Emphasis on assessment, planning, and implementing educational programs for people with disabilities. Second course for students seeking to become licensed teachers in special education.

EPSY 5615. Advanced Academic Interventions. (3 cr; A–F or Aud. Prereq–5612) Develop knowledge and skills in designing, implementing, and evaluating Individual Education Plans (IEPs) for students eligible for special education service in learning disabilities, emotional/behavioral disorders, and mild mental intellectual disabilities.

EPSY 5616. Behavior Analysis and Classroom Management. (3 cr) Introduction to assumptions, principles, and procedures of behavioral approach to analyzing behavior and programs for classroom management. Emphasis on specifying problems, conducting observations, intervening, and evaluating behavioral change.

EPSY 5618. Specialized Interventions for Students With Disabilities in Reading and Written Language. (3 cr; A–F or Aud. Prereq–Enrollment in ESL or LD or DD or DHH or #) Historical/contemporary perspectives, empirical evidence relating to reading/written language instruction/assessment designed to improve outcomes of students with disabilities. Field work in tutoring.

EPSY 5621. Functional/Basic Academic Interventions in Mental Retardation. (3 cr; A–F or Aud. Prereq–5613, 5614) Methods and materials course emphasizing functional approaches to promoting academic learning in students with mild to moderate mental retardation and moderate to severe mental retardation.

EPSY 5622. Programs and Curricula for Learners With Severe Disabilities. (3 cr; Prereq–5613) Emphasis on developing programs and curricula for students with moderate, severe, and profound developmental delays, as well as severe multihandicapping conditions. Special consideration given to preparing children and youth for integrated community environments.


EPSY 5626. Seminar: Developmental Disabilities and Instructional Management. (3 cr; Prereq–5621, 5622 or #) Data-based strategies for designing instruction of learners with developmental disabilities including assessment, design, implementation, and evaluation of curriculum and instruction: curriculum content, concept and task analysis, classroom arrangements, natural and instructional cues, corrections, and consequences.

EPSY 5635. Education of Students With Physical and Health Disabilities. (3 cr; A–F or Aud. Prereq–5601 or #) Introduction to students with physical and health disabilities and their characteristics; the educational implications of physical disabilities; assessment procedures and appropriate educational interventions for learners with physical and health disabilities.

EPSY 5636. Education of Multihandicapped Learners With Sensory Impairments. (2 cr [max 3 cr; Prereq–5613, 5614] Characteristics of learners with visual and auditory impairments; design of instructional programs to remediate or circumvent disabilities, including use of prosthetic devices; related areas of performance affected by sensory impairments.

EPSY 5641. Foundations of Education for Individuals Who Are Deaf/Hard of Hearing, (3 cr) Historical and current issues related to education of individuals who are deaf or hard of hearing. Implications of causes of hearing loss, social and cultural relationships, philosophies of education, characteristics and legislative guidelines and their applicability to education of individuals who are deaf or hard of hearing.

EPSY 5642. Early Childhood Intervention for Infants, Toddlers, and Preschoolers Who Are Deaf/Hard of Hearing. (3 cr; Prereq–Preserve teacher in deaf education licensing program or #) Early identification/assessment Family-centered, interdisciplinary servicing. Program development for infants, toddlers, preschoolers who are deaf/hard of hearing. Presentations, discussions, activities.


EPSY 5646. Reading and Writing Practices with Deaf/Hard of Hearing Children. (3 cr; Prereq–5613) or general education methods in trhe reading and writing skills, or #) Gain knowledge and skills to assess, plan, and implement instruction for children and youth with hearing loss. Emphasis is placed on research, theoretical, and programmatic issues in developing reading and writing skills, curricular adaptations, and effective instructional approaches.

EPSY 5647. Aural and Speech Programming for Persons Who Are Deaf/Hard of Hearing. (3 cr) Study of the speech and hearing mechanisms, causes of hearing loss, and rehabilitation. Emphasis on instructional practices, aural rehabilitation in the educational setting, adaptive technology, and adaptations to optimize functional skills with individuals who are deaf or hard of hearing.

EPSY 5656. Social and Interpersonal Characteristics of Students with Disabilities. (3 cr; A-F or Aud) Emphasis on children and youth of school age and on the ways in which their emotional, social, and behavioral disorders affect their functioning in school and on ways in which their behaviors disturb others.

EPSY 5657. Interventions for Social and Emotional Disabilities. (3 cr; A-F or Aud. Prereq–5616, 5656) Developing comprehensive behavioral programs for students with social and emotional disabilities. Instructing students with social and emotional disabilities.


EPSY 5671. Literacy Braille. (3 cr; A-F or Aud) Mastery of literacy braille code including all contractions and short-form words used in Grade 2 English Braille. American usage. Use of specialized braille writing equipment including, braille writer, slate and stylus, and computer programs with six-key input.

EPSY 5672. Advanced Braille Codes. (2 cr; A-F or Aud. Prereq–5671 or #) Mastery of the Nemeth code for braille mathematics transcription including elementary math computation, algebra, geometry, trigonometry, and symbolic logic notation. Introduction to foreign languages, computer notation, music, and raised line drawing techniques.

EPSY 5674. Techniques of Orientation, Mobility, and Independence for Students with Visual Disabilities. (3 cr; A-F or Aud. Prereq–5675 or #) Introduction to basic techniques to gain skills in pre-cane techniques, orientation to learning environments for activities of daily living and independence. Introduction to mobility maps, consideration of cane, guide dog, and telescopic aids to mobility.

EPSY 5676. Case Management for Children with Visual Disabilities. (3 cr; A-F or Aud. Prereq–5671, 5673, 5675) Advanced course evaluating and managing cognitive, psychosocial, physical, and academic needs of students. Consideration of parent, teacher, and student in counseling and educational program management.

EPSY 5681. Education of Infants, Toddlers, and Preschool Children with Disabilities: Methods and Materials. (3 cr; A-F or Aud. Prereq–5625) Overview of the methods and materials available to maximize the developmental and educational outcomes for young children, birth to age 5, with disabilities and their families in home, community, and school based-settings.

EPSY 5701. Practicum: Field Experience in Special Education. (1-6 cr [max 12 cr]; A-F or Aud. Prereq–[5614, FOE or SPED grad or licensure student] or #) Observations and supervised support of teaching practice in schools or agencies serving children with disabilities in integrated programs.

EPSY 5702. Practicum in Autism Spectrum Disorder. (3 cr; A-F only. Prereq–5625, 5656) Enrolled in Autism Spectrum Disorder certificate program. Four hundred hours of supervised work in settings where individual serves Autism Spectrum Disorder are served. On-site supervision is provided by qualified professionals. A University supervisor conducts on-site observations. Biweekly seminars.

EPSY 5703. Practicum in Applied Behavior Analysis. (3 cr; A-F only. Prereq–5616, 5637, Psy 4011, Applied Behavior Analysis Certificate student) Four hundred hours of supervised experience in applied behavior analytic intervention with individuals with significant challenging behavior and learning difficulties. On-site supervision is provided by qualified professionals. A University supervisor conducts on-site observations. Biweekly seminars.

EPSY 5720. Special Topics: Special Education. (1-4 cr [max 12 cr]; Prereq–#) Lab and fieldwork approach, often assuming a product orientation, e.g., generation of action plan, creating set of observation field notes, collecting data in some form. Provides opportunities for educational personnel to study specific problems and possibilities related to special education.

EPSY 5740. Special Topics: Interventions and Practices in Educational and Human Service Programs. (1-4 cr [max 8 cr]; Prereq–#) Concepts, issues, and practices related to the community in which children, youth, and adults with developmental disabilities through weekly seminar and extensive supervised experience working with individuals within the community.

EPSY 5751. Student Teaching: Deaf/Hard of Hearing. (1-6 cr [max 10 cr]; Prereq–#) Students participate in educational programming for infants, children, and youth who are deaf or hard of hearing, as well as in on-site, directed experiences under the supervision of master teachers of deaf and hard of hearing students.

EPSY 5752. Student Teaching: Learning Disabilities. (1-6 cr [max 10 cr]; S-N or Aud. Prereq–#) Supervised experience in teaching or related work in schools or other agencies serving children and adolescents with learning disabilities.

EPSY 5753. Student Teaching: Early Childhood Special Education. (1-6 cr [max 8 cr]; S-N or Aud. Prereq–#) Completion of all course requirements for license in ECSE) Supervised experience in teaching or related work in schools, agencies, or home settings with infants, toddlers, and preschoolers with disabilities and their families.

EPSY 5754. Student Teaching: Social and Emotional Disabilities. (1-6 cr [max 8 cr]; A-F or Aud. Prereq–Completion of licensure courses for social and emotional disorders, #) Teach students with social and emotional disorders at public schools and other appropriate sites. Attend a weekly seminar on student teaching competencies.

EPSY 5755. Student Teaching: Developmental Disabilities, Mild/Moderate. (1-6 cr [max 6 cr]; A-F or Aud. Prereq–Completion of all licensure coursework, #) Supervised student teaching, or special practicum project, in schools or other agencies serving students at elementary/secondary levels who have mild to moderate developmental disabilities.

EPSY 5756. Student Teaching: Developmental Disabilities, Moderate/Severe. (1-6 cr [max 6 cr]; A-F or Aud. Prereq–Completion of all licensure coursework, #) Supervised student teaching, or special practicum projects, in schools or other agencies serving students at elementary/secondary levels who have moderate to severe developmental disabilities.

EPSY 5757. Student Teaching: Physical and Health Related Disabilities. (1-6 cr [max 8 cr]; A-F or Aud. Prereq–#) Supervised student teaching and related work (direct instruction and consultation) in schools or other agencies serving children and adolescents who have physical disabilities.

EPSY 5758. Student Teaching: Visual Impairments. (1-6 cr [max 8 cr]; A-F or Aud. Prereq–#) Supervised student teaching, or special practicum project, in schools or other agencies serving children and adolescents who have visual impairments.

EPSY 5800. Special Topics in School Psychology. (1-9 cr [max 8 cr]) Current issues in school psychology or areas not normally available through regular curriculum offerings.

EPSY 5801. Assessment and Decision Making in School and Community Settings. (3 cr; A-F or Aud) Introduction to psychological and educational assessment for individuals who work with children, especially those experiencing academic and behavior problems. Study of standardized group and individual tests of intelligence, achievement, socio-emotional functioning, perception, reading, mathematics, adaptive behavior, and language.

EPSY 5849. Observation and Assessment of the Preschool Child. (3 cr [max 4 cr]) Introduction to assessment principles and practices, including observational assessment methods, for children (birth to 5). Intended primarily for teachers in training and others interested in basic information regarding assessment and its relationship to intervention services for young children.

EPSY 5851. Collaborative Family-School Relationships. (2-3 cr [max 3 cr]; Prereq–Honors senior or grad student) Theoretical and empirical bases for creating collaborative family-school relationships for students’ development and educational success in school. Emphasis on model programs for K–12 and practical strategies for educational personnel to address National educational goal 8.

EPSY 5852. Prevention and Early Intervention. (3 cr) Theory/research base for school-based primary/secondary programs to promote academic/social competence of children/youth (birth to grade 12).

EPSY 5871. Interdisciplinary Practice and Interagency Coordination in Education and Human Services. (3 cr) Principles and procedures of interdisciplinary practice and interagency coordination. Examine the relative strengths of interdisciplinary approaches, develop skills for collaborating with others, and examine different approaches to interagency coordination.

EPSY 5991. Independent Study in Educational Psychology. (1-8 cr [max 20 cr]; A-F or Aud. Prereq–#) Self-directed study in areas not covered by regular courses. Specific program of study is jointly determined by student and advising faculty member.


EPSY 8114. Seminar: Cognition and Learning. (3 cr) Advanced study in critical analysis and application of contemporary psychological theory and research in cognition and learning for education.

EPSY 8115. Psychology of Instruction and Technology. (3 cr) Seminar including, but not limited to, learning and instructional theories, advanced and emerging technologies, and measurement and evaluation.

EPSY 8116. Reading for Meaning: Cognitive Processes in the Comprehension of Texts. (3 cr; Prereq–#) Students read primary articles on cognitive processes involved in reading comprehension. Focuses on inference making during reading and on construction of a coherent memory representation. Computational models, neurological processes, developmental/individual differences, effects of text genre (e.g., expository, narrative).
Courses

EPSY 817. Writing Empirical Paper and Research/Grant Proposals in Education and Psychology. (3 cr; Prereq–#) Scientific writing skills. Focuses on logic/argumentation. Each student produces an empirical paper or research proposal. Breaks down the writing process into components: one component per week. Each week, students write a section of their paper/proposal and critique others.

EPSY 8313. Development of Moral-Political Judgment. (3 cr; A-F or Aud) Current research topics in socio-political moral judgment and moral development.

EPSY 8312. Personality Development and Socialization. (3 cr; Prereq—Personality or child psycho course) Major research and theoretical work. Developmental and educational influences on personality.

EPSY 8215. Advanced Research Methodologies in Education. (3 cr; Prereq–PSY 5221, 8247, 8261, 8262, #) Quantitative research methods, including models of scientific inquiry, role of theories/research design, role of measurement error in quantitative data-based inference, and qualitative methods of inquiry. Focuses on advanced quantitative/qualitative methodologies used in methodologically-oriented studies in educational measurement, evaluation, and statistics.

EPSY 8216. Seminar: Research Processes in Psychological Foundations of Education. (3 cr; A-F or Aud, Prereq–PSY 5216, admitted through departmental faculty) Advanced examination of research processes in educational psychology. Invited faculty discuss specific research designs. Students refine/implement research projects and present them in class.

EPSY 8221. Psychological Scaling. (3 cr; Prereq–PSY 5212 or equiv, 8261-8262 or equiv) Elementary and advanced topics in unidimensional and multidimensional scaling: measurement theory and statistics, rating scales and other category scaling methods, magnitude estimation, paired comparisons, multi-attribute scaling, and multidimensional scaling.

EPSY 8222. Advanced Measurement: Theory and Application. (4 cr; EPSY 5665, Prereq–[PSY 5241 or PSY 5862 or equiv] 8241 or 8282 or equiv) Generalizability theory, model response theory, factor analysis, and educational measurement. Use of problems in design, linking assessments. Includes a computer lab.

EPSY 8247. Advanced Interviewing and NVIVO. (3 cr; Prereq–8527 or qualitative course or #) Practice in designing, conducting, and analyzing interviews. Students design interview protocols, video/audio tape themselves conducting interviews, analyze their techniques, and critique others. Students use NVIVO to analyze data they have collected.

EPSY 8261. Statistical Methods I: Probability and Inference. (3 cr; Prereq–[PSY 5264 or PSY 5261 or equiv]) Advanced theory, derivations of quantitative statistics. Descriptive statistics, probability, normal distribution. One- and two-sample hypothesis tests, confidence intervals. One-way analysis of variance, follow up tests.

EPSY 8262. Statistical Methods II: Regression and the General Linear Model. (3 cr; Prereq–[PSY 8261 or PSY 8262 or equiv]) Analysis of variance designs (two-/three-way), repeated measures, correlation, simple/multiple regression methods, non-parametric procedures, multivariate analyses.

EPSY 8263. Design and Analysis of Experiments. (3 cr; Prereq–PSY 8261, 8262 or equiv) Advanced treatment of various experimental designs, including completely randomized factorial, randomized block, hierarchical, repeated measures, and Latin square designs. Major computer packages used for data analyses. Univariate and multivariate approaches to these designs.

EPSY 8264. Advanced Multiple Regression Analysis. (3 cr; Prereq–PSY 8261-8262, regression in ANOVA course, familiarity with a statistical analysis package) General linear model used as a context for regression. Matrix algebra, multiple regression, path analysis, polynomial regression, standardized regression, stepwise solutions, analysis of variance, weighted least squares, and logistic regression.

EPSY 8266. Statistical Analysis Using Structural Equation Methods. (3 cr; Prereq–PSY 8263 or 8284) Quantitative techniques using manifest and latent variable approaches for analysis of educational and social science data. Introduction to structural equation modeling approaches to multiple regression, factor analysis, and path modeling. Developing, estimating, and interpreting structural equation models.

EPSY 8267. Applied Multivariate Analysis. (3 cr; Prereq–[PSY 8261, 8262 or equiv] familiarity with matrix algebra, knowledge of a computerized statistics package) Use/interpretation of results from several multivariate statistical techniques. Matrix algebra, variance/covariance, Hotelling’s T2, GLM, MANOVA, MANCOVA, discriminant analysis, canonical correlations, dimensionality, principal components, latent composites, distance, hierarchical clustering.

EPSY 8268. Hierarchical Linear Modeling in Educational Research. (3 cr; Prereq–PSY 8261 or equiv) Conceptual framework of hierarchical linear models for nested data, their application in educational research. Nature/effects of nested data, logic of hierarchical models, mixed-effects models. Estimation and hypothesis testing in these models, model-checking, nonlinear models.


EPSY 8271. Statistics Education Research Seminar: Studies on Teaching and Learning Statistics. (3 cr) Introduction to classic/current research related to teaching/learning of statistics. Research from psychology, education, and statistics. Students focus on a particular research question and review the literature related to that question.

EPSY 8272. Nonparametric Statistics in Education. (3 cr; Prereq–[PSY 8261, 8262 or equiv]) Estimation/inference procedures outside normal-theory tests. One-, two-, and K-sample procedures for between/within-subject differences, including factorial analysis of variance/covariance. Contingency table analysis (tests of independence, homogeneity).

EPSY 8281. Advanced Statistical Computing and Data Analysis. (3 cr; Prereq–PSY 8281 or equiv, 8261 or equiv) Cross-disciplinary course. Students learn to use SAS statistical package to perform data management, data analysis, and report writing.

EPSY 8282. Statistical Analysis of Longitudinal Data. (3 cr; Prereq–PSY 8261-8262 or equiv) Traditional/modern approaches to analyzing longitudinal data. Dependent t-test, repeated measures ANOVA and MANOVA. Linear mixed models, multilevel models, generalized models. Required labs using SAS computer program.

EPSY 8290. Special Topics: Seminar in Psychological Foundations. (1-6 cr; max 15 cr; Prereq–#) Students formulate research designs. Learning and cognition, social psychology, measurement, and statistics.

EPSY 8295. Evaluation Problems. (1-6 cr [max 24 cr]; §EDPA 8595, Prereq–PSY 8243 or EDPA 5501, #) Individually directed study of an issue in the theory or program of evaluation.

EPSY 8296. Evaluation Internship. (1-9 cr; max 24 cr; §EDPA 8595, Prereq–PSY 8243 or EDPA 5501, #) Hands-on experience in conducting a program evaluation in a real-world setting under supervision of an evaluation professional.

EPSY 8300. Special Topics in Educational Psychology. (1-4 cr; max 9 cr) Issues or related coursework in areas not normally available through regular curriculum offerings.


EPSY 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

EPSY 8400. Topics: Counseling and Student Personnel Psychology. (1-3 cr; max 9 cr) Current issues in counseling and student personnel psychology, or related coursework in areas not normally available through regular curriculum offerings.

EPSY 8402. Individual Counseling: Theory and Applications. (3 cr; A-F or Aud. Prereq–Grad ed. major with psychology, or related coursework in areas not normally available through regular curriculum offerings)

EPSY 8403. Social/Cultural Contexts: Counseling and Skills. (3 cr; A-F or Aud. Prereq–Grad ed. major with psychology, or related coursework in areas not normally available through regular curriculum offerings)

EPSY 8404. Group Counseling: Theory, Applications, and Skills. (3 cr; A-F or Aud. Prereq–Ed. major with psychology, or related coursework in areas not normally available through regular curriculum offerings)

EPSY 8405. Career Development: Theory, Skills, and Counseling Applications. (3 cr; A-F or Aud. Prereq–CSPP or psychology, or related coursework in areas not normally available through regular curriculum offerings)

EPSY 8406. Professional Ethics for Counselors and Psychologists. (3 cr; A-F only. Prereq–CSPP or psychology, or related coursework in areas not normally available through regular curriculum offerings)

EPSY 8410. Advanced Counseling Research. (4 cr; A-F or Aud. Prereq–Ed. major with psychology, or related coursework in areas not normally available through regular curriculum offerings)

EPSY 8411. Advanced Counseling Research. (4 cr; A-F or Aud. Prereq–Ed. major with psychology, or related coursework in areas not normally available through regular curriculum offerings)

EPSY 8412. Seminar: Advanced Counseling Theory and Ethics. (4 cr; A-F or Aud. Prereq–Ed. major with psychology, or related coursework in areas not normally available through regular curriculum offerings)

EPSY 8460. Professional Ethics for Counselors and Psychologists. (3 cr; A-F only. Prereq–CSPP or psychology, or related coursework in areas not normally available through regular curriculum offerings)

EPSY 8495. Social/Cultural Contexts: Counseling and Skills. (3 cr; A-F or Aud. Prereq–CSPP or psychology, or related coursework in areas not normally available through regular curriculum offerings)

EPSY 8595. Evaluation Problems. (1-6 cr [max 24 cr]; §EDPA 8595, Prereq–PSY 8243 or EDPA 5501, #) Individually directed study of an issue in the theory or program of evaluation.

EPSY 8596. Evaluation Internship. (1-9 cr; max 24 cr; §EDPA 8595, Prereq–PSY 8243 or EDPA 5501, #) Hands-on experience in conducting a program evaluation in a real-world setting under supervision of an evaluation professional.
EPSY 8413. Personality Assessment of Adolescents and Adults. (3 cr; A-F or Aud. Prereq: [Psy 6504H or Psy 8111 or Psy 8112], doctoral student) # Assessment interviews, MMPI-2, MMPI-A, DSM-IV, written report assessments.

EPSY 8431. Master’s Research Seminar: CSPP. (4 cr; A-F or Aud, Prereq: 5261 or equi, 5221 or equi; EPsy MA student with CSPP subprog or #) Survey of research methods, data-based decision making, basic research design skills, and research simulation.

EPSY 8433. Organization of School Counseling Comprehensive Programs. (3-6 cr; max 6 cr; A-F or Aud. Prereq–CSPP grad student in school counselor prog or #) Integrates learning from all courses in MA program with research in comprehensive guidance programming. Critiques of research, analyses of current trends/issues. Theories of management/organization in educational and other service settings. Literature review of comprehensive guidance programs. Students develop/demonstrate knowledge of comprehensive school counseling programming in K–12 school settings.


EPSY 8444, FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, audit, or DGS consent)

EPSY 8542. Psychological Aspects of Counseling Supervision. (3 cr; Prereq–Ed Psy PhD student with CSPP subprog or #) Theories, review of relevant research, demonstration, and in-class practice of supervision skills.

EPSY 8501. Counseling Pre-Practicum. (3 cr; A-F or Aud. Prereq–CSPP or genetic counseling) grad student) Overview of basic helping skills through demonstration, in-class practice.

EPSY 8502. Field Placement in Counseling and Student Personnel Psychology. (2 cr; S-N or Aud, Prereq–8501 or #) Students participate under supervision in practitioner activities within a counseling work environment.

EPSY 8503. Counseling Practicum I. (1-4 cr [max 4 cr]; A-F or Aud. Prereq–8502 or #) Beginning-level supervised practice in counseling with individuals and groups; emphasizes systematic evaluation of student’s counseling practice through direct observations, audio tapes, and audio tapes.

EPSY 8504. Counseling Practicum II. (1-4 cr [max 4 cr]; A-F or Aud. Prereq–8503 or #) Intermediate supervised practice in counseling with individuals and groups; emphasizes ethical issues with systematic evaluation of student’s practice through direct observations, video, and audio tapes.

EPSY 8509. Supervision Practicum: CSPP. (2 cr; Prereq–Ed Psy PhD student with CSPP subprog or #) Students involved in counseling supervision of beginning courses.

EPSY 8512. Internship: CSPP. (1-12 cr [max 12 cr]; S-N only. Prereq–CSPP grad student with CSPP subprog) Supervised internship in counseling psychology.

EPSY 8513. University Counseling Practicum I. (4-8 cr [max 6 cr]; S-N or Aud. EPSY 8514, Prereq–EPSY grad student with CSPP subprog, #) Science of counseling psychology. Supervised practice in University Counseling and Consulting Services with career, academic, and personal clients.

EPSY 8514. University Counseling Practicum II. (4-6 cr [max 6 cr]; S-N or Aud. EPSY 8515. Prereq–8513, #) Integrates science of counseling psychology with supervised practice in University Counseling and Consulting Services with career, academic, and personal clients.

EPSY 8521. Practicum in Student Affairs and Student Development. (1-4 cr [max 4 cr]; A-F or Aud. Prereq–EPSY MA or PhD student with CSPP subprog or #) Supervised practice in university and college student development offices.

EPSY 8522. Counseling Practicum: Advanced. (3 cr [max 12 cr]; A-F or Aud. Prereq–Grad EpSy PhD student with CSPP subprog or #; Instruct consent required after 2 repeats) Advanced skills practice in counseling, counseling psychology, or student development.

EPSY 8600. Special Topics: Special Education Issues. (1-3 cr [max 9 cr]) Current trends (e.g., schoolwide discipline, models of collaboration, and diversity) investigated by formulating research projects. Students write a media piece describing an issue and its impact on the community.

EPSY 8612. Seminar: Students with Academic Difficulties. (3 cr; A-F or Aud) Survey, analysis, and application of relevant theories and research related to current issues. Students in course develop skills in scholarly inquiry, writing, and debate.

EPSY 8621. Seminar on Intellectual Impairments. (3 cr; Prereq–Grad students interested in mental retardation and related intellectual impairments) Review of research and theories in context of relevant developmental theories; important contributions in primary sources concerning principles of cognition and behavior and applied problems. Procedures for deriving appropriate field applications; generalizing and implementing researchable questions.

EPSY 8651. Seminar on Social and Emotional Disabilities. (3 cr; A-F or Aud) Review and critical analysis of current trends and future directions of education of students with social and emotional disabilities.

EPSY 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq for 1st/2nd registrants, up to 12 combined cr; for 3rd/4th registrants, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

EPSY 8677. Seminar: Information Acquisition for Persons with Disabilities. (3 cr; A-F or Aud) Research findings from diverse disciplines on impact of hearing and visual disabilities on ability to acquire and/or access information.

EPSY 8694. Research in Special Education. (3 cr) Design and implementation of research related to the unique developmental characteristics of exceptional learners.

EPSY 8701. Doctoral Core Seminar: Special Education I. (3 cr [max 6 cr]; A-F or Aud. Prereq–EDPSY PhD student with spec ed subprog or #) Required for students with a family/life span focus on social development, behavioral interaction, and cultural interactions.

EPSY 8702. Doctoral Core Seminar: Special Education II. (3 cr [max 6 cr]; A-F or Aud. Prereq–8701 or #) Required for students focusing on communication/language/academic skills.

EPSY 8706. Single Case Designs in Intervention Research. (3 cr) Design and analysis of single-case experiments to examine effects of interventions on individual behavior in school, home, and community.

EPSY 8772. Seminar in Early Intervention. (2 cr) Explores research and diverse disciplines related to education of infants, toddlers, and preschool children with disabilities and their families. Discusses practical application of this research.

EPSY 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only]) Issues or related coursework in areas not normally available through regular curriculum offerings.


EPSY 8812. Assessment in School Psychology II: Intellectual and Social-Emotional Domains. (3 cr; A-F or Aud. Prereq–Grad ed psy major with school psy subprog or #) Builds on EPSY 8811. Emphasizes gathering data on a child’s intellectual and social-emotional functioning and educational progress.

EPSY 8813. Assessment Practicum in School Psychology. (2 cr [max 4 cr]; A-F or Aud. Prereq 8811, grad ed psy major with school psy subprog or #) Principles/models of consultation/interventions for social-emotional problems exhibited by school-aged children. Emphasizes universal intervention, competence enhancement approaches. All interventions presented from a system-level perspective.

EPSY 8816. Individual Intervention and Consultation. (3 cr; A-F or Aud) In-depth study/analysis of interventional procedures necessary to work with school personnel in developing schoolwide, classroom, individual instructional interventions. Practice in developing/applying interventions with individual students.

EPSY 8818. Intervention Practicum in School Psychology. (1 cr [max 2 cr]; A-F or Aud. Prereq–Grad ed psy major with school psy subprog, 8811, or 8816) Students design, implement, and evaluate interventions for individuals or groups of children and for system-level concerns under supervision of practicing school psychologists. Students observe school psychologists collaborate with educators and parents in intervention-related activities.


EPSY 8822. Research in School Psychology. (3 cr [max 6 cr]; A-F only. Prereq–[8860, 8861, 5616] or equiv), grad ed psy major with school psy subprog or #) Integrative, developmental discussions/activities about research in school psychology. Consuming, synthesizing, distributing, and conducting research. Students formulate their own research agenda.

EPSY 8823. Ethics and Professional Standards in School Psychology. (3 cr; A-F or Aud. Prereq–8821) Ethics, law, and current educational issues applied to study/practice of school psychology. Ethical principles, state/federal laws governing educational practices. How mandates are applied to work of school psychologists in general/special populations (e.g., special education, ESL, ethnic/racial minorities). Students apply learning as researchers and practicing school psychologists in schools.
Courses


EE 571. Microelectronic Fabrication. (4 cr; Prereq—IT grad student or Δ) Fabrication of microelectronic devices. Silicon integrated circuits, GaAs devices. Lithography, oxidation, diffusion, Process integration of various technologies, including CMOS, double poly bipolar, and GaAs MESFET.

EE 573. Basic Microelectronics Laboratory. (1 cr; Prereq—[5171 or 5171], IT grad student or Δ) Students fabricate a polysilicon gate, single-layer metal, NMOS chip, performing 80 percent of processing, including photolithography, diffusion, oxidation, and etching. In-process measurement results are compared with final electrical test results. Simple circuits are used to estimate technology performance.

EE 5831. Practicum: School Psychological Services. (1-10 cr [max 10 cr]; 5-10 cr Aud. Prereq—Grad ed psy major with school psychology subprog) Advanced field placement. Full-time supervised experience for one year or part-time for no more than two years.

EE 5842. Internship: School Psychological Services. (1-10 cr [max 10 cr]; 5-10 cr Aud. Prereq—Grad ed psy major with school psychology subprog) Advanced field placement. Full-time supervised experience for one year or part-time for no more than two years.

EPSY 8842. Internship: School Psychological Services. (1-10 cr [max 10 cr]; S-N or Aud. Prereq—Grad ed psy major with school psychology subprog or #) Supervised experience in assessment and intervention planning of children referred to psychoeducational settings; training in broad range of approaches to problems of adjustment in school-age children and their families, schools, and community settings.

EPSY 8905. Doctoral Seminar in School Psychology: Research, Policy Issues, and Action Plans. (3 cr; F-A only; Prereq—[Grad student in school psychology, coursework in school psychology] or advanced PhD student from related department) # Critical issues in school psychology, led by students or visiting professionals. Outside reading/research. Scientific findings/applications for training, practice, policy, and research. Students create professional-development plan.

EPSY 8988. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

EPSY 8990. History and Systems of Psychology: Landmark Issues in Educational Psychology. (3 cr; Prereq—Ed psy PhD student) Critical issues in learning and cognition, statistics and measurement, counseling, school psychology, social psychology of education, and special education.

EPSY 8993. Directed Study: Educational Psychology. (1-10 cr [max 20 cr]; A-F or Aud. Prereq—#) Arranged independently with individual faculty member.

EPSY 8994. Research Problems: Educational Psychology. (1-6 cr [max 18 cr]; A-F or Aud. Prereq—#) Research methodology, techniques, and literature.

Electrical and Computer Engineering (EE)

Department of Electrical and Computer Engineering

Institute of Technology

EE 5121. Transistor Device Modeling for Circuit Simulation. (3 cr; Prereq—[5115, 3115, IT grad student] or Δ) Basics of MOS, bipolar theory. Evolution of popular device models from early SPICE models to current industry standards.

EE 5141. Introduction to Microsystem Technology. (4 cr; Prereq—[5161, 3601, IT grad student] or Δ) Microelectromechanical systems composed of microsensors, microactuators, and electronics integrated onto common substrate. Design, fabrication, and operation principles. Labs on micromachining, photolithography, etching, thin film deposition, metalization, packaging, and device characterization.
EE 5542. Adaptive Digital Signal Processing. (3 cr; Prereq–4541, 5531, IT grad student or Δ)

EE 5545. Digital Signal Processing Design. (3 cr; Prereq–4541, IT grad student or Δ)

EE 5549. Digital Signal Processing Structures for VLSI. (3 cr; Prereq–4541, IT grad student or Δ)

EE 5551. Multiscale and Multirate Signal Processing. (3 cr; Prereq–4541, 5531, IT grad student or Δ)

EE 5561. Image Processing and Applications. (3 cr; Prereq–4541, 5581, IT grad student or Δ)
Two-dimensional digital filtering/transformers. Application to image enhancement, restoration, compression, and segmentation.

EE 5561. Information Theory and Coding. (3 cr; Prereq–4551, IT grad student or Δ)
Source/channel models, codes for sources/channels. Entropy, mutual information, capacity, rate-distortion functions. Coding theorems.

EE 5583. Error Control Coding. (3 cr; Prereq–[3025, Math 2373] or equiv, IT grad student or Δ)

EE 5586. Data Compression. (3 cr; Prereq–IT grad student or Δ)

EE 5601. Introduction to RF/Microwave Engineering. (3 cr; Prereq–3601, IT grad student or Δ)

EE 5602. RF/Microwave Circuit Design. (3 cr; Prereq–[5601 or equiv], IT grad student or Δ)
Transmission lines, network analysis concepts. CAD tools for passive/active designs. Diode based circuit designs (detectors, frequency multipliers, mixers). Transistor based circuit design (amplifiers, oscillators, mixers/doubler).

EE 5607. Wireless Hardware System Design. (3 cr; Prereq–3015, 3115, 3601, IT grad student or Δ)
Review of random processes, noise, modulation, and error probabilities. Basis antenna operation, power transfer, antennas, RF propagation phenomena, transmitters/receivers, transmission lines, effect of antenna performance on system performance, rf/microwave device technologies, small-signal amplifiers, mixers, power amplifiers, rf oscillators.

EE 5611. Plasma-Aided Manufacturing. (4 cr; K-F or Aud. [ME 5361, Prereq–ME 3321, ME 3325] or equiv, upper div IT grad student or Δ)

EE 5613. RF/Microwave Circuit Design Laboratory. (2 cr; Prereq–[5601 or 5661], IT grad student or Δ)
Scattering parameters, planar lumped circuits, transmission lines, RF/microwave substrate materials, matching networks/tuning elements, resonators, filters, combiners/dividers, couplers. Integral lab.

EE 5616. Antenna Theory and Design. (3 cr; Prereq–[5601 or 5661], IT grad student or Δ)
Antenna performance parameters, vector potential/radiation integral, wire antenna structures, broadband antenna structures, microstrip/aperture theory, antenna measurements.

EE 5621. Physical Optics. (3 cr; Prereq–[5015, IT grad student or Δ)
Physical optics principles, including Fourier analysis of optical systems/images, scalar diffraction theory, interferometry, and coherence theory. Diffraction optical elements, holography, astros, geometrical imaging, optical information processing, microoptics.

EE 5622. Physical Optics Laboratory. (1 cr; Prereq–[5621 or 5661], IT grad student or Δ)

EE 5624. Optical Electronics. (4 cr; Prereq–[3601 or PHYS 3002], IT grad student or Δ)
Fundamentals of lasers, including propagation of Gaussian beams, optical resonators, and theory of laser oscillation. Polarization optics, electro-optic, acousto-optic modulation, nonlinear optics, phase conjugation.

EE 5627. Optical Fiber Communication. (3 cr; Prereq–[3025, 3601, IT grad student or Δ)]

EE 5628. Fiber Optics Laboratory. (1 cr; Prereq–[5627 or 5667], IT grad student or Δ)
Experiments in fiber optics, optical fibers, fiber dispersion/attenuation, properties of light sources/detectors, optical communication systems.

EE 5629. Optical System Design. (2 cr; Prereq–IT grad student or Δ)

EE 5653. Physical Principles of Magnetic Materials. (3 cr; Prereq–IT grad student or Δ)

EE 5655. Magnetic Recording. (3 cr; Prereq–IT grad student or Δ)
Magnetic fundamentals, recording materials, idealized models of magnetic recording/reproduction, analytic models of magnetic record heads, sinusoidal magnetic recording, digital magnetic recording, magnetic recording heads/media, digital recording systems.

EE 5657W. Physical Principles of Thin Film Technology. (4 cr; Prereq–IT grad student or Δ)

EE 5705. Advanced Electric Drives. (3 cr; Prereq–[4701, IT grad student or Δ)]

EE 5721. Power Generation Operation and Control. (3 cr; Prereq–[4721, IT grad student or Δ)]
Engineering aspects of power system operation. Economic analysis of generation plants & scheduling to minimize total cost of operation. Scheduling of hydro resources and thermal plants with limited fuel supplies. Loss analysis, secure operation. State estimation, optimal power flow. Power system optimizations.

EE 5725. Power Systems Engineering. (3 cr; Prereq–[4721, IT grad student or Δ)]

EE 5741. Advanced Power Electronics. (3 cr; Prereq–IT grad student or Δ)

EE 5811. Biomedical Instrumentation. (3 cr; Prereq–IT grad student or life-science grad student or Δ)

EE 5821. Biomedical System Modeling and Analysis. (3 cr; Prereq–IT grad student or life-science grad student or Δ)

EE 5863. Computer Systems Performance Analysis. (2 cr; Prereq–[4363 or 5361], IT grad student or Δ)
Basic performance measurement/simulation techniques necessary for experimental computer science/engineering. Hands-on performance evaluation techniques using simulations/measurements of existing systems. Using measured data to compare computer systems or to judge how much a new architectural feature improves systems performance.

EE 5940. Special Topics in Electrical Engineering I. (1-4 cr max 12 cr)
Special topics in electrical and computer engineering. Topics vary.

EE 5950. Special Topics in Electrical Engineering II. (1-4 cr max 12 cr)
Special topics in electrical and computer engineering. Topics vary.

EE 5960. Special Topics in Electrical Engineering III. (1-4 cr max 12 cr)
Special topics in electrical and computer engineering. Topics vary.

For definitions of course numbers, abbreviations, and symbols, see page 169.
Courses


EE 8100. Advanced Topics in Electronics. (1-3 cr [max 12 cr]; Prereq–) Topics vary according to needs and staff availability.

EE 8141. Advanced Heterojunction Transistors. (3 cr; Prereq–5564 or #) Recent developments in device modeling with emphasis on bipolar junction transistors. High-level effects in base and collector regions and their interrelationship.


EE 8190. Electronics Seminar. (1 cr [max 3 cr]; S-N or Aud. Prereq–) Current literature, individual assignments.

EE 8210. System Theory Seminar. (1 cr [max 3 cr]; S-N or Aud) Current literature, individual assignments.

EE 8213. Advanced System Theory. (3 cr; Prereq–IT grad student) Generalized linear systems; applications, structural properties, computational approaches, classification, functional behavior, and synthesis.

EE 8215. Nonlinear Systems. (3 cr; Prereq–) Current topics in stability analysis of nonlinear systems, design of controllers for nonlinear systems, discrete-time and stochastic nonlinear systems.

EE 8230. Control Theory Seminar. (1 cr [max 3 cr]; S-N or Aud) Current literature, individual assignments.

EE 8231. Optimization Theory. (3 cr; Prereq–) Introduction to optimization in engineering; approximation theory. Least squares estimation, optimal control theory, and computational approaches.


EE 8300. Advanced Topics in Computers. (1-3 cr [max 12 cr]; Prereq–) Topics vary according to needs and staff availability.

EE 8301. Advanced Topics in Design Automation. (3 cr; A-F or Aud) Advanced topics in state-of-the-art automated design tools used for electronic system design. Topics vary.

EE 8310. Advanced Topics in VLSI. (1-3 cr [max 12 cr]; Prereq–) Topics vary according to needs and staff availability.

EE 8331. CMOS Data Converters: A/D and D/A. (3 cr; Prereq–5533 or #) Data converters, low power low voltage analog circuits. Basic background in design of CMOS analog-to-digital and digital-to-analog converters. Special circuit design techniques for low power design. Students design/test several design problems.

EE 8333. FTE: Master's. (1 cr; No grade. Prereq–Master's student, adviser and DGS consent)

EE 8337. Analog Circuits for Wire/Wireless Communications. (3 cr; A-F or Aud. Prereq–5533) Basic background, advanced design concepts necessary to design integrated CMOS RF circuits. Emphasizes CMOS and RF. Where appropriate, mention is made of bipolar circuits and applications to other communications areas.

EE 8360. Computer Systems Seminar. (1 cr [max 3 cr]; S-N or Aud) Current literature, individual assignments.


EE 8370. Computer Aided Design Seminar. (1 cr [max 3 cr]; S-N or Aud. Prereq–EE or COMPE or CSci grad major, #) Current literature, individual assignments.

EE 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

EE 8500. Seminar: Communications. (1-3 cr [max 12 cr]; Prereq–) Topics vary according to needs and staff availability.

EE 8520. Advanced Topics in Signal Processing. (1-3 cr [max 12 cr]; Prereq–) Topics vary according to needs and staff availability.

EE 8581. Detection and Estimation Theory. (3 cr; Prereq–5531 or #) Risk theory approach to detection and estimation, random process representation, signal parameter estimation. Waveform estimation; detection of phase, frequency, and amplitude. Applications to communications and radar-sonar signal design and processing.

EE 8591. Predictive Learning from Data. (3 cr; Prereq–IT grad student or #) Basic elements and application areas of artificial intelligence (AI) related to design and implementation of expert systems (ES). Knowledge representation, reasoning under uncertainty, ES and their environments, planning, natural language processing (NLP), intelligent computer-aided instruction (ICAI), and AI tools (software and hardware).


EE 8610. Seminar: Electronics, Fields, and Photonics. (1 cr [max 3 cr]; S-N or Aud. Prereq–EE grad major or #) Students are assigned readings from current literature and make individual presentations to class. From time to time outside speakers present research papers.

EE 8611. Plasma Physics. (3 cr; Prereq–) Plasma theory and charged particle transport phenomena: collision processes, orbit theory, kinetic theory; Boltzmann transport equation, moment (continuity) equations, magnetohydrodynamics, transport properties. Applications of plasma theory to modeling of dc, rf, and microwave discharges.

EE 8630. Advanced Topics in Electromagnetics. (1-3 cr [max 12 cr]; Prereq–) Topics vary according to needs and staff availability.

EE 8660. Seminar: Magnetics. (1 cr [max 3 cr]; S-N or Aud) Current literature, individual assignments.

EE 8866. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

EE 8725. Advanced Power System Analysis and Economics. (3 cr; Prereq–4721, IT grad student or #) Solving sets of equations that involve large sparse matrices. Sparse matrix storage, ordering schemes, application to power flow, short circuit calculation, optimal power flow, and state estimation.


EE 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer, 10 cr total required (Plan A only))

EE 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

EE 8890. Special Investigations. (1-3 cr [max 3 cr]; Prereq–1-3 cr [may be repeated for cr]; IT grad student or #) Studies of approved theoretical or experimental topics.

EE 8950. Advanced Topics in Electrical and Computer Engineering. (1-3 cr [max 12 cr]; Prereq–CSci 3565 or #) Topics vary according to needs and staff availability.

EE 8965. Plan C Project I. (3 cr; Prereq–Grad EE major) Project topics arranged between student and adviser. Written reports.

EE 8967. Plan C Project II. (1-3 cr [max 3 cr]; Prereq–EE grad student) Project topics arranged between student and adviser. Written reports.

EE 8970. Graduate Seminar I. (1 cr [max 3 cr]; S-N or Aud. Prereq–Grad student) Recent developments in electrical engineering, related disciplines.

EE 8980. Graduate Seminar II. (1 cr [max 3 cr]; S-N or Aud) Recent developments in electrical engineering, related disciplines.

English: Creative Writing (ENGW)

Department of English Language and Literature
College of Liberal Arts

ENGW 5102. Advanced Fiction Writing. (4 cr [max 8 cr]; Prereq–) Advanced workshop for graduate students with considerable experience in writing fiction.

ENGW 5104. Advanced Poetry Writing. (4 cr [max 8 cr]; Prereq–) Advanced workshop for graduate students with considerable experience in writing poetry. An opportunity to explore new poetic possibilities and to read widely in contemporary poetry and poetics.

ENGW 5105. Advanced Poetry Writing. (4 cr [max 8 cr]; Prereq–) Advanced workshop for students with considerable experience in writing poetry. An opportunity to explore new poetic possibilities and to read widely in contemporary poetry and poetics.

ENGW 5106. Advanced Literary Nonfiction Writing. (4 cr [max 8 cr]; Prereq–) Advanced workshop for graduate students with considerable experience in writing literary nonfiction.
ENGW 5110. Topics in Advanced Fiction Writing. (4 cr; max 16 cr; Prereq–Grad student or #) Special topics in fiction writing. Topics specified in Class Schedule.

ENGW 5120. Topics in Advanced Poetry. (4 cr; max 16 cr; Prereq–A) Special topics in poetry writing. Topics specified in Class Schedule.

ENGW 5130. Topics in Advanced Creative Writing. (4 cr; max 16 cr; Prereq–A) Workshop. Might include work in more than one genre.

ENGW 5201. Journal and Memoir Writing. (3 cr) Using memory in writing, from brainstorming to drafting to revising, in several genres (poems, traditional memoir essays, fiction). How diverse cultures shape memory differently.

ENGW 5202. Journal and Memoir Writing. (3 cr) Using memory in writing, from brainstorming to drafting to revision, in several genres (poems, traditional memoir essays, fiction). How diverse cultures shape memory differently.

ENGW 5204. Playwriting. (4 cr; max 8 cr; Prereq–[jr or sr], one ENGW 3xxx course, permission number available in creative writing office) Advanced workshop. Contact creative writing program for specific description.

ENGW 5205. Screenwriting. (4 cr; Prereq–[jr or sr], one ENGW 3xxx course, Δ permission number available in creative writing office) Advanced workshop. Contact creative writing program for specific description.

ENGW 5207. Screenwriting II. (4 cr; Prereq–5205; one [Eng W or Eng, or Eng] 3xxx course, [jr or sr], Δ) Story structure, dialogue, description. Students turn story created in 5205 into a fully realized screenplay.

ENGW 5210. Topics in Advanced Literary Nonfiction. (4 cr; max 16 cr; Prereq–A) Special topics in essay writing (e.g., arts reviewing, writing about public affairs, writing in personal voice). Topics specified in Class Schedule.

ENGW 5310. Reading as Writers. (4 cr; max 8 cr; Prereq–grad student, Δ) Special topics in reading fiction, literary nonfiction, poetry. Topics specified in Class Schedule.

ENGW 5501. Minnesota Writing Project Invitational Institute. (1-3 cr [max 3 cr]; Prereq–Competitive selection for 20 educators [K-college]) Emphasizes participants’ teaching each other best practices in writing instruction. Participants attend a retreat before beginning.

ENGW 5502. Minnesota Writing Project Open Institute. (1-2 cr [max 2 cr]; Prereq–Teacher–K-college, [school district sponsorship or NWPI approval]) Summer workshop to refine skills in writing instruction.

ENGW 5570. Minnesota Writing Project Directed Studies. (1-3 cr [max 3 cr]; A-F orAud. Prereq–Participates must be members of the Minnesota Writing Project) Current theories of writing and writing pedagogy. Topics vary. Workshop.

ENGW 5600. Literary Aspects of Journalism. (3 cr; A-F or Aud. §JOUR 5600W) Literary aspects of journalism as exemplified in and influenced by works of English/American writers past/present. Lectures, discussions, weekly papers.

ENGW 5993. Directed Study in Writing. (1-4 cr [max 18 cr]; Prereq–A) Projects in writing poetry, fiction, drama, and nonfiction, or study of ways to improve writing.

ENGW 8101. Reading Across Genres. (4 cr; S-N or Aud. Prereq–Creative writing MFA student, A) Contemporary writing in fiction, poetry, and creative nonfiction. Primarily a reading course rather than a writing course.

ENGW 8110. Seminar: Writing of Fiction. (4 cr [max 16 cr]; Prereq–A) Focuses on full-length book (e.g., novel, short story collection). Assignments in common. Individual project.

ENGW 8120. Seminar: Writing of Poetry. (4 cr [max 8 cr]; Prereq–A) Focuses on exploration and practice of various styles. Assignments in common and individual project.

ENGW 8130. Seminar: Writing of Literary Nonfiction. (4 cr [max 8 cr]; Prereq–A) Advanced workshop. Assignments in common and individual projects.

ENGW 8140. Thesis Seminar: Poetry. (4 cr [max 8 cr]; Prereq–Creative writing MFA student, #) For students working on their creative project.

ENGW 8150. Thesis Seminar: Fiction. (4 cr [max 8 cr]; Prereq–Creative writing MFA student, #) Students work on creative project.

ENGW 8160. Thesis Seminar: Nonfiction. (4 cr [max 8 cr]; Prereq–Creative writing MFA student, #) Students work on their creative project.

English: Literature (ENGL)

Department of English Language and Literature

College of Liberal Arts

ENGL 5001. Introduction to Methods in Literary Studies. (3 cr) Ends/methods of literary research, including professional literary criticism, analytical bibliography, and textual criticism.

ENGL 5002. Introduction to Literary and Cultural Theory. (3 cr; Prereq–grad or #) Approaches to practical/theoretical problems of literary history/genre.

ENGL 5030. Readings in Drama. (3 cr [max 9 cr]; Prereq–Grad student or #) Wide reading in literature of a given period or subject. Prepares students for work in other courses/seminars. Relevant scholarship/criticism. Topics specified in Class Schedule.

ENGL 5090. Readings in Special Subjects. (1-4 cr [max 9 cr]; §ENGL 5100. Prereq–grad student or #) General background preparation for advanced study. Diverse selection of literatures written in English, usually bridging time and time periods. Readings specified in Class Schedule.

ENGL 5110. Readings in Middle English Literature and Culture. (3 cr [max 9 cr]; Prereq–Grad student or #) Wide reading in literature of period. Relevant scholarship/criticism. Topics vary. See Class Schedule.

ENGL 5121. Readings in Early Modern Literature and Culture. (3 cr; Prereq–A) Topical readings in early modern poetry, prose, fiction, and drama. Attention to relevant scholarship or criticism. Preparation for work in other courses or seminars.

ENGL 5140. Readings in 18th Century Literature and Culture. (3 cr; §ENGL 5141. Prereq–Grad student or #) Literature written in English, 1660-1798. Topics may include British literature of Restoration and 18th century, 18th-century American literature, a genre (e.g., 18th-century novel).

ENGL 5150. Readings in 19th-Century Literature and Culture. (3 cr [max 9 cr]; Prereq–Grad student or #) Topics may include British Romantic or Victorian literatures, American literature, important writers from a particular literary school, a genre (e.g., the novel).

ENGL 5170. Readings in 20th-Century Literature and Culture. (3 cr) British, Irish, or American literatures, or topics involving literatures of two nations. Focuses either on a few important writers from a particular literary school or on a genre (e.g., drama). Topics specified in Class Schedule.


ENGL 5180. Readings in Contemporary Literature and Culture. (3 cr; Prereq–Grad student or #) Multi-genre reading in contemporary American, Anglophone literature. Relevant scholarship/criticism. Topics vary. See Class Schedule.

ENGL 5200. Readings in American Literature. (3 cr [max 9 cr]; Prereq–Grad student or #) General background/preparation for advanced graduate study. Readings cover either a wide historical range (e.g., 19th century), a genre (e.g., the novel), or a major literary movement (e.g., Modernism).

ENGL 5300. Readings in American Minority Literature. (3 cr [max 9 cr]; Prereq–Grad student or #) Contextual readings of 19th-/20th-century American minority writers. Topics specified in Class Schedule.

ENGL 5400. Readings in Post-Colonial Literature. (3 cr) Selected readings in post-colonial literature, Topics specified in Class Schedule.

ENGL 5510. Readings in Criticism and Theory. (3 cr [max 9 cr]; Prereq–Grad student or #) Major works of classical criticism in the English critical tradition from Renaissance to 1920. Leading theories of criticism from 1920 to present. Theories of fiction, narratology, Feminist criticism, Marxist criticism, Psychoanalytic criticism. Theories of postmodernism.

ENGL 5597. Harlem Renaissance. (3 cr; §AFRO 4597) Multidisciplinary review of Jazz Age’s Harlem Renaissance: literature, popular culture, visual arts, political journalism, major black/white figures.

ENGL 5602. Gender and the English Language. (3 cr; Prereq–Grad student or #) Introduction to features of English that are gender-marked or gender-biased. Connections between language theory and social structures, including class and ethnicity. Patterns of women’s/sen’s speech in specific social contexts. Gender and writing. Sociolinguistics and sexual orientation.

ENGL 5603. World Englishes. (3 cr; Prereq–Grad student or #) Historical background, psychosocial significance, and linguistic characteristics of diverging varieties of English spoken around the world, especially in postcolonial contexts (Caribbean, Africa, Asia). Development of local standards/vernaculars. Sociolinguistic methods of analysis.
ENGL 5605. Social Variation in American English. (3 cr; Prereq—Grad student or #) Description/analysis of English language variation from sociolinguistic perspective in the United States and the Caribbean. Social history of volunteer/enforced migrations leading to development of regional/rural dialects, pidgins, creoles, and urban varieties.

ENGL 5612. Old English I. (3 cr; §ENGL 5612. Prereq—Grad student or #) Introduction to the language through A.D. 1150. Anglo-Saxon culture. Selected readings in prose/poetry.

ENGL 5613. Old English II. (3 cr; §ENGL 4613. Prereq—[ENGL 5612 or 5612], grad student or #) Critical reading of texts, introduction to versification. Reading of Beowulf.

ENGL 5621. Modern Irish Language I. (4 cr; Prereq—pr or sr or grad or #) Grammatical structures of modern Irish dialect of Connemara, Co. Galway. Development of oral/written language skills: vocabulary, manipulation of grammatical structures, speaking, listening, reading, writing. Modern Gaelic culture.

ENGL 5622. Modern Irish Language II. (5 cr; Prereq—5621 or #) Grammatical structures of modern Irish dialect. Development of oral/written language skills: vocabulary, manipulation of grammatical structures, speaking, listening, reading, writing. Modern Gaelic culture.

ENGL 5630. Theories of Writing and Writing Instruction. (3 cr; Prereq—Grad student or #) Introduction to major theories that inform teaching of writing in college and upper-level high school curriculums. Topics specified in Class Schedule.

ENGL 5660. Minnesota Writing Project: Directed Studies. (1-3 cr [max 30 cr]; Prereq—#) Workshops. Theories of writing and writing pedagogy. Writing for publication. Research topics in applied literacy.

ENGL 5711. Introduction to Editing. (4 cr) Editor–writer relationship, manuscript reading, author querying, rewriting, style. Some discussion of copy editing. Students develop editing skills by working on varied writing samples.

ENGL 5712. Advanced Editing. (4 cr; Prereq—5401 or 5711 or #) Editing long text. Fiction, children’s literature, translations, indexes. Workshop/seminar.

ENGL 5743. History of Rhetoric and Writing. (3 cr; Prereq—Grad student or #) Assumptions of classical/contemporary rhetorical theory, especially as they influence interdisciplinary field of composition studies.

ENGL 5790. Topics in Rhetoric, Composition, and Language. (3 cr; Prereq—Grad student or #) Topics specified in Class Schedule.

ENGL 5800. Practicum in the Teaching of English. (1-2 cr [max 2 cr]; Prereq—Grad student or #) Discussion of and practice in recitation, lecture, small-groups, tutoring, individual conferences, and evaluation of writing/reading. Emphasizes theory informing effective course design/teaching for different disciplinary goals. Topics vary. See Class Schedule.

ENGL 5805. Writing for Publication. (3 cr; Prereq—Grad student in Engl or #) Conference presentations, book reviews, revision of seminar papers for journal publication, and preparation of a scholarly monograph. Style, goals, and politics of journal and university press editors/readers. Electronic publication. Professional concerns.

ENGL 5880. General Topics. (3 cr [max 9 cr]) Topics specified in the Class Schedule.

ENGL 5992. Directed Readings, Study, or Research. (1-3 cr [max 45 cr]; Prereq—#)
Courses


ENT 5081. Insects, Aquatic Habitats, and Pollution. (3 cr; A-F or Aud) Prereq—[3xxx or above] course in [Agro or AnSc or shelf]. Theoretical/practical procedures of biological, chemical, cultural. Strategies to optimize the dynamic integrated management of aquatic ecosystems. Identifying ecological stressors, assessing level of exposure, measuring ecological responses, communicating/managing risks. Class participation, two reaction projects, final exam, small-group project.

ENT 5121. Applied Experimental Design. (4 cr; §AGRO 5121) Prereq—Stat 5021 or equiv or #) Principles of sampling methodologies, experimental design, and statistical analyses. Methods/procedures in generating scientific hypotheses. Organizing, initiating, conducting, and analyzing scientific experiments using experimental designs and statistical procedures. Offered with AGRO 5121.

ENT 5211. Insect Pest Management. (3 cr; Prereq—3005 or #) Prevention or suppression of injurious insects by integrating multiple control tactics, e.g., chemical, biological, cultural. Strategies to optimize the dynamic integrated management of aquatic ecosystems. Identifying ecological stressors, assessing level of exposure, measuring ecological responses, communicating/managing risks. Class participation, two reaction projects, final exam, small-group project.

ENT 5241. Ecological Risk Assessment. (3 cr; Prereq—§) Evaluating current/potential impact of physical, chemical, biological agents on ecosystems. Identifying ecological stressors, assessing level of exposure, measuring ecological responses, communicating/managing risks. Class participation, two reaction projects, final exam, small-group project.

ENT 5275. Medical Entomology. (3 cr; Prereq—§) Biology of arthropod vectors of human disease. Emphasizes disease transmission and host, vector, and pathogen interactions.


ENT 5481. Invertebrate Neurobiology. (2-3 cr [max 3 cr]; MISC 5481) Fundamental principles/concepts underlying cellular bases of behavior/systems neuroscience. Particular invertebrate preparations.

ENT 5900. Basic Entomology. (1-6 cr [max 12 cr]; Prereq—§) For graduate students who need to make up certain deficiencies in their biological science background.

ENT 5910. Special Problems in Entomology. (1-6 cr [max 10 cr]; Prereq—§) Individual field, lab, or library studies in various aspects of entomology.

ENT 5920. Special Lectures in Entomology. (1-3 cr [max 3 cr]; Prereq—§) Lectures or labs in special fields of entomological research. Given by visiting scholar or regular staff member.

ENT 8006. Supervised Laboratory or Extension Teaching Experience. (1-3 cr [max 3 cr]; A-F or Aud. Prereq—3005 or equiv or §) Training/experience conducting lab or extension based educational activities in Entomology. Students select a faculty member to serve as their sponsor, and develop lecture outlines or instructional aids such as Web sites, Web-based training sites, print materials, demonstration aids, and demonstration presentations. Students prepare/conduct lab or extension presentations. Overviews of Web-based instructional aids.

ENT 8041. Advanced Insect Genetics. (2 cr; Prereq—§) Molecular genetic techniques and their applications. Emphasizes insect species other than Drosophila. Application of genetic techniques to physiological processes.

ENT 8051. Toxicology. (2 cr; Prereq—§) Molecular, organic, inorganic chem courses, biochem course) or §) Chemistry, mode of action of conventional insecticides. Insect growth regulators, microbial pesticides. Transgenic virus, genetically modified plants. Offered alternate years.

ENT 8061. Scientific Communication and Ethics. (1 cr; S-N or Aud) Students develop/lose critical elements of scientific communication, within an ethical framework. Elements in writing scientific manuscripts and research proposals. Oral communication for scientific, outreach, and classroom presentations.

ENT 8220. Colloquium in Social Insects. (1-3 cr [max 3 cr]; Prereq—§) Current research on bees, wasps, ants, and termites. Student critiques and research reports.

ENT 8220. Colloquium in Insect Evolution. (1-3 cr [max 3 cr]; Prereq—§) Research issues in systematics and evolution. Comparative biology, biogeography, and molecular evolution. Students may re-enroll as topics alternate. Students critique papers from primary literature.

ENT 8240. Colloquium in Insect Ecology. (1-2 cr [max 2 cr]; Prereq—§) Advanced topics.

ENT 8330. Graduate Seminar. (1 cr; S-N or Aud. Prereq—§) Oral and written reports on and discussion by students of selected topics from current literature.

ENT 8333. FTE: Master’s. (1 cr, No grade. Prereq—Master’s student, adviser and DGS consent)

ENT 8444. FTE: Doctoral. (1 cr, No grade. Prereq—Doctoral student, adviser and DGS consent)

ENT 8594. Research in Entomology. (1-16 cr [max 36 cr]; S-N or Aud) Directed research.

ENT 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; Prereq—§) No grade. Prereq—Doctoral student who has not passed prelim exam or required course for 1st/2nd registration, up to 6 combined cr; or 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 80 combined cr)

ENT 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq—Max 18 cr per semester or summer, 10 cr total required [Plan A only])

ENT 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

Environmental Sciences, Policy, and Management (ESPM)

Division of Environmental Sciences, Policy, and Management

College of Food, Agriculture and Natural Resource Sciences

ESPM 5001. Treaty Rights and Natural Resources. (3 cr; A-F or Aud. §ESPM 3001. Prereq—Grad student or #) Readings, class discussion about treaty rights reserved by indigenous Americans with respect to use of natural resources. Emphasizes Midwest issues. Web-assisted course.


ESPM 5021. Ecological Vegetation Management: a Consulting Approach. (3 cr; §ESPM 3021. Prereq—Grad student or #) Application of ecological concepts such as succession/competition to ecosystems under management. Wetlands, riparian zones, urban interfaces, agriculture, agroforestry, Northern/boreal conifer, hardwood forests, grasslands (prairie), Management objectives, methods, impacts. Evaluating practices for sustainability. Social issues. Regional (Great Lakes area), national, global case studies.

ESPM 5031. Applied Global Positioning Systems for Geographic Information Systems. (3 cr; A-F or Aud. §ESPM 3031. Prereq—Grad student or #) GPS principles, operations, techniques to improve accuracy. Datum, projections, and coordinate systems. Differential correction, accuracy assessments discussed/applied in lab exercises. Code/carrier phase GPS used in exercises. GPS handheld units, PDA based ArcPad/GPS equipment. Transferring field data to/from desktop systems, integrating GPS data with GIS.

ESPM 5061. Water Quality and Natural Resources. (3 cr; §ESPM 4061W. Prereq—§) Issues, parameters, and decision making for managing surface/groundwater resources in Minnesota and globally. Biophysical/human side of water management. Wetlands, exotic species, heavy metal deposition. Cultural, political, and societal dimensions. Case studies, discussions, problem-solving, debates, projects.

ESPM 5101. Conservation of Plant Biodiversity. (3 cr; A-F or Aud. §ESPM 3101. Prereq—Grad student or #) Introduction to concepts underlying assessing/conservation of plant biodiversity at individual, population, and community levels. Case studies in management of biodiversity to restore or maintain ecosystem function. Genetics, timber harvesting, invasive species, plant reproduction.


For definitions of course numbers, abbreviations, and symbols, see page 169.
Courses


ESPM 5131. Environmental Biophysics and Ecology. (3 cr; A-F or Aud. Prereq—[Biol 1059 or equiv], Math 1271, PHYHS 1101, [paper div or grad student] or §) Basic concepts of environmental variables such as temperature, humidity, wind, and radiation. Mechanics of heat/mass transfer between a living organism and its surrounding environment. Set of practical examples to integrate concepts and transport processes.

ESPM 5202. Environmental Conflict Management, Leadership, and Planning. (3 cr; A-F or Aud. §ESPM 3202W. Prereq—Grad or §) Negotiation of natural resource management issues. Use of collaborative planning. Case study approach to conflict management, strategic planning, and building leadership qualities. Emphasizes analytical concepts, techniques, and skills.

ESPM 5207. Emerging Issues in Tropical Agriculture and Forestry: Costa Rica. (3 cr; §ESPM 3207. Prereq—Grad student, §) Experiential learning through field trips. From conventional to organic bird-friendly coffee production/sustainable management of high-/low-land tropical forests and of biodiversity. Lectures, seminars, labs, field work, written project. Offered through CATIE/Us/OM.

ESPM 5211. Survey, Measurement, and Modeling for Environmental Analysis. (3 cr; §ESPM 3211. Prereq—Grad student or §) Introduction to survey, measurement, and modeling concepts/methods for study of natural resources and environmental issues. Emphasizes survey design for data collection, estimation, and analysis for issues encompassing land, water, air, vegetation, animal, soil, and human/social variables.


ESPM 5242. Methods for Natural Resource and Environmental Policy. (3 cr; A-F or Aud. §ESPM 4242. Prereq—[Soc 3251 or equiv; or grad student]) Methods, formal and informal, for analyzing environmental/natural resources policies using economic/non-economic decision-making criteria. Application of policy analysis principles/concepts to environmental/natural resource issues. Recognizing politically-charged environment in which decisions over use, management, and protection of these resources often occur.

ESPM 5245. Sustainable Land Use Planning and Policy. (3 cr; A-F or Aud. §ESPM 3245. Prereq—Grad student or §) Overview of policies that affect recreation at local, state, and federal levels. Landscape-level planning. Collaborative relationships as means to implement sustainable natural/social policy. Class project involving all aspects of implementing recreation policy. From public meetings to hands-on evaluation of options.

ESPM 5251. Natural Resources in Sustainable International Development. (3 cr; A-F or Aud. §ESPM 3251, LAS 3251. Prereq—Grad student or §) International perspectives on resource use in developing countries. Integration of natural resource issues with social, economic, and policy considerations. Agriculture, forestry, agroforestry, non-timber forest products, water resources, certification, telecommunications. Latin American case studies.


ESPM 5295. GIS in Environmental Science and Management. (3 cr; A-F or Aud. §ESPM 3295. Prereq—Grad student or §) Application of spatial data inventory/analysis in complex environmental planning problems. Spatial data collection. Database development methods, including GIS, DRG, TIGER, NWI data, and spatial analysis. Topics identified by non-University partners.

ESPM 5402. Biometeorology. (3 cr; Prereq—Math 1271, Physics 1201, Stat 3011) Calculus-based introduction to atmospheric boundary layer (ABL), interactions between earth’s surface and the atmosphere. ABL development/turbulence, surface energy balance, ABL, clouds, air quality, microclimate, observational/modeling methods.

ESPM 5480. Topics in Natural Resources. (1-4 cr; max 6 cr; Prereq—Sr or grad student) Lectures by visiting scholar or regular staff member. Topics specified in Class Schedule.

ESPM 5482. Biosafety Science and Policy. (3 cr) Science/policy for governing environmental/health safety of genetic engineering through Minnesota, national, and international cases.


ESPM 5575. Wetland Soils. (3 cr; A-F or Aud. §SOIL 5575. Prereq—[Biol 1010 or Biol 1020, CHEM 1021, Stat 3011]) Methods, formal and informal, for analyzing environmental/natural resources policies using economic/non-economic decision-making criteria. Application of policy analysis principles/concepts to environmental/natural resource issues. Recognizing politically-charged environment in which decisions over use, management, and protection of these resources often occur.

ESPM 5585. Wetland Soils. (3 cr; A-F or Aud. §SOIL 5585. Prereq—[Biol 1010 or Biol 1020, CHEM 1021, Stat 3011]) Methods, formal and informal, for analyzing environmental/natural resources policies using economic/non-economic decision-making criteria. Application of policy analysis principles/concepts to environmental/natural resource issues. Recognizing politically-charged environment in which decisions over use, management, and protection of these resources often occur.

ESPM 5591. Industrial Biotechnology and the Environment. (3 cr; A-F or Aud. §ESPM 4591. Prereq—Chem 1011, CHEM 1021, grad student) Biological, physical, and environmental attributes of agroforestry as pertains to watershed management. Coupling production with watershed protection benefits. Implications for policy, economics, and human dimensions in sustainable development. Types/cases, characteristics, and identification of useful microorganisms. Applications of microbes to benefit industrial processes of wood/lumber.

ESPM 5703. Agroforestry in Watershed Management. (3 cr; §ESPM 3703. Prereq—Grad student or §) Biological, physical, and environmental attributes of agroforestry as pertains to watershed management. Coupling production with watershed protection benefits. Implications for policy, economics, and human dimensions in sustainable development. Types/cases, characteristics, and identification of useful microorganisms. Applications of microbes to benefit industrial processes of wood/lumber.


Experimental and Clinical Pharmacology (ECP)

College of Pharmacy

ECP 5360. Pharmacopeiology. (2 cr; Prereq—PubH 5330, PubH 5330 or §) Application of epidemiologic principles to study, use, and beneficial/adverse outcomes of drugs in human populations.

ECP 5620. Drug Metabolism and Disposition. (3 cr; A-F or Aud. Prereq—Grad student or §) Oxidative/conjugative enzymes systems involved in human drug metabolism/disposition. Various in vitro models used to evaluate drug metabolism or chemical entity, pros/cons of each. Factors involved in conducting in vivo studies. Components used to predict in vivo drug disposition from in vivo studies.
For definitions of course numbers, abbreviations, and symbols, see page 169.
Courses

FSOS 8001. Conceptual Frameworks in the Family. (3 cr; Prereq—FSOS grad student or #) Major theoretical models about families, emphasizing sociocultural context.

FSOS 8003. Current Issues in Family Science. (3 cr) Content, theories, and methodologies in family science. Emphasizes findings of recent/emerging areas of research. Readings covering a wide range of topics. Critical examination of research studies. Targeted class discussion.


FSOS 8007. Ethical Issues and Moral Dilemmas in Family Life. (3 cr) Multidisciplinary perspectives of ethics, social norms, family law, family policy, family economics, and family decision-making. Focuses on differing perspectives of individuals representing various ethnicities, socio-economic levels, religions, and sexual orientations.

FSOS 8013. Qualitative Family Research Methods. (3 cr) Approaches to qualitative family research evaluation. Phenomenological, feminist, grounded theory, content analytic, ethnomethodological, ethnographic, program evaluation. Theory, research examples, student projects.

FSOS 8014. Quantitative Family Research Methods II. (3 cr; Prereq—[5014 or equiv], [8011 or equiv], two stat courses) or #) Quantitative research process, from developing a research question to putting findings to use. A major course project (development of a federally fundable research grant application) is basis for class discussion. Focuses on family research. Applying research knowledge to study of families.

FSOS 8031. Family of Origin. (3 cr; S-N or Aud. Prereq—Preference given to marriage and fam therapy students) In-depth study of each student’s family of origin in a group of other students and a clinical faculty therapy supervisor.

FSOS 8033. Problems in Families. (3 cr; Prereq—[8032 or equiv], #) Family therapy assessment/treatment approaches to problems such as depression, alcoholism, and sexual abuse, and to challenges of varying family structures, such as single-parent/remarried families.

FSOS 8034. Marriage and Family Therapy Supervision. (3 cr; Prereq—5032 or 8032 or #) Theories of supervision, structures for supervision, methods of supervision, evaluation process, legal/ethical issues. Therapist-client-supervisor relationships, potential problems, contextual issues.

FSOS 8035. Assessment of Couples and Families. (3 cr; A-F or Aud. Prereq—[5014 or equiv] or #) Issues in research and clinical assessment. Assumptions and values underlying assessment approaches. Specific assessment techniques discussed, evaluated, and administered. Ethical, legal, and practical issues.

FSOS 8036. Couple and Family Therapy Research. (3 cr; A-F or Aud. Prereq—FSOS 4013, 2014) Strengths and limitations of current couple and family outcome research; methodological approaches, including qualitative and quantitative.

FSOS 8037. Ethical, Legal, and Professional Issues in Mental Health Practice: Issues with Couples and Families. (2-10 cr; max 10 cr; A-F or Aud. Prereq—[8032, practicum or internship exper] or [grad student in cooperating mental health practice prog who has completed 1 course on therapy with children]) Boundaries and triangles, gender inequities, family law, confidentiality and reporting requirements, dual roles, client identity, and virtue classes.

FSOS 8038. Clinical Interventions for Couples. (3 cr; A-F or Aud. Prereq—[8032 or equiv] or #) Interventions into problems faced by couples at various ages and stages of their relationship. Developing and implementing effective strategies for problem solving, relationship maintenance, and partner growth, including integration of sex therapy into ongoing couple therapy.

FSOS 8043. Family Therapy Development: A Systemic Perspective. (3 cr; Prereq—[8001 or equiv] or #) Concepts and principles of systems and ecosystems and their applications in family science; emphasizes theoretical integration and development of research models with appropriate methodologies.

FSOS 8047. Integrative Research Seminar. (3 cr; Prereq—[8001 or equiv], [8013 or equiv], [8014 or equiv]) For advanced doctoral students primarily in family social science who are working on independent research projects. Giving and receiving of constructive criticism and support in integrating theories, methods, and applications in order to create a totality that is logically coherent and conceptually and methodologically sound.

FSOS 8101. Family Stress, Coping, and Adaptation. (3 cr; Prereq—[8001 or equiv], research methods course) Helping families become more resilient to stress by decreasing vulnerability to crises and traumatic stress disorders. Students develop research or intervention proposal on family stress, coping, adaptation, crisis, trauma, or resilience.

FSOS 8102. Seminar in Gender Roles. (3 cr; Prereq—Two grad family courses or #) Theory and research on gender roles in families. Gender issues in roles of mothers, fathers, marital partners, and same-sex partners. Issues of race, ethnicity, and social class as they intersect with gender.

FSOS 8103. Family Decision Making. (3 cr; Prereq—Two grad family courses or #) Analysis and assessment of methodological and theoretical approaches to studying problem-solving and decision-making processes of individuals and family groups.

FSOS 8104. Family Policy Seminar. (3 cr) Distinguishing family policy research from other family research. Conceptual frameworks, methods, and roles family policy research can play in policy-making and knowledge-building processes.

FSOS 8105. Family Gerontology. (3 cr; Prereq—[4154 or equiv or #]) Integrates gerontology and family studies; new lines of inquiry, qualitative and quantitative, into aging families. Family gerontological research, family relationships, and long-term care institutions, theoretical frameworks and research methods, and research and interventions.


FSOS 8107. Family Values Research: Theories and Critical Methods. (3 cr; Prereq—[8013 or equiv], [8014 or equiv] or #; WICF 8920 recommended) Interdisciplinary seminar on critical modes of inquiry in the family domain that require designing studies using normative theories, examining values and beliefs, and evaluating and explaining the relationship between values and family processes. Cross-cultural perspectives.

FSOS 8108. Topics in Family Social Science. (1-6 cr; max 6 cr; Prereq—FSOS grad student or #) Special seminars on timely topics.

FSOS 8160. Topics in Marriage and Family Therapy. (1-6 cr; max 6 cr; Prereq—MFT grad student or #) Special seminars on timely topics.

FSOS 8193. Directed Study in Family Social Science. (1-6 cr; max 12 cr; Prereq—Doctoral student in FSOS or related field) Directed study.

FSOS 8200. Orientation for Family Social Science. (1 cr; S-N or Aud. Prereq—#) What is a uniquely family social science major? What are the goals and expectations of the major?

FSOS 8201. Teaching Family Courses in Higher Education I. (3 cr; S-N or Aud. Prereq—12 FSOS grad cr; teaching assistant exper recommended) Students cooperatively plan, administer, and evaluate (with graduate faculty supervisor) an undergraduate core course. Improvement of teaching and evaluation methods, and conceptualization and presentation of research-based course in family studies.

FSOS 8202. Teaching Family Courses in Higher Education II. (3 cr; S-N or Aud. Prereq—[8021 or equiv] or #) Under faculty supervision, students teach an undergraduate course in family social science for which they have appropriate academic preparation and professional experience.

FSOS 8275. Clinical Consultation with Couples and Families. (3 cr; S-N or Aud. Prereq—#; required for grad FSOS majors in marriage and family therapy prog) Supervised students serve as a consultation group working with community clinicians and their clients, utilizing a one-way window and observation room; opportunities for cotherapy.

FSOS 8285. Family Therapy Practicum. (1-12 cr; max 12 cr; S-N or Aud. Prereq—Marriage and family therapy student) Clinical placement doing family therapy in a community setting.

FSOS 8286. Family Therapy Internship. (1-21 cr; max 21 cr; S-N or Aud. Prereq—[8285, marriage and family therapy student] Full-time clinical placement doing marriage and family therapy in a community setting.

FSOS 8287. Supervision of Supervision. (1-3 cr; max 12 cr; S-N or Aud. Prereq—MFT student, #) Hands-on practicum to gain AAMFT-approved supervisor status.

FSOS 8333. FTE: Masters. (1 cr; No grade. Prereq—Master’s student, adviser and DDS consent)

FSOS 8444. FTE: Doctoral. (1 cr; No grade. Prereq—Doctoral student, adviser and DDS consent)

FSOS 8550. Advanced Topics in Family Social Science. (1-6 cr; max 6 cr; A-F or Aud. Prereq—FSOS PhD student) Special seminars on topics suited to student needs.

FSOS 8560. Advanced Clinical Topics in Marriage and Family Therapy. (1-6 cr; max 36 cr; A-F or Aud. Prereq—FSOS PhD student or #) Special advanced topics or seminars.

FSOS 8666. Doctoral Pre-Thesis Credits. (1-6 cr; max 12 cr) No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr, a 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before Fall 2007 may register up to four times, up to 60 combined cr

FSOS 8755. Master's Paper: Plan B Project. (1-6 cr; max 6 cr; S-N or Aud. Prereq—FSOS MA student) Graduate faculty work with students on research for Plan B paper.

FSOS 8777. Thesis Credit: Master’s. (1-18 cr; max 50 cr) No grade. Prereq—Max 18 cr per semester or summer; 10 cr total required (Plan A only)

FSOS 8794. Directed Research in Family Social Science. (1-6 cr; max 12 cr; Prereq—Grad FSOS major) Directed research.

FSOS 8888. Thesis Credit: Doctoral. (1-24 cr; max 100 cr) No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)
Finance (FINA)

Department of Finance

Curtis L. Carlson School of Management

FINA 8802. Theory of Capital Markets I: Discrete Time. (2 cr; Prereq—Econ 8101, Econ 8102, business admin PhD student or #) Modern asset pricing theory. Static/discrete time frameworks. Fundamental asset pricing equation. Classical finance models: CAPM, consumption-based CAPM, APT. Complete markets, representative agent, Pareto optimality. Challenges to theories. Approaches such as habit formation, heterogeneous agents (incomplete markets) model.

FINA 8803. Theory of Capital Markets II: Continuous Time. (2 cr; Prereq—Econ 8103, Econ 8104, business admin PhD student or #) Continuous-time financial economics. Emphasizes mathematical/statistical tools. Ito processes, Girsanov’s theorem, risk-neutral pricing. How to formulate/analyze continuous-time models.

FINA 8804. Advanced Continuous Time Finance. (2 cr; Prereq—FINA 8802, 8803) Pricing of fixed income securities, optimal capital structure, general equilibrium. Classic/current papers in continuous-time literature.

FINA 8812. Corporate Finance I. (2 cr; Prereq—Econ 8103, Econ 8104, business admin PhD student or #) Corporate control, managerial incentives, corporate governance, capital structure. What assets are collected within firm. What determines boundaries of firm. Empirical evidence in support of theoretical models. Modern theories of firm, based on incomplete contracts. How corporate finance decisions expand/limit scope of firm.


FINA 8890. Seminar: Finance Topics. (2-4 cr [max 16 cr]; A-F only, Prereq—[[8802, 8812, 8822, 8823] or equiv]; business admin student or #) Current topics/problems of interest considered in depth. Topics vary.

FINA 8892. Independent Study in Finance. (1-8 cr [max 16 cr]; Prereq—business admin PhD student or #) Problems or developments of special interest to the student.

FINA 8894. Directed Research in Finance. (1-8 cr [max 16 cr]; Prereq—business admin PhD student specializing in finance or #) Individualized directed research on a project of interest to the student, approved and advised by faculty.

Financial Mathematics (FM)

School of Mathematics

Institute of Technology


FM 5002. Preparation for Financial Mathematics II. (3 cr; Prereq—5001) Mathematics needed for the MFM program.

FM 5011. Mathematical Background for Finance I. (4 cr; Prereq—[5001, 5002] with grade of at least B or MFM program director approval) Mathematics needed for MFM program. Focuses on finance.

FM 5012. Mathematical Background for Finance II. (4 cr; Prereq—5011) Mathematics needed for MFM program. Focuses on finance.

FM 5021. Mathematical Theory Applied to Finance I. (4 cr; Prereq—[5011 or 5012]) Bridge between theory and application.

FM 5022. Mathematical Theory Applied to Finance II. (4 cr; Prereq—5021, [5012 or 50512]) Practical course taught by industry professionals. Focuses on hands-on real-world problem solving.

FM 5031. A Practitioner’s Course in Finance I. (4 cr; Prereq—[5021 or 50512]) Practical course taught by industry professionals. Focuses on hands-on real-world problem solving.

FM 5091. Programming and Presentation in Finance I. (3 cr) Most common computer software tools used by financial professionals. Hands-on programming course.

FM 5092. Programming and Presentation in Finance II. (3 cr; Prereq—5091) Continues to develop software tools from 5091. How to use computer applications to prepare presentation materials geared toward explaining ideas to those with less training in mathematics.

Finnish (FIN)

College of Liberal Arts

FIN 5670. Topics in Finnish Studies. (3 cr [max 9 cr]) Interdisciplinary social science topics on Finnish people, culture, and society. Taught in English.

Fisheries and Wildlife (FW)

Department of Fisheries, Wildlife, and Conservation Biology

College of Food, Agricultural and Natural Resource Sciences

FW 5003. Human Dimensions of Biological Conservation. (3 cr; Prereq—[Biol 1001 or Biol 1009], Biol 3407) Survey of social, psychological, economic, policy aspects of managing/conerving wildlife, fisheries, and related resources.

FW 5051. Analysis of Populations. (3 cr; Prereq—[Econ 8101 or Biol 1009], [FW 4001 or Stat 3011 or Stat 5021] or #) Statistical methods for describing, analyzing, and modeling population data. Application of statistical software to describe, analyze, and model attributes of fish populations. Case studies from literature of marine/freshwater fisheries management.

FW 5603W. Habitats and Regulation of Wildlife. (2 cr; S-N or Aud. Prereq—[Biol 1001 or Stat 5021], Biol 3407, Math 1142 or Math 1271) Introduction to theory/methods for estimating vital statistics of fish populations. Using microcomputers/statistical software to describe, analyze, model attributes of fish populations. Case studies from literature of marine/freshwater fisheries management.

FW 5604W. Fisheries Ecology and Management. (3 cr; Prereq—EEB 4134 or grad or #) Current problems in aquatic conservation/management. Nongame, wetland, game birds.

FW 5601. Fisheries Population Analysis. (3 cr; A-F or Aud. Prereq—[4001 or Stat 5021], Biol 3407, [Math 1142 or Math 1271]) Introduction to theory/methods for estimating vital statistics of fish populations. Using microcomputers/statistical software to describe, analyze, model attributes of fish populations. Case studies from literature of marine/freshwater fisheries management.

FW 5602W. Habitats and Regulation of Wildlife. (3 cr; S-N or Aud. Prereq—Biol 3407) Environmental interactions of wildlife at population/community levels. Environmental threats from human activities. Habitat management practices. Objectives, polices, regulations in population management.


FW 5625. Wildlife Handling and Immobilization for Research and Management. (2 cr; S-N or Aud. Prereq—[grad student or vet med student or FW 5430]) Practical techniques to maximize animal/safe and ensure effective operations. Preparation procedures, legal responsibilities, capture drugs/indicators, treatment of captured animals. Habitat management practices. Objectives, police, regulations in population management.

FW 5620. Seminar. (1-4 cr [max 8 cr]; S-N or Aud) Oral and written student reports on selected topics from current literature in fisheries biology and management and wildlife. Lectures and discussions with faculty and visiting specialists.

FW 8333. FTE: Master’s. (1 cr; No grade. Prereq—Master’s student, adviser and OGS consent) Directed research.

FW 8440. FTE: Doctoral. (1 cr; No grade. Prereq—Doctoral student, adviser and OGS consent)

For definitions of course numbers, abbreviations, and symbols, see page 169.
Courses

FW 8450. Data Analysis. (4 cr; A-F or Aud. Prereq—Saxx statistics course)
Advanced statistical methods are used to teach exploration/analysis of univariate/multivariate data. Descriptive statistics, estimation and inference, regression and smoothing, multivariate techniques, resampling.

FW 8452. Conservation Biology. (3 cr; A-F or Aud)
Seminar examining population-to-system-level biophysical issues (genetics; demographic processes; community, ecosystem, and landscape scale interaction; regulation ecology; ex situ strategies for restoration and recovery) and societal issues (social, economic, cultural perspectives; sustainable development strategies; roles of institutions; international and U.S. policies).

FW 8459. Stream and River Ecology. (3 cr; Prereq—Limnology course or #)
Structure/dynamics of running waters from ecosystem perspective. Historical perspective, basic hydrology/fluval geomorphology, terrestrial-aquatic interactions, detrital dynamics, metabolism, drift, trophic relations, biotic/abiotic interactions, ecosystem experiments and natural alterations, stability/succession, ecosystem dynamics in a watershed.

FW 8461. Advanced Topics in Fish Physiology. (1 cr; Prereq—Vertebrate physiology course or #)
Lectures, discussion, current literature. Complements 5459.

FW 8462. Advanced Topics in Fish Behavior. (1 cr; Prereq—5459 or behavior course or #)
Current literature. Complements 5459.

FW 8465. Fish Habitats and Restoration. (3 cr; Prereq—Intro ecology course or #)
Mechanisms underlying physiology/behavior that shape fish community structure in specific north temperate habitats. Techniques and planning procedures for restoring lakes/streams.

FW 8494. Research in Wildlife. (1-4 cr [max 4 cr]; Prereq—#)
Directed research.

FW 8576. Biology and Management of Large Mammals. (2 cr; A-F or Aud. Prereq—Ecology course, wildlife, forestry, and ecology grad student or #)

FW 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)
FW 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq—Max 18 cr per semester or summer; 10 cr total required [Plan A only]"
FW 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

Food Science and Nutrition (FSCN)

Department of Food Science and Nutrition

College of Food, Agricultural and Natural Resource Sciences

FSCN 5411. Food Biotechnology. (2 cr; Prereq—4212)
Genetic tools as applied to food biotechnology. Improvement of microbes used in food production by modern biotechnological approaches. Discuss need for stringent regulation of modern biotechnology as well as ethical and legal issues.

FSCN 5421. Introduction to Food Law. (3 cr; Prereq—1102)
Analysis of the federal legal requirements affecting the production processing, packaging, marketing, and distribution of food and food products using case law studies and regulatory history.

FSCN 5441. Introduction to New Product Development. (2 cr; Prereq—4111, 4331)
Interactive course that introduces students to the principles of new product development, from identification and testing of new product concepts, through prototype testing, to basic process design using examples from industry.

FSCN 5461. Food Packaging. (2 cr; Prereq—3102, PHYS 1102 or PHYS 1102)
Materials, principles, and procedures of packaging as they apply to food products. Emphasis is on consumer products, but the principles also apply to bulk and institutional foods and ingredients.

FSCN 5471. Advanced Food Chemistry. (3 cr; Prereq—4111)
Chemical reactions taking place in formation, stability, and degradation of important food constituents. Examples of reactions for major chemical changes occurring in food systems.

FSCN 5481. Sensory Evaluation of Food Quality. (2 cr; Prereq—3102, Stat 3011)

FSCN 5531. Grains: Introduction to Cereal Chemistry and Technology. (2 cr; Prereq—Biol 1009, Chem 1022)
Origins, structure, biochemistry, and cellular properties of major cereal grains as they relate to primary processing (milling) and secondary processing (production of cereal products).

FSCN 5601. Management of Eating Disorders. (3 cr; Prereq—[Sr or grad student] in health related program or #)
Etiology, occurrence, course, treatment, and prevention of eating disorders from a multidisciplinary perspective. Roles/responsibilities of eating disorder treatment team members of varying types across various treatment milieus.

FSCN 5631. Dietary Supplements: Regulatory, Scientific, and Cultural Perspectives. (3 cr)
Concepts/principles of dietary supplements-RDA, dose-response, risk assessment. Laws/regulations, their interpretation concerning dietary supplements. Vitamins/minerals. Philosophy/use of botanicals/nutraceuticals in Western medicine in contrast to other cultures. Use of herbal supplements in Western medicine.

FSCN 8130. General Seminar. (1 cr [max 2 cr]; S-N or Aud. Prereq—#)
Presentations by faculty, graduate students, and outside speakers.

FSCN 8138. Current Issues in Food Science. (2 cr [max 4 cr]; A-F or Aud. Prereq—4111, 4212, #)
Current issues, how they impact food industry.

FSCN 8320. Advanced Topics in Food Science. (1-3 cr [max 6 cr])
Recent research or special topics.

FSCN 8330. Research Topics. (1 cr [max 6 cr])
Seminar in which faculty member or group of faculty/graduate students discuss research progress or review/discuss current research literature.

FSCN 8331. Food Proteins. (3 cr; Prereq—4111, 4312)
Basic protein biochemistry as applied to food systems and food processing. emphasizes forces that determine protein structure. Techniques for isolation/characterization of food proteins. Protein structure function relationships in regard to handling/processing specific food protein systems (cereal, meat, dairy).

FSCN 8333. FTE: Master’s. (1 cr; no grade. Prereq—Master’s student, advisor and DDS consent)
FSCN 8334. Reaction Kinetics of Food Deterioration. (2 cr; Prereq—Chem 3501)
Basis for use of applied chemical kinetics to deteriorative reactions occurring in processing and storage of foods and drugs. Systems include enzymatic reactions, lipid oxidation, nonenzymatic browning, acid base catalysis, and microbial growth and death. Application of these kinetics to study of accelerated shelf-life testing of foods, drugs, and biologics.

FSCN 8335. Carbohydrate Chemistry in Food and Nutrition. (2 cr; Prereq—4111)
Current methods of carbohydrate and polysaccharide analysis, including structural and chemical characterization methods, polymer reactions, and modifications.

FSCN 8336. Lipid Chemistry and Rancidity of Foods. (2 cr; Prereq—4111)
Chemistry of food lipid oxidation and rancification, and protective functions of antioxidants.

FSCN 8337. Flavor Chemistry. (2 cr; Prereq—4111)
Chemistry involved in formation, analysis, and release of flavoring materials in foods.

FSCN 8338. Antioxidants in Food: Practical Applications. (2 cr; Prereq—4111, Bio 3021, food chemistry, organic chemistry, biochemistry)
Mechanisms of antioxidant activities in food systems. Free radical scavengers, hydroperoxide stabilizers, synergists, metal chelators, singlet oxygen quenchers, substance reducing hydroperoxides. Practical applications of antioxidants in various food systems, effect of antioxidants on health/diseases.

FSCN 8391. Independent Study: Food Science. (1-4 cr [max 6 cr]; Prereq—#)
Includes written reports.

FSCN 8444. FTE: Doctoral. (1 cr; no grade. Prereq—Doctoral student, advisor and DDS consent)

FSCN 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

FSSP 5977. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq—Max 18 cr per semester or summer; 10 cr total required [Plan A only])

FSSP 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

Foreign Study—SPAN (FSSP)

College of Liberal Arts

FSSP 5960. Preparatory Seminar for SPAN Overseas Research. (4 cr; A-F or Aud. §FSSP 3960. Prereq—#)
Preparatory seminar for SPAN overseas research.

FSSP 5970. Seminar for SPAN Overseas Research. (4 cr; A-F or Aud. §FSSP 3970, FSSP 5980. Prereq—#)
Seminar for SPAN overseas research.

FSSP 5980. Seminar for SPAN Overseas Research. (1-4 cr [max 4 cr]; A-F or Aud. §FSSP 3970, FSSP 5970. Prereq—#)

Forest Resources (FR)

Department of Forest Resources

College of Food, Agricultural and Natural Resource Sciences

FR 5104. Forest Ecology. (4 cr; A-F or Aud. §FR 3104)
Prereq—[Biol 1001 or 1009, grad student] or #; 1 semester college chemistry recommended
Form/function of forests as ecological systems. Characteristics/dynamics of species, populations, communities, landscapes, and ecosystem processes. Examples applying ecology to forest management. Weekly discussions on research topics, exercises, current issues in forest resource management. Required weekend field trip.

FR 5105. Forest Ecosystem Health and Management. (3 cr; A-F only §FR 3105, Prereq—3104 or Biol 3407 or EEB 3001 or equiv)
Principles of forest ecosystem health and its management applied to areas ranging from wilderness to urban forest, and from local to global.


FR 5131. Geographical Information Systems (GIS) for Natural Resources. (4 cr; A-F only. §FR 3131. Prereq–Grad student or #) Introduction to GIS. Focuses on natural resources. Data structures, sources, collection, and quality. Lab exercises introduce geodesy, map projections, spatial analyses, and cartographic modeling.

FR 5142. Tropical Forest Ecology. (3 cr; Prereq–300 ecology course) Ecological principles related to form, function, and development of wet/dry tropical forests at organismal, community, and ecosystem scales. Ecophysiology, succession, productivity, biodiversity, sustainability, agroforestry, social forestry, and management alternatives. Natural distribution of forest types. Causes, consequences, and extent of deforestation.


FR 5153. Forest and Wetland Hydrology. (3 cr; Prereq–[Basic hydrology course, [upper div or grad student]] or #) Current topics, methods/models in forest/wetland hydrology. Hydrologic role of forests, wetlands, riparian systems in snowfall/rainfall regimes. How activities such as deforestation, wetland drainage, and stream channel alterations, affect hydrologic response of watersheds. Runoff/streamflow response from undisturbed/alternated forest/wetland watersheds. Problem-solving exercises.

FR 5161. Northern Forest Field Course. (2 cr; A-F or Aud. Prereq–#) Field identification of common trees, shrubs, and nonwoody vascular plants. Plant communities, soil site relationships, and natural values. Natural history of northern/boreal forests in terms of soils, ecological characteristics of trees, community-environment relationships, stand development, succession, and regeneration ecology. Land survey, tree/forest stand measurement, forest sampling techniques. Taught at Cloquet Forestry Center.

FR 5203. Forest Fire and Disturbance Ecology. (3 cr; A-F or Aud. §FR 2303. Prereq–[Grad student or #], course fee) Ecology, history, management, and control of fire, wild and prescribed. Browsing, and other disturbances in forests. Disturbance regimes of boreal, northern hardwood, and other major forest types of North America. Influence of disturbance on wildlife habitat, wildlife/forest interfaces, forest management, and stand/landscape dynamics. Guest speakers on fire organization, training, and operations. Two-day field trip.

FR 5204. Landscape Ecology and Management. (3 cr; A-F or Aud. §FR 5204. Prereq–Grad student or #) Introduction to landscape ecology at different scales in time/space. Development/implications of broad-scale patterns of ecological phenomena, role of disturbance in ecosystem processes, spatial/temporal scales of ecological events. Principles of landscape ecology as framework for landscape research, analysis, conservation, and management.

FR 5265. Productivity and Ecology of Forest Soils. (3 cr; §FR 2265. Prereq–Grad student or #) Soil-site factors affecting plant/wildlife communities. Site quality estimation, site modification/enhancement. Effects of forest management and other human-related disturbances on forest site quality.


FR 5228. Advanced Assessment and Modeling. (3 cr; A-F or Aud. Prereq–3218, Math 1272, Stat 5201) Application of recently developed mathematics, computer science, and statistics methodologies to natural resource functioning, management, and use problems. Specific topics, software, and methodologies vary.


FR 5264. Advanced Forest Management Planning. (3 cr; Prereq–4371 or #) Applied models for forest planning to integrate forest resource condition/uses. Stand-level management. Forest-wide/landscape-level planning. Regional timber supply analysis. Optimization models and heuristic techniques as tools. Integrating sustainable timber production with desired future conditions and spatial structure for biodiversity. Problems, case studies involving recent large-scale applications.

FR 5411. Managing Forest Ecosystems: Silviculture. (3 cr; §FR 3411. Prereq–Grad student or #) Management of forest ecosystems for sustaining ecological integrity, soil productivity, water quality, wildlife habitat, biological diversity, commodity production in landscape context. Silvics, forest dynamics, disturbances, regeneration, restoration, silvicultural systems. Ramifications of management choices. Weekend field trip.


FR 5413. Managing Forest Ecosystems: Silviculture Lab. (1 cr; Prereq–FR [major or minor] or grad student) Development of silvicultural prescriptions to achieve various landowner objectives. Timber cruise, growth/yield simulations, stand density management diagrams, thinning schedules, use of forest vegetation simulator. Field trips, computer labs, lectures.

FR 5431. Timber Harvesting and Road Planning. (2 cr; §FR 3431. Prereq–Grad student or #) Forest operations, terminology, engineering, equipment/harvesting system options, productivity/costs. Relationship to forest management and silviculture. Road planning, forest management guidelines. Mitigating potential impacts to soil/water resources. Environmental implications of methods/equipment choices. Selling timber. Sale design, layout, and administration. All two-day field trips.

FR 5471. Forest Planning and Management. (3 cr; A-F or Aud. §FR 3471. Prereq–Grad student or #) Processes/techniques for scheduling forest management. Goals of landowners, industry, government, and society. Issues/policies/regulations that influence management. Predicting outcomes, financial analysis, regulation, mathematical models, linear programming, economic analysis. Landscape-level management, historical range of variability, wildlife management, carbon sequestration, resource monitoring, certification, adaptive management.

FR 5480. Topics in Natural Resources. (1-3 cr [max 3 cr]; §FR 3480. Prereq–#) Lectures in special fields of natural resources given by visiting scholar or regular staff member. Topics specified in Class Schedule.

FR 5501. Urban Forest Management: Managing Greenspaces for People. (3 cr; §FR 4501. Prereq–Grad student or #) Management concepts for green infrastructure of cities, towns, and communities. Urban forest as social/biological resource. Emphasizes management of urban forest ecosystem to maximize benefits. Tree selection, risk assessment, cost-benefit analysis, landscape planning, values, perceptions. How urban forestry can be a tool to improve community infrastructure.

FR 5611. Field Silviculture. (2 cr; Prereq–3104, 3411, 3612) Collection of field data to prepare/write silvicultural prescriptions for regeneration, thinning, and harvesting in context of landscape, watershed, and wildlife habitat issues. Field exercises in forest entomology, pathology, tree improvement, and non-forest timber products. Tree planting. Marking stands for harvest. Taught at Cloquet Forestry Center. Field trips to forests managed by state/industry.


FR 5615. Field Remote Sensing and Resource Survey. (2 cr; A-F or Aud. Prereq–3218, 3262) Field applications of remote sensing, sampling/measurement methods to inventory/mapping of forest and other natural resources. Offered at Cloquet Forestry Center.


FR 5700. Colloquium in Natural Resources. (1-3 cr [max 3 cr]; Prereq–#) Colloquium in specialized topics in natural resources.

FR 8101. Research Problems: Physiological Ecology. (1-5 cr [max 10 cr]; Prereq–#) Independent research under faculty guidance.

FR 8102. Research Problems: Forest-Tree Genetics. (1-5 cr [max 5 cr]; Prereq–#) Independent research under faculty guidance.

FR 8103. Research Problems: Forest Hydrology. (1-5 cr [max 5 cr]; Prereq–#) Independent research under faculty guidance.

FR 8104. Research Problems: Forest Ecology. (1-5 cr [max 5 cr]; Prereq–#) Independent research under faculty guidance.

FR 8105. Research Problems: Silviculture. (1-5 cr [max 5 cr]; Prereq–#) Independent research under faculty guidance.

FR 8106. Research Problems: Urban Forestry—Biology and Management. (1-5 cr [max 5 cr]; Prereq–#) Independent research under faculty guidance.

FR 8107. Seminar: Forest Resources. (1 cr) Assigned topics, problem analyses, and research reports.

FR 8201. Research Problems: Forest Economics. (1-5 cr [max 5 cr]; Prereq–#) Independent research under faculty guidance.
Courses

FR 8202. Research Problems: Forest Biodiversity and Measurements. (1-5 cr) Independent research under faculty guidance.


FR 8205. Research Problems: Spatial Data Analysis. (1-5 cr) Independent research under faculty guidance.


FR 8208. Research Problems: Environmental Learning and Leadership. (1-5 cr [max 5 cr]; Prereq-(#)) Independent research under faculty guidance.

French (FREN)

Department of French and Italian

College of Liberal Arts

FREN 2520. Promenades Poétiques: The Subject in Motion. (3 cr [max 9 cr]; Prereq-3111 or above) The search for the subject in poetry and poetic prose as revealed through the motif of the “promenade” and experimentation with literary forms.

FREN 2560. The Returns of Tragedy. (3 cr [max 9 cr]; Prereq-3111 or above) Tragedy as dramatic form in relation to social order, myth and history, and theatre.

FREN 2570. “If Change or not to Change?”: Speculations on (Post) Modern French Texts. (3 cr [max 9 cr]; Prereq-3111) The meaning and purpose of the notion of “change” in French novels. Explore how a multiplicity of causes produces major changes in an individual’s personal and public life. The notion of change as it relates to financial and intellectual speculation.

FREN 3501. Critical Issues in French Studies. (3 cr; Prereq-Grad or #) Introduces the methods of interpretation and critical debates that have shaped and continue to define the discipline of French studies. Provides a practical introduction to graduate-level literary research.

FREN 3530. Topics in Literature and Culture. (3 cr [max 12 cr]; Prereq-3101 or equiv) Problem, period, author, or topic of interest. See Class Schedule.

FREN 4570. Post/Colonial Francophone Literatures. (3 cr [max 9 cr]; Prereq-3111 or above) Francophone literature from North Africa, Africa, and the Caribbean of the colonial and/or post-colonial era. Specific topics/texts treated vary. Taught in French.

FREN 3531. Sociolinguistics of French. (3 cr; § FREN 3531. Prereq-JF 3501; Ling 3001 or 5001), grad student) Explores variation in the use of French associated with factors such as medium (oral/written), style (formal/ informal), region, social and economic groups.

FREN 5541. Oral Discourse of French. (3 cr; Prereq-3015, grad student; Ling 5001 recommended) Nature of contemporary spoken French discourse. Focuses on spontaneous, multi-speaker discourse. Readings include examples of various linguistic approaches to such discourse. Emphasizes syntactic analysis, phonological/lexical particularities. ‘Macro’ level analyses such as discourse analysis and conversation analysis.

FREN 5995. Directed Teaching. (1-6 cr [max 24 cr]; S-N or Aud. Prereq-(#)) Directed teaching.

FREN 8110. Topics in Early Medieval French Literature. (3 cr [max 9 cr]) Introduction to epic, romance, allegory, and theater in Old French readings (12th–13th centuries). Specific topics/texts studied vary. Taught in French.

FREN 8111. Introduction to Old French. (3 cr) Studies in instruction in reading Old French, sources of bibliography, and topics in medieval studies (language and literature). Taught in French.

FREN 8114. Old Provençal Language and Literature. (3 cr) Language and literature of Old Occitan (Old Provençal), chiefly troubadours’ poems. Some language instruction, reading of poems and other works, and consideration of nature and origins of “courtly love.” Knowledge of French, Spanish, or Italian desirable. Taught in English.

FREN 8120. Topics in Later Medieval French Literature. (3 cr [max 9 cr]; Prereq-8110 or #) Problems presented by texts written in France ca. 1300-1500. Evolution of Middle French language. Specific topics/texts vary. Taught in French.

FREN 8210. Narrative, History, and Memory: Topics. (3 cr [max 9 cr]) Significance of narrative paradigm in literature, history, and cultural memory. Specific topics/texts treated vary. Taught in French.


FREN 8250. Critical Issues: Poetry. (3 cr [max 12 cr]) Significant critical issues relating to poetic writing of selected authors or periods.

FREN 8260. Critical Issues: Theatre. (3 cr [max 12 cr]) Significant critical issues relating to dramatic writing of selected authors or periods.

FREN 8270. Critical Issues: Prose. (3 cr [max 12 cr]) Significant critical issues relating to prose writing of selected authors or periods.

FREN 8271. The Novel of the Ancien Regime. (3 cr) Considers major novels of the 17th and 18th centuries in connection with developments in such areas as aesthetic theory, intellectual currents, social transformations, and reading practices.

FREN 8290. Critical Issues: Perspectives on an Author. (3 cr [max 12 cr]) In-depth study of major author’s writing, critical tradition this writing has occasioned, and theoretical issues upon which this writing may be brought to bear.

FREN 8291. Jean Genet’s Writings and French Institutions. (3 cr) Jean Genet’s writings at the crossroads of several disciplines (politics, psychoanalysis, religion, and law). Genet’s novels, dramas, and political essays explore the power of institutional settings and strategies imagined by individuals to short-circuit their impact.

FREN 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, adviser and DIS consent)

FREN 8371. The Rule of Reason, the Reign of Madness: Readings in Early Modern France. (3 cr) Relationship between construction of reason and madness in philosophy, legitimation of political rule, and the institution of literature in early modern France.

FREN 84110. Topics in Quebecois Literature. (3 cr [max 9 cr]) Quebecois in relation to other North American literatures and to Francophone literature produced elsewhere in the world. Specific topics/texts vary. Taught in French.

FREN 8420. Critical Issues: Francophone Literature. (3 cr [max 9 cr]) Critical issues relating to literature of Francophone world. Specific topics/texts vary. Taught in French.

FREN 8444. FTE: Doctoral. (3 cr; No grade. Prereq-Doctoral student, adviser and DIS consent)

FREN 8521. History of the French Language. (3 cr) History of French from its origins in Latin to the present day. Aspects of diachronic phonology (sound change), morphology, syntax. Taught in French.

FREN 8866. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 69 combined cr)

FREN 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])


FREN 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

FREN 8990. Directed Teaching. (1-5 cr [max 25 cr])

FREN 8992. Directed Readings for Graduate Students. (1-5 cr [max 25 cr]; Prereq-#)

FREN 8994. Directed Research. (1-5 cr [max 25 cr]; Prereq-#; may be taken as tutorial with #)

French and Italian (FRIT)

Department of French and Italian

College of Liberal Arts

FRIT 5257. Passionate Beings: Literary and Medical Problematics in Italy and France from 1800 to the Present. (4 cr) Literary and medical representations of the passions in France and in Italy from 1800 to the present. Texts range from theatrical works to medical treatises on the passions as ways for exploring notions of subjectivity, responsibility, order. Taught in English.

FRIT 5850. Topics in French and Italian Cinema. (3 cr; Prereq–Knowledge of [French or Italian] helpful but not required) Focuses on a theme, problem, period, filmmaker, or other topic of interest in French or Italian cinema. See Class Schedule. Taught in English.

Gay, Lesbian, Bisexual, and Transgender Studies (GLBT)
Department of Gender, Women, and Sexuality Studies

College of Liberal Arts

GLBT 5993. Directed Study. (1-12 cr [max 12 cr])

Gender, Women, and Sexuality Studies (GWSS)
Department of Gender, Women, and Sexuality Studies
College of Liberal Arts

GWSS 5101. Feminist Approaches to Ethnography. (3 cr)
Preparation for feminist ethnographic research in the social sciences. Using recent works by feminist ethnographers, focuses on the methods, politics, and ethics, as well as gender, race, class, and cross-cultural issues pertaining to fieldwork.

GWSS 5102. Feminist Approaches to History. (3 cr; Prereq–8 crWoSt or grad or #)
Analysis and practice of feminist history. Theories, methods, and sources that address the interrelationship of gender, race, class, and sexuality.

GWSS 5103. Feminist Pedagogies. (3 cr; Prereq–grad or #)
Theory and practice of feminist pedagogies by comparing and evaluating various multicultural feminist theories of education/teaching and the application of specific theories, techniques, and teaching strategies.

GWSS 5104. Transnational Feminist Theory. (3 cr)
Third World and transnational feminisms. Interrogating the categories of “women,” “feminism,” and “Third World.” Varieties of power/oppression that women have endured/resisted, including colonization, nationalism, globalism, and capitalism. Concentrates on postcolonial context.

GWSS 5105W. Gendered Rhetoric of Science and Technology. (3 cr; Prereq–§RHET 5108, §RHET 8530; 8 cr WoSt or grad or #)
How cultural gender roles are affected by science and technology as well as influence scientific and technological thinking and communication strategies.

GWSS 5107. Gender, Culture, and Science. (3 cr)
Critical study of some of the major papers concerning the relations of gender and scientific inquiry produced in the past 20 years.

GWSS 5122. Philosophy and Feminist Theory. (3 cr; §GWSS 4122, PHIL 4622, PHIL 5622, Prereq–8 cr in [philosophy or women’s studies] or #)
Encounters between philosophy/feminism. Gender’s influence in traditional philosophical problems/methods. Social role of theorist/theorizing as they relate to politics of feminism.

GWSS 5190. Topics: Theory, Knowledge, and Power. (3 cr)
Topics specified in Class Schedule.

GWSS 5201. Global Processes and the Politics of Sexuality. (3 cr; Prereq–12 crWoSt or feminist studies grad student or #)
Comparative examination of the social construction of sexuality. Formal/informal norms/regulations, categories of deviance, representation of sex in the media/arts, role of sexuality in relation to agency/subjugation.

GWSS 5203. Women and Madness in History and Literature. (3 cr; §GWSS 2206, Prereq–4 cr or WoSt or #)
The representation of madness and how it intersects with gender as well as class, race, sexual orientation, and nationality.

GWSS 5290. Topics: Biology, Health, and Environmental Studies. (3 cr)
Topics specified in Class Schedule.

GWSS 5300. Communication and Gender. (3 cr; A-F or Aud.)
COMM 5405. Prereq—one women’s studies course or #)
How gender affects verbal communication. Development of analytical skills through readings, exercises, research that raise awareness of the power of language and the influence of gender prescriptions.

GWSS 5390. Topics: Visual, Cultural, and Literary Studies. (3 cr)
Topics specified in Class Schedule.

GWSS 5403. Chicana/Latina Feminisms. (3 cr; Prereq–8 cr WoSt and/or [Chic or grad or #)
The historical and social development of Chicana and Latina feminisms in general and their various specific types.

GWSS 5404. Working Class Women’s Cultures. (3 cr; Prereq–12 cr WoSt or #)
Myths and realities surrounding working class women and their cultures. Use sociological and literary material in an effort to learn about working class women and to hear their own voices.

GWSS 5405. Chicanas: Women and Work. (3 cr; Prereq–#)
Chicanas, their various relationships to family/community. Local, national, and global work forces. Questions/issues related to growing integration of world’s systems of production.

GWSS 5490. Topics: Political Economy and Global Studies. (3 cr [max 12 cr])
Topics specified in Class Schedule.

GWSS 5501. Women and the Law. (3 cr; Prereq–9 cr [WoSt or pre-law grad] or #)
Legal system as it relates to women: historical legal approach to issues related to constitutional rights of women.

GWSS 5590. Topics: Social Change, Activism, Law, and Policy Studies. (3 cr [max 12 cr])
Topics specified in Class Schedule.

GWSS 5690. Topics: Women, Society, and Race in the United States. (3 cr)
Topics specified in Class Schedule.

GWSS 5790. Topics: Sexuality Studies. (3 cr)
Topics specified in Class Schedule.

GWSS 5993. Directed Study. (1-12 cr [max 12 cr])

GWSS 5994. Directed Instruction. (1-12 cr [max 36 cr])

GWSS 5995. Directed Research. (1-8 cr [max 36 cr])

GWSS 8101. Intellectual History of Feminism. (3 cr)
Major trends in feminist intellectual history from 14th century to the present, especially in the United States and Europe.

GWSS 8102. Advanced Studies in Sexuality. (3 cr; Prereq–Priority given to feminist studies grad students)
Contemporary theoretical scholarship/research on selected issues related to sexuality, gender, and the body.

GWSS 8103. Feminist Theories of Knowledge. (3 cr; §PHIL 8133)
Interdisciplinary seminar. Feminist approaches to knowledge and to criticism of paradigms of knowledge operative in the disciplines. Feminist use of concepts of subjectivity, objectivity, and intersubjectivity. Feminist empiricism, standpoint theory, and contextualism. Postmodern and postcolonial theorizing.

GWSS 8108. Feminist Theories and Methods I. (3 cr; Prereq–Feminist studies PhD or grad minor student or #)

GWSS 8109. Feminist Theories and Methods II. (3 cr; Prereq–GWSS 8108, feminist studies PhD or grad minor student or #)

GWSS 8190. Topics: Feminist Theory. (1-3 cr [max 12 cr])
Topics in feminist theory.

GWSS 8201. Feminist Theory and Methods in the Social Sciences. (3 cr)
Seminar on recent theories, including feminist versions of poststructuralist, interpretive, critical realism, and postmodernist models of social science knowledge. Methodologies congenial to feminist practices of inquiry, including use of narrative in theory, feminist ethnography, discourse analysis, and comparative methods in history.

GWSS 8290. Topics: Social Sciences and Public Policy. (1-3 cr [max 3 cr])

GWSS 8301. Feminist Literacy Criticism. (3 cr)
Recent developments and major issues in feminist studies of literature. Introduction to array of scholars and scholarship in field of feminist literary theory and criticism, emphasizing broad range of feminist textual analysis taking place in various University departments.

GWSS 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

GWSS 8390. Topics: Literary Studies. (1-3 cr [max 3 cr])

GWSS 8401. Gender, Space, and Resistance. (3 cr)
Identity politics, social movements, and development politics; complex interrelationships among gender, space, and resistance. Social nature of place and space: sociopolitical and economic processes by which gendered, raced, and classed differences are constituted, reinforced, and resisted in and through space, place, and social networks.

GWSS 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

GWSS 8490. Topics: Comparative and Global Studies. (1-3 cr [max 3 cr])

GWSS 8590. Topics: Historical Studies. (1-3 cr [max 3 cr])

GWSS 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

GWSS 8888. Thesis Credit: Doctoral. (1-24 cr [max 24 cr]; No grade. Prereq–Max 18 cr or per semester or summer; 24 cr required)

GWSS 8993. Directed Study. (1-6 cr [max 9 cr])

GWSS 8994. Directed Instruction. (1-8 cr [max 36 cr])

GWSS 8995. Directed Research. (1-8 cr [max 36 cr])

GWSS 8996. Feminist Studies Colloquium. (1 cr [max 4 cr]; S-N or Aud. Prereq–Grad student)

GWSS 8997. Feminist Research and Writing. (3 cr; Prereq–8109, passed written prelim in degree granting program)
Develops interdisciplinary feminist components of Ph.D. thesis or other major piece of writing. Facilitates research/writing.
Courses

Genetics, Cell Biology and Development (GCD)

Department of Genetics, Cell Biology, and Development

College of Biological Sciences

GCD 5036. Molecular Cell Biology. (3 cr; Prereq—BIOL 4004 or #; [or grad student recommended])
Modern, integrative approaches combining cell/molecular biology, biochemistry, and genetics to investigate cell organization/function. Membranes, signaling, extracellular matrix, secretion, endocytosis, cytoskeleton, nucleus. Analysis of scientific papers to illustrate new concepts and experimental approaches to cell organization/function.

GCD 8008. Mammalian Gene Transfer and Expression. (2 cr; A-F or Aud. Prereq—#)
Current gene transfer technology. Applications of genetic modifications in animals, particularly transgenic animals and human gene therapy.

GCD 8073. Advanced Human Genetics. (3 cr; Prereq—8121 or #)
Application of molecular, biochemical, chromosomal, and population genetics to human variation and disease. Abnormal chromosome number and structure; aberrations, enzymes, structural protein, receptor and transport; analysis of inheritance patterns; behavioral genetics; genetic basis of common disease. Current research articles in human genetics.

GCD 8103. Human Histology. (6 cr; GCD 6103. Prereq—Undergraduate biology, chemistry, math, and physics course.)
Light/electron microscopic anatomy of tissues and their organization into human organs. Emphasizes integrating structure, its relationship to function at levels from molecules to organs. Lecture, lab.

GCD 8131. Advanced Genetics. (3 cr; Prereq—3022 or BIOL 4003, BIOL 3021 or BIOL 4331 or #)
Literature-based course covering modern genetic analysis, including mutant screens, characterization of multiple alleles, gene mapping and cloning, genome sequencing, intergenic interactions, transposable elements, genetic mosaics, and molecular mechanisms of recombination.

GCD 8136. Techniques of Biological Electron Microscopy. (4 cr; Prereq—#)
Theory and methodology of transmission and scanning electron microscopy.

GCD 8151. Cell Structure and Function. (3 cr; Prereq—[[4034 or 8121 or BIOL 8002], BIOL 4004] or BMBB or MCDB/G grad student.)
Structure, function, and biochemistry of cellular organelles. Cellular interactions in eukaryotes. Emphasizes membranes, secretion, trafficking, cytoskeleton, cell motility, nucleus, cell cycle, apoptosis, cell signaling, and signal transduction mechanisms.

GCD 8161. Advanced Developmental Biology. (3 cr; Prereq—[[4034 or 8121 or BIOL 8002], [8131 or BIOL 4003], BIOL 4004] or #)
Current concepts and of experimental approaches taken to understand basic mechanisms of development. Model organisms. Embryology, cell fate determination, differentiation, pattern formation, polarity, cell migration, and cell interactions. Analysis of original research articles.

GCD 8171. Literature Analysis. (2 cr; A-F or Aud. Prereq—Grad MCDB major)
Critical reading and evaluation of current literature. May include evaluation of both excellent and flawed papers. Intensive and in-depth discussions of selected papers in molecular biology, genetics, cell biology, and developmental biology.

GCD 8212. Selected Topics in Cell and Developmental Biology. (3 cr; Prereq—[8121 or BIOL 8002], 8151, [4161 or 8161] or #)
Reading and discussion of papers from current literature. Topics selected from research areas of cell biology and developmental biology and experimental approaches taken in these fields. Topics vary annually.

GCD 8213. Selected Topics in Molecular Biology. (4 cr; §BIOL 8213. Prereq—8121 or BIOL 8002 or #)
Sample topics: DNA replication, recombination and gene conversion, regulation of gene expression in prokaroytes, regulation of gene expression in eukaryotes, chromatin structure and transcription, organelar gene expression. Lectures, readings, discussions.

GCD 8900. Seminar. (1 cr [max 4 cr]; S-N or Aud. Prereq—Grad MCDB major or #)
Current scientific research.

GCD 8910. Journal Club. (1 cr [max 4 cr]; S-N or Aud. Prereq—Grad MCDB major or #)
Critical evaluation of selected current literature.

GCD 8912. Genetic Counseling in Practice. (4 cr; A-F or Aud. Prereq—MCDB MS student with genetic counseling specialization or #)
Practical genetic counseling, communicating genetics and medical information to the family, helping families with decision making.

GCD 8913. Psychosocial Issues in Genetic Counseling. (3 cr; A-F or Aud. Prereq—MCDB MS student with genetic counseling specialization or #)
Professional ethics; ethical and legal concerns with new genetic technologies.

GCD 8914. Ethical and Legal Issues in Genetic Counseling. (3 cr; A-F or Aud. Prereq—MCDB MS student with genetic counseling specialization or #)
Independent research determined by student’s interests, in consultation with faculty mentor.

Geographic Information Science (GIS)

Department of Geography

College of Liberal Arts

GIS 5555. Basic Spatial Analysis. (3 cr; Prereq—Stat 3001 or equiv, MGIS student or #)

GIS 5571. Introduction to Arc/Info. (3 cr; Prereq—Geog 5561 or equiv, status in MGIS program or #)
Introductory overview of the Arc/Info system. Topics include data capture, geometric transformations and map projections, topology, editing systems, database management and map production.

GIS 5572. Advanced Arc/Info. (3 cr; Prereq—Geog 5571 or equiv, status in MGIS program or #)
Advanced course in Arc/Info providing in-depth exploration of the topics emphasized in GIS 5571 as well as advanced topics including dynamic segmentation, address matching, and macro language programming.

GIS 5573. Desktop Mapping. (1.5 cr; Prereq—Geog 5561 or equiv, Geog 3511 or equiv, status in MGIS program or #)
Introduction to desktop mapping systems such as ArcView, MapInfo and MapPitude. Emphasizes the application of these systems to the display and analysis of geographical data.

GIS 5574. GIS and the Internet. (1.5 cr; Prereq—Geog 5561 or equiv, status in MGIS program or #)
The role of the Internet in GIS applications. Topics include GIS data sources on the Internet, the role of the Internet in information dissemination, Internet capabilities for interactive mapping and issues surrounding the development of GIS-related Web sites.

GIS 5575. Surveying and the Global Positioning System (GPS). (2 cr; Prereq—Geog 5561 or equiv, status in MGIS program or #)
Introduction to GPS (Global Positioning System) and other surveying techniques of use to GIS professionals. Topics include geodesy, data adjustment, datums, ellipsoids, coordinate systems, and transformations.

GIS 5577. Spatial Data Administration. (3 cr; Prereq—#)
Theory/application for administration of geographic databases. Quality assurance, development planning/management, maintenance, access/distribution, documentation.

GIS 5578. GIS Programming. (3 cr; Prereq—MGIS student or #)
Opportunities/feasibility that computer programming offers to application of GIS technologies. Programming techniques using Visual Basic, Python, and ArcObjects. Students apply GIS principles/concepts to programs using ESRI software.

GIS 5590. Special Topics in GIS. (1-3 cr [max 6 cr]; A-F or Aud. Prereq—#)
Special topics in geographic information science (GIS). Topics vary according to student needs, technological developments in field.

GIS 8333. FTE. Master’s. (1 cr; No grade. Prereq—Master’s student, adviser and DGS consent)

GIS 8501. Survey of Geographic Information Science: Past, Present, and Future Trends and Activities. (3 cr; Prereq—MGIS student or #)
Major trends and activities in geographic information science; university, local, state, and federal-level initiatives. History of GIS and its various disciplinary roots as well as major GIS-related resources (e.g., data sources, Web resources).

GIS 8990. MGIS Capstone Project. (2-6 cr [max 6 cr]; A-F or Aud. Prereq—MGIS, #)
Project of sufficient scope/complexity to document student’s ability to analyze issues and address them. Written summary of work. Done under supervision of faculty member and, where appropriate, workplace supervisor.

Geography (GEOG)

Department of Geography

College of Liberal Arts

GEOG 5181. Russia and Environ. (3 cr; GEOG 3181)

GEOG 5361. Geography and Real Estate. (4 cr)
Origins and evolution of land ownership in the United States.

GEOG 5371W. American Cities I: Population and Housing. (4 cr; GPA 5201W, Prereq—Grad or #)
Emergence of North American cities; residential building cycles, density patterns; metropolitan housing stocks, supply of housing services; population and household trends; neighborhood-level patterns of
Courses

housing use; housing prices; intrarural migration; housing submarkets inside metro areas; emphasis on linking theory, method, case studies.

GEOG 5372W. American Cities II: Land Use, Transportation, and the Urban Economy. (4 cr; §PA 5202W)

GEOG 5374W. The City in Film, (4 cr; §GEOG 3374V, GEOG 3374W, Prereq–grad student or #)
Cinematic portrayal of changes in 20th-century cities worldwide. Social/cultural conflict, political/economic processes, changing gender relationships, rural versus urban areas, population/development issues (especially as they affect women/children). Meets concurrently with 3374. Additional weekly meeting discusses films, readings. Project on a topic selected in consultation with instructor.

GEOG 5377. Music in the City: Sounds and Bodies in Different Places, (3 cr; A-F only)
Geographical conceptions of place, space, embodiment, and identity. Case studies of music.

GEOG 5385. Globalization and Development: Political Economy, (4 cr; §GEOG 3401W, Prereq–#)
Nature/scope of modern world system (capitalism), its impact on regional development processes. Roles of state and of international financial institutions.

GEOG 5401. Geography of Environmental Systems and Global Change, (4 cr; §GEOG 3401, Prereq–grad student or #)
Processes that create/change the spatial patterns of climate, vegetation, and soils. Potential of humans to alter climate, vegetation, and soil processes. Possible impacts of human-altered environmental conditions.

GEOG 5411. Geography of Health and Health Care, (4 cr; §GEOG 3411W)
Application of human ecology, spatial analysis, political economy, and other geographical approaches to analyze problems of health and health care. Topics include distribution and diffusion of disease; impact of environmental, demographic, and social change on health; distribution, accessibility, and utilization of health practitioners and facilities.

GEOG 5421. Introduction to Atmospheric Science, (3 cr; §ES 5421; Prereq–Familiarity with fundamentals of physics, calculus, and algebra or advanced standing in an allied field such as landscape architecture, geology, or physics)
Calculus-based introduction to atmospheric dynamics, radiation, thermodynamics, chemical composition, and cloud processes. Applications to climate, meteorology, the hydrologic cycle, air quality, and biogeochemical cycles.

GEOG 5423. Climate Models and Modeling, (3 cr; Prereq–3401 or #)
Survey of development and research with simple and complex (three-dimensional) climate models. Environmental processes and their numerical representation in climate models; evaluation of model sensitivity and accuracy; coupling between atmosphere, biosphere, hydrosphere, and cryosphere; assessment of model predictions for climate change.

GEOG 5426. Climatic Variations, (3 cr; Prereq–1425 or 3401 or #)
Theories of climatic fluctuations and change at decadal to centuries time scales; analysis of temporal and spatial fluctuations especially during the period of instrumental record.

GEOG 5431. Plant and Animal Geography, (3 cr; §GEOG 3431)
Introduction to biogeography. Focuses on patterns of plant/animal distributions at different scales over time/space. Evolutionary, ecological, and applied biogeography. Paleobiogeography, vegetation-environment relationships, vegetation dynamics/disturbance, human impact on plants/animals, nature conservation. Discussions, group/individual projects, local field trips.

GEOG 5441. Quaternary Landscape Evolution, (3 cr; Prereq–3401 or grad student or #)
Roles of climate change, geomorphic history, vegetation change, and soil development in the evolution of landscape patterns during the Quaternary Period, with emphasis on North America.

GEOG 5511. Advanced Cartography, (3 cr)

GEOG 5512. Cartography: Topics, (3 cr; Prereq–3511 or 3531 or #)
Selected topics include the system of cartographic communication, map design, map reading, map analysis, history of cartography

GEOG 5530. Cartographic Internship, (2-7 cr (max 10 cr): S-N or Aud, Prereq–#)
Provides intensive hands-on experience in contemporary map production and design, ranging from GIS applications to digital prepress. Strong computer skills essential.


GEOG 5561. Principles of Geographic Information Science, (4 cr; Prereq–grad)
Introduction to the study of geographic information systems (GIS) for geography and non-geography students. Topics include GIS application domains, data models and sources, analysis methods and output techniques. Lectures, reading, and hands-on experience with GIS software.

GEOG 5562. Geographic Information Science and Analytical Cartography, (3 cr; Prereq–3551 or 3551W and 3511 or #)
Topics include algorithms and data structures for digital cartographic data, topological relationships, surface modeling and interpolation, map projections and geometric transformations, numerical generalization, and raster and vector processing. Hands-on experience using a variety of software packages.

GEOG 5563. Advanced Geographic Information Science, (3 cr; Prereq–8 or better in 3561 or 5561 or #)
Advanced study of geographic information systems (GIS). Topics include spatial data models, topology, data encoding, data quality, database management, spatial analysis tools and visualization techniques. Hands-on experience using an advanced vector GIS package.

GEOG 5564. Urban Geographic Information Science and Analysis (3 cr; Prereq–3561 or 5561)
Core concepts in urban geographic information science including sources for urban geographical and attribute data (including census data), urban data structures (focusing on the TIGER data structure), urban spatial analyses (including location-allocation models), geodemographic analysis, network analysis, and the display of urban data.

GEOG 5565. Geographical Analysis of Human-Environment Systems, (3 cr; Prereq–3561 or FR 4131 or LA 5573 or one intro GIS course or grad student or #)
Applications of geographic information systems and other spatial analysis tools to analysis of environmental systems patterns and interactions. Focuses on global to landscape databases developed to analyze atmospheric, hydrogeographic, geomorphic, pedologic, biologic, and human land use systems.

GEOG 5568. Multimedia Cartography, (3 cr; Prereq–Minimum of three geo courses including one cartography course or advanced standing in: urban field such as landscape architecture or #)
Conceptualizing geographic topics in animatable form, selecting appropriate animation metaphors for specific ideas, using standard graphic software to prepare images for computer display and animation.

GEOG 5565W. Honors: Geographical Perspectives on Planning, (4 cr; §GEOG 3603V, GEOG 3603W, GEOG 5605V, GEOG 5605W, PA 5203W)
Role of planning in reshaping 19th-/20th-century cities in Europe, North America, selected Third World countries. History of planning; societal change; interest groups, power relations in planning process. Citizen participation/practice in planning. Meets with 3605. Includes additional weekly seminar-style meeting; bibliography project on topic selected in consultation with instructor.

GEOG 5566W. Geographical Perspectives on Planning, (4 cr; §GEOG 3605V, GEOG 3605W, GEOG 5605V, GEOG 5605W, PA 5203W, Prereq–Grad student or #)
Open to graduate students and undergraduates wishing Honors credits. Includes one additional weekly seminar-style meeting and a bibliography project on a topic selected in consultation with the instructor. Meets with 3605.

GEOG 5701. Field Research, (3 cr; Prereq–9 cr in geo, #)
Field investigation in physical, cultural, and economic geography; techniques of analysis and presentation; reconstruction of environments.

GEOG 5775. Geographic Education, (3 cr; Prereq–Three courses in geography or history or social sciences or education or #)
Teaching geography from middle school up; pedagogical use of geographical themes; methods for effective teaching of multiple cognitive domains – facts, theories, analytical skills, and evaluations; designing audio-visual aids, independent projects, simulations, etc. to meet National Standards in geography.

GEOG 5900. Topics in Geography, (3 cr; §mix 9 cr; Prereq–or grad, #)
Special topics and regions. Course offered by visiting professors in their research fields.

GEOG 8001. Problems in Geographic Thought, (3 cr; A-F or Aud)
Currents of geographic thought in biophysical, GIS, human, cultural, and human-environment subfields. Focuses on concepts/paradigms through which geographers have attempted to unify/codify the discipline, around which debate has flourished, and about which interdisciplinary histories can be traced.

GEOG 8002. Research Methods in Geography, (3 cr)
Seminar. Overview of research designs/methods in geography. Relationships between different research paradigms (modes of inquiry), research designs, and methods. Critical readings. Analyses of research projects.

GEOG 8005. Proseminar: Population Geography, (3 cr; Prereq–#)
Conceptual literature and empirical studies on fertility, mortality, and migrations in different parts of the world.

GEOG 8006. Proseminar: Research Methods in Geography, (3 cr; Prereq–#)
Introduction to research design, strategies, methods of data collection, analysis, interpretation, and representation in contemporary geographic research.

GEOG 8007. Proseminar: Theories of Development and Change, (3 cr; Prereq–#)
Recent research themes and questions in geography and related social sciences on Third World development; development theories, conceptually grounded case studies, and grassroots-based research.

GEOG 8020. Research Seminar: Economic Geography, (3 cr; Prereq–#)
Contemporary research. Advanced topics, which vary with interests of faculty offering course.

GEOG 8101. Proseminar: Nature and Society, (3 cr; Prereq–#)
Interconnectedness of environment and people, nature and society. Conceptual literature and empirical studies in human/cultural/political ecology.
Courses

GEOG 8102. Proseminar: The State, the Economy, and Spatial Development. (3 cr; Prereq–#)
Introduction to research in economic, political, and urban geography; conceptual research addressing interrelationship between political and economic processes and spatial dynamics of urban and regional development; empirical research documenting nature and extent of this interrelationship at different spatial scales.

GEOG 8103. Proseminar: Physical Geography. (3 cr; Prereq–#)
Historical development of research in physical geography, current research trends, and transfer of current research to undergraduate education.

GEOG 8105. Proseminar: Historical Geography. (3 cr; Prereq–#)
Introduction to conceptual research and empirical studies.

GEOG 8106. Seminar: Social and Cultural Geography. (3 cr; Prereq–#)
Role of space and place in constitution of social and cultural life, social relations, and social identities; class, space, and place; geography of race and racism; environmental racism; geography of gender and sexuality; nationalism, national identity, and territory.

GEOG 8107. Geographic Writing. (3 cr; S-N or Aud. Prereq–#)
Analysis of organization and presentation of geographic research; Critics of selected examples of geographic writing.

GEOG 8200. Seminar: Seminar: Urban Geography. (3 cr; A-F or Aud)
Contemporary research. Topics vary with the interests of faculty.

GEOG 8201. Explorations in the Geography of Minnesota. (3 cr; S-N or Aud. Prereq–#)

GEOG 8211. Environmental Policy. (3 cr; Prereq–#)
U.S. environmental policies at federal/state level. Policy formulation, implementation, and evaluation.

GEOG 8212. Africa. (3 cr; Prereq–#)
Advanced topics. Topics vary with interests of faculty offering course.

GEOG 8213. East Asia and China. (3 cr; Prereq–#)
Contemporary research, advanced topics. Topics vary with interests of faculty offering course.

GEOG 8214. South Asia. (3 cr)
Advanced topics. Topics vary with interests of faculty offering course.

GEOG 8220. Agrarian Change and Rural Development. (3 cr; A-F or Aud)

GEOG 8230. Theoretical Geography. (3 cr; Prereq–#)
Advanced topics. Topics vary with interests of faculty offering course. Contemporary theoretical/philosophical themes transcending subdisciplines of human/physical geography.

GEOG 8240. Medical Geography. (3 cr; Prereq–#)
Geographic inquiry concerning selected problems of health and health care.

GEOG 8260. Seminar: Physical Geography. (3 cr; Prereq–#)
Topics of contemporary research. Topics vary with interests of faculty offering course.

GEOG 8270. Seminar: Climatology. (3 cr; Prereq–#)
Sample topics: climate modeling; climatic variability; climate change and predictability; severe local storms; drought; energy balance; urban climate; statistical climatology.

GEOG 8280. Biogeography. (3 cr; max 3 cr; Prereq–#)
Forest dynamics, dendrochronology, treering and climate, environmental disturbance, paleobiogeography, field/lab methods in biogeography.

GEOG 8290. Seminar in GIS and Cartography. (3 cr; Prereq–#)
Selected concepts/methods. Topics, which vary yearly, include spatial analysis methods in GIS; advanced visualization methods; data quality and error propagation in GIS; generalization methods in GIS and cartography; role of time in GIS; interactive animated cartography; incorporation of uncertainty.

GEOG 8291. Seminar in GIS, Technology, and Society. (3 cr; Prereq–#)

GEOG 8292. Seminar in GIS: Spatial Analysis and Modelling. (3 cr; Prereq–#)

GEOG 8301. Advanced Qualitative Methods. (3 cr; A-F or Aud)

GEOG 8302. Research Development. (3 cr; S-N or Aud. Prereq–#)
Students in geography and related social sciences are guided in key steps to effective research proposal writing.

GEOG 8333. FTE: Masters. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

GEOG 8336. Development Theory and the State. (3 cr; A-F or Aud)
Why certain interventionist states in third world countries have been able to guide their economies to overcome legacy of underdevelopment while most have failed to induce development. Internal/external conditions that facilitated such departure from underdevelopment. Comparative national/provincial/case studies. Taiwan, South Korea, Botswana, Brazil, India. Applying theoretical approaches to policy issues.

GEOG 8350. Seminar: World Population. (3 cr; Prereq–#)
Contemporary research in world population development and problems. Topics vary with interests of faculty offering course.

GEOG 8405. Seminar: Graduate Student Professional Development. (1 cr [max 2 cr]; S-N or Aud. Prereq–Geography grad student)

GEOG 8420. Teaching Practicum. (1 cr [max 3 cr]; S-N or Aud. Prereq–[Geog or MGIS] grad student or #)
Teaching methodologies, learning objectives, course content, classroom techniques, student/course evaluation. Specific application to instruction in Geography.

GEOG 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

GEOG 8866. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Gradual student who has not passed prelim exam; required for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

GEOG 8877. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade; Max–18 cr or per semester or summer; 10 cr total required [Plan A only])

GEOG 8880. Seminar: Development of Geographic Thought. (3 cr; Prereq–#)
Topics vary with interests of faculty offering course.

GEOG 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Max–18 per semester or summer; 24 cr required)

GEOG 8970. Directed Readings. (1-5 cr [max 10 cr]; Prereq–#)

GEOG 8990. Topics in Geography. (1-3 cr [max 15 cr]; Prereq–#)
Seminar offered by visiting or regular faculty. Topics vary with interests of faculty.

GEOG 8990. Research Problems in Geography. (1-5 cr [max 10 cr]; Prereq–#)
Individual research projects.

Geological Engineering (GEOE)

Department of Civil Engineering

Institute of Technology

GEOE 5311. Experimental Geomechanics. (3 cr; A-F or Aud. §CE 5311, Prereq–IT upper division or grad student, 4301, CE 4301, or #)
Machine stiffness; closed-loop testing. Small-strain theory. Measurement of deformation; strain gages, LVDTs, accelerometers, and associated circuits. Direct and indirect testing. Material behavior: measurements on anisotropic, damaged, and fluid-filled solids.

GEOE 5321. Geomechanics. (3 cr; A-F or Aud. §CE 5321, Prereq–IT upper division or grad student, 4301, CE 4301 or #)

GEOE 5331. Geomechanics Modeling. (3 cr; A-F or Aud. §CE 5331, Prereq–IT upper division or grad student, 4301 or CE 4301)
Soil and rock response in triaxial testing; drained and undrained behavior; elastic and plastic properties. Modeling stresses, strains, and failure in geomechanics problems.

GEOE 5341. Wave Methods for Nondestructive Testing. (4 cr; A-F or Aud. Prereq–AEM 2021, AEM 3301 or #)
Introduction to contemporary methods for nondestructive characterization of objects of civil infrastructure (e.g., highways, bridges, geotechnical sites). Imaging technologies based on propagation of elastic waves: ultrasonic and resonant frequency methods, seismic surveys, acoustic emission monitoring. Lecture, lab.

GEOE 8300. Seminar: Geomechanics. (1-3 cr [max 4 cr]; S-N or Aud. §CE 8300)
Presentations on various topics.

GEOE 8301. Fracture of Geomaterials. (3 cr; A-F or Aud. §CE 8301, Prereq–#CE 5331 or #, IT grad student)

GEOE 8302. Soil/Rock Plasticity and Limit Analysis. (4 cr; A-F or Aud. §CE 8302, Prereq–CE 4303 or #, IT grad student)
Courses

GEOE 5311. Advanced Rock Mechanics. (3 cr; A-F or Aud. §GEOE 1351, Prereq–CE 3351 or #) Stress transformations; principal stresses and directions; Fricction and behavior of rock joints; stability of frictional sliding. Elastic waves; acoustic emission and seismic measurements. Fragmentation and rock breakage.

GEOE 5321. Thermomechanical. (3 cr; A-F or Aud. §GEOE 3231, Prereq–CE 5331 or #) Dissipation factors; stress and strain relations; thermal strain; anisotropy; phase change; boundary element method.

GEOE 5329. Storage and Flow of Granular Materials. (3 cr; A-F or Aud. §GEOE 3229) Permeability of granular materials; in situ tests; flow properties of sand; fluid flow in permeable and impermeable media; force and moment balances; stability of granular masses.

GEOE 5331. Engineering Model Fitting. (3 cr; A-F or Aud. §GEOE 3331, Prereq–CE 3331 or #) Parameter estimation and inverse modeling for civil and geological engineering. Formulating engineering model fitting problems; comparing and selecting various fit criteria; implementing numerical algorithms; analyzing and interpreting results using both statistical and qualitative tools; designing future measurement plans.

GEOE 5344. FTG. Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

GEOE 5392. Advanced Groundwater Mechanics II. (3 cr; A-F or Aud. §GEOE 4392) Well development and installation; single/multiple well testing; development and optimization of existing wells; cementing and grouting; chemical composition; time-dependent test performance.


GEOE 5596. Doctoral Pre-Thesis Credits. (1-6 cr; max 12 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

GEOE 5701. Climate Change and Human History. (3 cr; §GEO 3701) Causes of long-/short-term climate change. Frequency/magnitude of past climate changes, their geologic records. Relationship of past climate changes to development of agrarian societies and to shifts in power among kingdoms/city-states. Emphasizes last 10,000 years.


GEOE 5705. Limnogeology and Paleoenvironment. (3 cr; Prereq–2245) Physical properties of minerals and rocks as related to the composition and dynamics of the Earth’s crust, mantle, and core.

GEOE 5802. Scientific Visualization. (3 cr; Prereq–GSCI 1107 or GEO 1113 or #) Visualization hardware and software; three-dimensional graphics, representation of scientific data, modeling, user interface techniques, output, commonly used algorithms, animation, case studies and examples.


GEOE 5875. Isotope Geology. (3 cr; A-F or Aud. Prereq–2303 or #) Theory and uses of radiometric, radiogenic, and stable isotopes in geology. Radioactive dating, geothermometry, and tracer techniques in geologic processes.

GEOE 5877. Tectonic Studies: Master’s. (1-18 cr; max 50 cr; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

GEOE 5888. Thesis Credit: Doctoral. (1-24 cr; max 100 cr; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

Geology and Geophysics (GEO)

Department of Geology and Geophysics

Institute of Technology


GEO 5102. Climate and Change in Human History. (3 cr; §GEO 3102. Prereq–1001 or equiv or #) Causes of long-/short-term climate change. Frequency/magnitude of past climate changes, their geologic records. Relationship of past climate changes to development of agrarian societies and to shifts in power among kingdoms/city-states. Emphasizes last 10,000 years.

GEO 5108. Principles of Environmental Geology. (3 cr; Prereq–Geology majors: core curriculum through 4501 or #; nonmajors: 1001 or #) Human impact on geological environment and effect of geology/geologic processes on human life from an ecosystem and biogeochemical cycles perspective. Geologic limits to resources and carrying capacity of Earth. Land use planning, environmental impact assessment, ecogeologic world models. Field project and trip.


GEO 5203. Mineral and Rock Physics. (3 cr; Prereq–2201, PHY 1302) Physical properties of minerals and rocks as related to the composition and dynamics of the Earth’s crust, mantle, and core.

GEOE 6491. Electron Microprobe Theory and Practice. (3 cr; Prereq–[one yr chem, one yr physics] or #) Characterizing solid materials with electron beam instrumentation, including reduction of X-ray data to chemical compositions.

GEOE 6592. Depositional Geology. (3 cr; Prereq–4602, Math 2243 or #) Elementary mechanics of sediment transport applied to quantitative interpretation of sedimentary rocks.

GEOE 6656. Doctoral Thesis Credits. (1-6 cr; max 12 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

GEOE 6877. Thesis Credit: Master’s. (1-18 cr; max 50 cr; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

GEOE 6888. Thesis Credit: Doctoral. (1-24 cr; max 100 cr; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

For definitions of course numbers, abbreviations, and symbols, see page 169.
Courses

GEO 8243. Principles of Rock Magnetism. (1-3 cr [max 3 cr]; Prereq–4204 or #) Remanent magnetizations, their classification and origins. Fundamentals of fine particle magnetism; magnetic minerals; separation of multicomponent magnetizations; effects of chemical change on magnetization; magnetic proxies of climatic and environmental change; biomagnetism.

GEO 8333. FTE. Master's. (1 cr; No grade. Prereq–Master's student, adviser and DGS consent)


GEO 8354. Igneous Petrology. (3 cr; Prereq–4301 or #) Igneous rocks and processes, emphasizing geochemistry of melts and minerals. Content varies with instructor and student interest.

GEO 8355. Metamorphic Petrology. (3 cr; Prereq–8353) Metamorphic processes; relation of theory and observation to current problems. Relation of fundamental concepts and techniques to progressive development of mineral assemblages. Term paper required.

GEO 8444. FTE. Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)


GEO 8601. Introduction to Stream Restoration. (3 cr; A-F or Aud. §§EEB 8601. Prereq–Grad student in CE or GEO or EEB or WR 8100 or FW or BAE or FR or HORT or ENR or LA or SRSE or #) Background material essential for participating in a stream restoration project. How to assimilate geologic, hydrologic, and ecological data at the watershed and reach scales to plan a restoration project and evaluate/critique existing stream restoration projects.

GEO 8602. Stream Restoration Practice. (2 cr; §N only. §§EEB 8602, EEB 8602. Prereq–8601 or CE 8601) Field experience, group design project. Students provide a stream restoration context for each other s elective coursework, complete critical assessments of stream restoration projects, and design a stream restoration site.

GEO 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed Prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four cr, up to 60 combined cr)

GEO 8712. Transport Phenomena and Analytical Geohydrology. (3-4 cr [max 4 cr]; Prereq–5701 or CE 3502 or #) Microscopic flow parameters, momentum, mass and energy transport through porous media. Geologic factors in aquifer performance, equations for groundwater flow, and analysis of pump tests.


GEO 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade. Prereq–Max 16 cr per semester or summer; 10 cr total required [plan A only])

GEO 8888. Thesis Credit. Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 16 cr per semester or summer. 24 cr required)

GEO 8970. Seminar: Current Topics in Geology and Geophysics. (1-4 cr [max 30 cr]; A-F or Aud. Prereq–#) Independent research under faculty supervision.

German (GER) Department of German, Scandinavian, and Dutch College of Liberal Arts

GER 5011. Advanced Conversation and Composition. (3 cr; Prereq–3011, grad student or adv undergrad) Achieving high proficiency in writing/speaking professional/academic German

GER 5016. Advanced Translation: Theory and Practice. (3 cr; Prereq–3016 or #) Translation theory, related issues in stylistics, philosophy of language; sample translations; student production of translations with methodological commentary.

GER 5101. Analysis of German. (3 cr; Prereq–1004, Ling 3001 or Ling 5001 or #) Phonology, morphology, and syntax of standard German.

GER 5410. Topics in German Literature. (3 cr [max 9 cr]; Prereq–3011) Topic may focus on a specific author, group of authors, genre, period, or subject matter. Topics specified in Class Schedule.

GER 5510. Topics in Contemporary German Culture. (3 cr [max 9 cr]; Prereq–#) A topic of contemporary German culture explored in depth.

GER 5610. German Literature in Translation. (3 cr [max 9 cr]; Prereq–No knowledge of German required; cr toward major or minor requires reading in German) Study in depth of authors or topics from various periods in German literature. Requires no knowledge of German.

GER 5630. Topics in German Cinema. (3 cr [max 9 cr]; Prereq–3xx cr film course or #) Topics chosen may focus on specific directors, genres, film production or reception, and/or other formal, theoretical, historical, or political issues.

GER 5711. History of the German Language I. (3 cr; Prereq–#) Historical development of German, from beginnings to 1450.

GER 5712. History of the German Language II. (3 cr; Prereq–#) Historical development of German from 1450 to 2000.

GER 5721. Introduction to Middle High German. (3 cr; Prereq–#) Introduction to Middle High German language and literature. Study of grammar through formal description of Middle High German phonology, morphology, and syntax. Normalized MHG texts read.

GER 5722. Middle High German: Advanced Readings. (3 cr; Prereq–#) Acquisition of fluency in reading Middle High German normalized as well as non-normalized texts, both poetry and prose.

GER 5731. Old High German I. (3 cr) Study of the monuments of Old High German. Detailed investigation of Old High German in comparison with the other Germanic languages.

GER 5732. Old High German II. (3 cr; Prereq–#) Study of the monuments of Old High German. Detailed investigation of Old High German in comparison with the other Germanic languages.

GER 5734. Old Saxon. (3 cr) Study of the poetry of Old Saxon. Detailed investigation of Old Saxon in comparison with the other Old Germanic languages.

GER 5740. Readings in Philology. (3 cr [max 9 cr]) Philological analysis of a chosen text in any medieval Germanic language.

GER 5993. Directed Studies. (1-4 cr [max 12 cr]; Prereq–#) Independent individual reading or study.

GER 8002. Basic Seminar in German Studies. (3 cr) Theory and methods applicable in study of German literature and culture; introduction to bibliography and research skills; guided research projects.

GER 8200. Seminar in Medieval German Literature and Culture. (3 cr [max 9 cr]; Prereq–#) Topics on specific author, group of authors, genre, or subject matter in German literature, ca. 800-1450.

GER 8210. Seminar in Early Modern German Literature and Culture. (3 cr [max 9 cr]) Topics on specific author, group of authors, genre, or subject matter in German literature, 1450-1750.

GER 8220. Seminar in 18th-Century German Literature and Culture. (3 cr [max 9 cr]) Literary, philosophical, and aesthetic texts emerging from major 18th-century literary trends, 1729-1810. Cultural and historical contexts of Enlightenment and Weimar Classicism.

GER 8230. Seminar in 19th-Century German Literature and Culture. (3 cr [max 9 cr]) Examination of an author, issue, or movement, using a variety of critical approaches.

GER 8240. Seminar in 20th-Century German Literature and Culture. (3 cr [max 9 cr]; A-F or Aud) Topics on literature, film, or other forms of “high” and popular culture.

GER 8300. Topics in Literature and Cultural Theory. (3 cr [max 9 cr]) Authors, themes, movements, and social issues from 1700 to present. Focus varies each semester.

GER 8741. Gothic and Methods of Comparative Reconstruction I. (3 cr) The oldest extant Germanic language and the prehistory of Germanic group of languages.

GER 8742. Gothic and Methods of Comparative Reconstruction II. (3 cr; Prereq–#) Continuation of study of the oldest extant Germanic language and the prehistory of Germanic group of languages.

GER 8751. Paleography: Medieval Manuscript Readings. (3 cr; A-F or Aud) Introduction to techniques of reading and transcribing medieval Germanic and Latin manuscripts.

GER 8752. Medieval Text Editing. (3 cr) Introduction to techniques of historical text-critical editing of medieval Germanic and Latin manuscripts.

GER 8810. Feminist Literary Theory and History. (3 cr [max 9 cr]) Cultural, historical, and literary examination of writings of German women, 18th–20th centuries, and feminist theoretical tools used to analyze their work.

GER 8820. Seminar: Advanced Theory. (3 cr [max 9 cr]) Topic in critical thought, e.g., the Frankfurt School, hermeneutics, reception theory.

GER 8994. Directed Research. (1-3 cr [max 12 cr]; Prereq–#) May be taken as tutorial with #)

German, Scandinavian, and Dutch (GSD) Department of German, Scandinavian, and Dutch College of Liberal Arts

GSD 5103. Teaching of Germanic Languages. (3 cr) Second language acquisition theory, methods, testing, and technology applicable to teaching of modern Germanic languages.

GSD 8333. FTE. Master's. (1 cr; No grade. Prereq–Master's student, adviser and DGS consent)
Courses

GSD 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student admitted before summer 2007). No grade. Prereq–Doctoral student who has not passed preliminary examinations; no required consent for first 2nd registrations, up to 12 combined credits. Prereq–3rd/4th registrations, up to 24 combined credits; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined credits.

GSD 8801. Dissertation Seminar. (3 cr; S-N or Aud) For doctoral students in German and Scandinavian studies who are beginning to establish topics and do research for their dissertations. Discussion of a variety of topics related to this process as well as presentation of some written work.


GSD 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

Gerontology (GERO) School of Public Health


GERO 5110. Biology of Aging. (3 cr) Biological changes that occur with aging. Methods for studying aging, descriptions of population aging, theories on hominid evolution. Process of aging in each body system, variation between individuals/populations. Clinical implications of biological changes with age. Guest lecturers from different disciplines.

GERO 5111. Studying Aging and Chronic Illness. (2 cr; Prereq–Introductory course in epidemiology or #) Methodological issues unique to studies of older populations. Focuses on measurement of epidemiological characteristics. Health conditions/disorders of older Americans.


GERO 5191. Independent Study: Gerontology. (1-4 cr [max 16 cr] Prereq–Approval of [adviser, DGS for gerontology minor])

GERO 8020. Seminar in Gerontology. (2 cr; Prereq–#) Meets weekly. Students present and discuss new or completed research projects on aging; conduct formal reviews using NIH formats; critique published papers using formal review criteria employed by gerontologic journals; become familiar with large database in aging and describe how that database has been used in research for secondary analyses.

Global Studies (GLOS) Institute of International Studies

College of Liberal Arts

GLOS 5103. Empire and Modernity. (3 cr; A-F or Aud. Prereq–3101, 3144 or #) How modern world has been constituted by colonial encounter. Role of colonialism in construction of west. Images of non-western societies. Modernity in colonial/postcolonial societies. Problems/potential of universal categories such as democracy, gender, history, human rights. Globalization at the margins.

GLOS 5114. International Perspectives: U.S.–Mexico Border Cultures. (3 cr; Prereq–Grad student) The relations of Mexico and the United States from an international perspective with a central focus on the cultural interchange in the border lands between the two countries. Uses both literary and historical materials.

GLOS 5301. Environment & Empire. (3 cr; A-F or Aud. Prereq–3101, 3144 or #) Key issues in environmental history. Emphasizes global/colonial processes that have made modern environment. Global spread of diseases, modern remaking of world’s flora/fauna, idea of nature. New technologies and the environment. Conservationist ideology.

GLOS 5410. Interactive Global and Local Studies. (3 cr; A-F or Aud. Prereq–#) Global studies topics, locally in the Twin Cities and Minnesota, and internationally through linked communication with classes at cooperating universities in other countries. Students communicate with counterparts abroad through e-mail to develop comparative/interactive elements. Possible topics: role of river in local history, grain storage/processing, manufacturing/industry, growth of metropolitan area.

GLOS 5602. Other Worlds: Globality and Culture. (3 cr; A-F or Aud. Prereq–3101, 3144, grad student) or #) Interconnectedness of world. Considering not one world, but many. Colonialism, consumption, diasporic conditions, global media, nationalism, supra-national governance. How is globalization experienced/contested locally/speciﬁcally.

GLOS 5603. Socialist/Post-socialist Transformations. (3 cr; A-F or Aud. §HIST 5251) Transformations underway in post-socialist societies of Eastern Europe, former Soviet Union. Ramifications of abandonment of state socialism, introduction of market relations. Effect of former system, new market system on cultural institutions/identities.

GLOS 5643. Colonialism and Culture. (3 cr; A-F or Aud. §ANTH 5043) Making of culture as colonial/anthropological object of knowledge. Relationship between colonial knowledge/formation of academic disciplines (especially anthropology). Colonial/postcolonial transformations of colony, nation, and metropole.

GLOS 5801. International Development: Critical Perspectives on Theory and Practice. (3 cr; A-F or Aud. Prereq–Admission to MSID prog, grad student) Interdisciplinary approaches to development. Assumptions, common paradigms, analysis of policies, projects, problems. Globalization, societal crisis, indigenous alternatives to dominant paradigm. Partially taught in separate sections to deepen understanding of particular topic (e.g., environment, health, education).


GLOS 5803. MSID Country Analysis. (3 cr; A-F or Aud. Prereq–Admission to MSID prog, grad student) Multidisciplinary study of host country. Emphasizes social sciences and history, especially concepts/information regarding development issues.

GLOS 5805. Community Internships in the Global South. (3 cr; A-F only. Prereq–Admission to MSID prog, grad student) Grassroots internship with a host-country development agency or project through Minnesota Studies in International Development. Community characteristics, development strategies/problems, organizational structure/culture, cross-cultural communication issues.

GLOS 5806. Topics: Case Studies in International Development. (3 cr; A-F or Aud. Prereq–Admission to MSID prog, grad student) Development issues illustrated in students, local-level projects through MSID. Focuses on a particular sector as it relates to development of country. Sample topics: environment and development; health and development; education, literacy, and development; women and development.

GLOS 5807. Applied Field Methods. (3 cr; A-F or Aud. Prereq–Admission to MSID program) Application of selected field research methods in rural/urban settings in Asia, Africa, and Latin America. Analysis of practical, ethical, and theoretical issues raised through small field assignments and individual research projects.

GLOS 5808. MSID Directed Research. (3 cr; A-F or Aud. Prereq–Admission to MSID prog, grad student) Research project based on field work in Ecuador, India, Kenya, or Senegal through Minnesota Studies in International Development (MSID).

GLOS 5809. Advanced International Development Internship. (3 cr; A-F only) Study abroad course for Minnesota Studied in International Development.

GLOS 5900. Topics in Global Studies. (1-4 cr [max 12 cr]) Proseminar. Selected issues in global studies. Topics specified in Class Schedule.

GLOS 5910. Topics in East Asian Studies. (1-3 cr [max 3 cr]) Description varies with topic title.

GLOS 5920. Topics in European Studies. (3 cr) Description varies with topic title.

GLOS 5930. Topics in Latin American Studies. (3 cr) Description varies with topic title.

GLOS 5940. Topics in Middle Eastern Studies. (3 cr) Description varies with topic title.

GLOS 5950. Topics in Russian Area Studies. (3 cr) Description varies with topic title.

GLOS 5960. Topics in South Asian Studies. (3 cr [max 4 cr]) Description varies with topic title.

GLOS 5993. Directed Studies. (1-4 cr [max 12 cr]; Prereq–#) Guided individual reading or study. Open to qualified students for one or more semesters.

GLOS 5994. Directed Research. (1-4 cr [max 12 cr]; Prereq–#) Guided studies work on a tutorial basis.

Graduate School (GRAD) Graduate School

GRAD 5102. Preparation for University Teaching for Nonnative English Speakers. (2 cr; S-N only) Prereq–[SPEAK score of 45 or successful completion of Foundations in English], [current or anticipated] TA assignment, #) Theory/practice of teaching in higher education in the United States. Emphasizes awareness of cross-cultural communication issues. Students practice in a simulated instructional setting.

GRAD 5105. Practicum in University Teaching for Nonnative English Speakers. (2 cr; S-N only) Prereq–[SPEAK score of 50 or successful completion of 5102], [current or anticipated] TA assignment) Theory, advanced practice in teaching in higher education for nonnative speakers of English. Emphasizes interactive teaching strategies, oral presentation skills, legal/policy issues.

GRAD 8101. Teaching in Higher Education. (3 cr) Teaching methods/techniques. Focuses on active learning, critical thinking, practice teaching, and preparing a portfolio to document/reflect upon teaching. Readings, discussion, peer teaching, e-mail dialog, reflective writing, co-facilitation of course.

For definitions of course numbers, abbreviations, and symbols, see page 169.
Courses

GRAD 8102. Practicum for Future Faculty. (3 cr, S-N only. Prereq–8101 or equiv.) Collegial support for teaching, faculty mentorship at regional college or university, investigation of faculty role at variety of institutions, classroom observation/feedback, preparation for academic job search. Non-native English speakers must pass University requirements for international teaching assistants.

GRAD 8200. Teaching and Learning Topics in Higher Education. (1 cr [max 4 cr]; A-F only. Prereq–8101 or PFF prog director consent) Teaching/learning topics in higher education. Applications to specific contexts/topics. Students create course materials for a context/discipline and assess an action plan in terms of student learning. Students write an action plan. Different sections cover topics such as active learning in the sciences, teaching with technology, multicultural education, teaching in clinical settings, learning-community course design.

Greek (GRK)

Department of Classical and Near Eastern Studies

College of Liberal Arts

GRK 5012. Prose Composition. (3 cr; Prereq–Grad student or #) Moving step by step through Ancient Greek grammar, starting with simple sentences and progressing to complex ones. Course ends with students translating short passages of modern English prose into Greek.

GRK 5013. Advanced Composition. (3 cr; Prereq–Grad student or #) English-to-Greek verse composition or writing styles of individual Greek authors.

GRK 5032. Text Criticism. (3 cr; Prereq–Grad student or #) Theory/practice. Elements of paleography and manuscript study. Tools for analyzing textual apparatus; constructing a critical edition of a literary text.

GRK 5121. Biblical and Patristic Greek. (3 cr; Prereq–Grad student or #) Septuagint, Philo, Josephus, New Testament, Apostolic Fathers, and other patristic literature to 5th century CE. Reading/discussion of selected texts in major genres.

GRK 5310. Greek Literature: Oratory. (3 cr [max 9 cr]; Prereq–Grad student or #) One or more authors.

GRK 5320. Greek Literature: Tragedy. (3 cr [max 9 cr]; Prereq–Grad student or #) Reading of Greek tragedy.

GRK 5330. Greek Literature: Comedy. (3 cr [max 9 cr]; Prereq–Grad student or instructor consent) Readings in Greek comedy.

GRK 5340. Greek Literature: History. (3 cr [max 9 cr]; Prereq–Grad student or #) Readings from Greek historians. Traditions of Greek historiography.

GRK 5350. Greek Literature: Philosophy. (3 cr; Prereq–Grad student or #) Readings from one or more works of Plato or Aristotle in original Greek. Selections vary.

GRK 5360. Literature: Religious Texts. (3 cr [max 9 cr]; Prereq–Grad student or #) Reading/discussion of religious texts from Greek antiquity, such as Homeric Hymns, cultic verse, arxaiology, sacred tales, oracle texts.

GRK 5370. Greek Literature: Epic. (3 cr [max 9 cr]; Prereq–Grad student or #) Reading classical Greek epic.

GRK 5380. Greek Literature: Lyric. (3 cr [max 9 cr]; Prereq–Grad student or #) Selections from Greek lyric poets.

GRK 5390. Greek Literature: Romance. (3 cr [max 9 cr]; Prereq–Grad student or #) Selections from Hellenistic Romances of, e.g., Chariton, Longus.

GRK 5440. Greek Literature: Later Authors. (3 cr [max 9 cr]; Prereq–Grad student or #) Selected topics in later Greek literature, especially Byzantine prose.

GRK 5450. Greek Literature: Classical Authors. (3 cr [max 9 cr]; Prereq–Grad student or #) Selected topics in classical Greek literature. Topics specified in Class Schedule.

GRK 5621. Grk Paleography. (3 cr; Prereq–Grad student or #) Analysis of various hands used in Greek manuscripts with attention to date/provenance. History of transmission of Greek literature.

GRK 5715. Introduction to the Historical-Comparative Grammar of Greek and Latin. (3 cr; LAT 5715. Prereq–Grad student or #) Historical/comparative grammar of Greek/Latin from their Proto-Indo-European origins to classical norms.

GRK 5716. History of Greek. (3 cr; Prereq–Grad student or #) Reading and formal analysis of documents illustrating evolution of Greek language from Mycenaean to modern times.

GRK 5993. Directed Studies. (1-4 cr [max 18 cr]; Prereq–Grad student or #) Guided individual reading or study.

GRK 5994. Directed Research. (1-12 cr [max 18 cr]; Prereq–Grad student or #) Supervised original research on topic chosen by student.

GRK 5996. Directed Instruction. (1-12 cr [max 20 cr]; Prereq–Grad student or #) Supervised teaching internship.

GRK 8120. Greek Text Course. (3 cr [max 15 cr]; Prereq–3111 or Δ; not for students in dept of Classical and Near East Studies) Students attend 3xx Greek courses. Supplementary work at discretion of instructor.

GRK 8262. Survey of Greek Literature I. (3 cr) Extensive selections from all genres of Greek literature of archaic and early classical periods.

GRK 8263. Survey of Greek Literature II. (3 cr) Extensive selections from Greek authors of the classical and Hellenistic eras.

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

Health Informatics (HINF)

Department of Laboratory Medicine and Pathology

Medical School


HINF 5621. Grk Paleography. (3 cr; Prereq–Grad student or #) Analysis of various hands used in Greek manuscripts with attention to date/provenance. History of transmission of Greek literature.

HINF 5715. Introduction to the Historical-Comparative Grammar of Greek and Latin. (3 cr; LAT 5715. Prereq–Grad student or #) Historical/comparative grammar of Greek/Latin from their Proto-Indo-European origins to classical norms.

HINF 5716. History of Greek. (3 cr; Prereq–Grad student or #) Reading and formal analysis of documents illustrating evolution of Greek language from Mycenaean to modern times.

HINF 5993. Directed Studies. (1-4 cr [max 18 cr]; Prereq–Grad student or #) Guided individual reading or study.

HINF 5994. Directed Research. (1-12 cr [max 18 cr]; Prereq–Grad student or #) Supervised original research on topic chosen by student.

HINF 5996. Directed Instruction. (1-12 cr [max 20 cr]; Prereq–Grad student or #) Supervised teaching internship.

HINF 8120. Greek Text Course. (3 cr [max 15 cr]; Prereq–3111 or Δ; not for students in dept of Classical and Near East Studies) Students attend 3xx Greek courses. Supplementary work at discretion of instructor.

HINF 8262. Survey of Greek Literature I. (3 cr) Extensive selections from all genres of Greek literature of archaic and early classical periods.

HINF 8263. Survey of Greek Literature II. (3 cr) Extensive selections from Greek authors of the classical and Hellenistic eras.

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

HINF 8494. Research in Health Informatics. (3 cr; A-F or Aud. Prereq–Grad student or #) Directed research under faculty guidance.

HINF 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; A-F or Aud. Prereq–Grad student admitted before summer 2007; may register up to 4 times, up to 60 combined cr)

HINF 8770. Plan B Project. (4 cr; A-F or Aud. Prereq–Plan B MS student, + no credit toward PhD) Research project. Topic arranged between student and instructor. Written report required.

HINF 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer, 10 cr total required [Plan A only])

HINF 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)
Courses

HIST 5468. Social Change in Modern China. (3 cr; SEAS 3468, HIST 3468) Opium War and opening of Treaty Ports in 19th century; missionary activity and cultural influence; changes in education system; women’s movement; early industrialization and collectivization after 1949; industrialization of Taiwan; PRC’s entry into the world trading system.

HIST 5469. Historiographies of China, 1000-1700. (3 cr; A-F or Aud. Prereq–Grad student or #) Important recent English-language work on Chinese culture during the Song, Yuan, and Ming dynasties. Topics include religion, gender, family structures, ethnic identity, commerce/economics, and political structures/events.


HIST 5501. Medieval Europe and the World. (3 cr; A-F or Aud. Prereq–#) Place of medieval Europe in the world. Relations of Europe with Asia, Africa, and the Americas. European knowledge of the world’s other great cultures. European travelers/explorers. Assessment of other cultures’ knowledge of Europe in the period.

HIST 5505. Survey of the Middle East. (3 cr; Prereq–Grad or #) Peoples, lands, cultures of the Middle East, from earliest civilizations to present.

HIST 5520. Topics in Chinese History. (3 cr [max 12 cr]) Selected topics not covered in regular courses. Taught as staffing permits.

HIST 5541. Islam in the Catholic Age. (3 cr; Prereq–Grad or #) Rise of Islam in its Arabian setting. Roles of prophet, orthodox/Umayyad caliphs. Development of Islamic state/empire, organizations, institutions, status of Muslims/non-Muslims.

HIST 5547. The Ottoman Empire. (3 cr; Prereq–Grad student or #) Founding of Ottoman society/state to empire, 1300 to end of empire in 1920. Lands, institutions, peoples, legacy. Impact on Europe.

HIST 5611. Proseminar in Medieval History. (3 cr; A-F or Aud. Prereq–Grad student or #) Basic scholarly bibliography for medieval Western European history during early Middle Ages. Foundation for teaching courses in medieval history, preparing for general doctoral exam.

HIST 5612. Proseminar in Medieval History. (3 cr; A-F or Aud. Prereq–[5611, grad student] or #) Basic scholarly bibliography for medieval Western European history during central/late Middle Ages. Foundation for teaching courses in medieval history, preparing for general doctoral exam.

HIST 5614. The Medieval Church. (3 cr; Prereq–Grad student or #) Introduction to history of western church in Middle Ages. Emphasizes church teachings and institutional structures, beliefs/practices of lay people, medieval Christian encounter with non-Christian world.

HIST 5616. Proseminar in Medieval Spain. (3 cr; A-F or Aud. Prereq–#) Graduate research on the development of the medieval kingdoms of Spain from Roman times to ca. 1500. Emphasis on major social, economic, and cultural developments. Christian, Jewish, and Muslim interaction. Spain and the beginnings of European expansion.

HIST 5617. Spain in the Early Modern Period: 1492-1814. (3 cr; A-F) Historiography, documents, and archives of early modern Spain analyzed. Includes reading in modern English and Spanish and practical experience with Spanish manuscript documents from the period.

HIST 5621. Proseminar: The French Revolution. (3 cr; A-F or Aud. Prereq–Grad student or #) Historical literature about French Revolution of 1789. Old Regime political culture. Enlightenment, origins of the revolution, revolutionaries’ transformations in society, politics/culture both in France and abroad, the Terror, Napoleon, revolutionary legacy.

HIST 5631. Proseminar: Comparative Early Modern History. (3 cr; A-F or Aud. Prereq–Hist grad or #) Critical reading of historical literature dealing with integration of the globe during the early modern period, ca. 1350-1750; book reports, class discussion.

HIST 5632. World History Proseminar. (3 cr; A-F or Aud. Prereq–#) Theoretical approaches to world/global history. Review of major theories, controversies, chronologies, pedagogical approaches.


HIST 5649. Ideas in Context: Making Early Modern Knowledge, 1500-1800. (3 cr; A-F or Aud. Prereq–Grad student or #) Role of institutions/local in development of early-modern European thought/culture. University, academy, learned society, princely court, museum, printing house, workshop, trading company, armies/navies, state bureaucracies, salons, other independent associations of nascent civil society.

HIST 5650. Proseminar: Early Modern Europe. (3 cr; A-F or Aud. Prereq–Hist grad or #) Critical reading of historical literature for early modern Europe, 1450-1700, dealing with France, Germany, Italy, the Low Countries, and Spain. Each student chooses a country to focus on; book reports, class discussion.

HIST 5651. Proseminar in Tudor England: 1485-1603. (3 cr; A-F or Aud. Prereq–#) A critical study of principal writings about English history during the Tudor and Stuart periods.

HIST 5652. Proseminar in Stuart England: 1603-1689. (3 cr; A-F or Aud. Prereq–#) Critical study of principal writings about English history.

HIST 5671. Proseminar: Modern Britain. (3 cr; A-F or Aud. Prereq–#) Critical study of major writings in British history, 1760-1945, and preparation for research in field.

HIST 5715. Readings in European Women’s History: 1450-1750. (3 cr; A-F or Aud. Prereq–#) Introduction to current historical research on European women’s history, 1450-1750. Topics include gender roles and form of family structure, women’s participation in religious movements, legal status of women.

HIST 5720. Society/Politics: Modern Europe. (3 cr [max 6 cr]; A-F or Aud. Prereq–Grad or #) Introduction to literature in English on problems of modern European social, cultural, political history. Thematic/geographic focus varies year to year. Topics include historical approaches to class/gender relations, state formation as social/political process, family history, evolution of public life, popular culture.

HIST 5721. Contemporary Europe From the Late 19th Century to the Beginning of the Cold War. 1880-1950. (3 cr; Hist 3721. Prereq–previous coursework in 19th- and/or 20th-century Europe, #) The historical literature and debates surrounding major issues in the social, political, cultural, and economic development of Europe from the turn of the century through the impact of WWII. Topics include the development of imperialism, national rivalries, social and political conflict, the rise of fascism and communism, and the origins of war.


HIST 5740. Topics in Modern German History. (3-4 cr [max 12 cr]; A-F or Aud. Prereq–#) Readings and discussions on some central questions concerning the history of Germany during the modern period with a particular emphasis on the relationship between social change and political development. Offers vary in thematic and chronological focus.

HIST 5761. Proseminar—Imperial Russia.. (3 cr; Prereq—knowledge of Russian or German or French) Western and Russian historiography on crucial issues of imperial Russia. Political institutions; culture and society; modernization and reforms; new interpretations.

HIST 5762. Proseminar in 20th Century Russia. (3 cr; Prereq—5761, knowledge of Russian or German or French) Western and Russian historiography on crucial issues of 20th-century Russia. The nature of revolutions, debate over the evolution of the Soviet regime, the collapse of empires, new interpretations.

HIST 5777. Proseminar in Habsburg Central Europe. (3 cr; Prereq–#) Central Europe under Habsburg rule from the reforms of Maria Theresa to imperial collapse. Continuity and change in society; economic and administrative modernization; the rise of national consciousness and anti-Semitism; politics and culture in the Fin de Siecle; the Empire and World War I.

HIST 5794. Proseminar in European Economic History. (3 cr; Prereq–#) Europe’s rise in the world economy; England’s industrial revolution and uneven development in Europe; imperialism and World War I; the Great Depression; the post-1945 economic miracle; continuity and change in Eastern Europe.


HIST 5801. Seminar in Early American History. (3 cr; A-F or Aud. Prereq–#) Introduction to the literature of early American history. Readings selected from some of the best scholarship in the field, the questions that now hold the attention of colonial historians, and the theories, methods, and sources they use in pursuit of those questions.


HIST 5821. American History in the Twentieth Century. (3 cr [max 4 cr]; A-F or Aud. Prereq—Grad student, #) Intensive readings seminar.

HIST 5841. Proseminar in American Economic History. (3 cr; A-F or Aud. Prereq—#) Historical literature on American economic and business history from American Revolution to the modern economy.

HIST 5844. U.S. Labor History. (3 cr) Readings in classic and recent approaches to the history of the working class in the United States. Central topics include slavery and free labor, women’s paid and unpaid labor, management strategy, labor protest, and trade union organization.

HIST 5845. History of American Capitalism. (3 cr; A-F or Aud. Prereq—Grad student or #) Historiography/history of American capitalism. Crucial events (e.g., market “revolution,” development of industrial capitalism) focus weekly discussions of new literature. Students analyze theoretical models of capitalism and new work in social, political, and economic history.

HIST 5857. Proseminar: Readings in the History of American Women. (3 cr; Prereq—#) An intensive graduate-level readings course. Survey selected significant topics in historical literature, conceptual frameworks, and methodological problems in the history of American women from 1600 to the present.

HIST 5861. History of American Immigration. (3 cr; A-F or Aud. Prereq—#) Readings in historical literature on immigration to the United States. Emphasis on recent works distinguished by new research methodologies and interpretations. Each student undertakes an independent reading and/or research project.


HIST 5871. Readings in U.S. Intellectual History: 19th–20th Centuries. (3 cr; Prereq—#) Definitions of American national identity from 1789 to the present as expressed in politics, religion, literature, painting, music, architecture, and history.

HIST 5877. Asian American History. (3 cr; A-F or Aud. Prereq—#) Introduction to key issues, theoretical frameworks, research, and methodologies of Asian American history. Seminar texts that defined the field. Recent scholarship in history and in related disciplines. Emphasis field’s comparative/transnational linkages to ethnic studies, Asian studies, and the Americas.

HIST 5881. American Foreign Relations to 1895. (3 cr; Prereq—#) Intensive readings in the historiography of American foreign relations with emphasis on American imperialism, domestic courses of foreign policy, and international political, economic, and cultural relations.

HIST 5882. American Foreign Relations Since 1895. (4 cr; Prereq—#) Intensive readings in the historiography of American foreign relations with emphasis on American imperialism, domestic courses of foreign policy, and international political, economic, and cultural relations.
HIST 8239. Readings in Gender, Race, Class, and/or Ethnicity in the United States. (3 cr; A-F or Aud. Prereq—#) Dynamics of gender, racial, class, and ethnic relations in U.S. history; intersections of these forces.

HIST 8240. Topics in Research in Gender, Race, Class, or Ethnicity in the United States. (3 cr [max 6 cr]; A-F or Aud. Prereq—#) Dynamics of gender, racial, class, and ethnic relations in U.S. history. Intersections of these forces. Topics vary by instructor.

HIST 8245. Race, Nation, and Genocides. (3 cr; A-F or Aud) Theoretical literature on genocides and human rights. Historical case studies of genocides. Readings/discussions on meaning of “genocide” and its codification in international law. Theoretical literature on race/nation. Historical cases, primarily in 20th century (e.g., Armenian genocide, the Holocaust, Rwanda, former Yugoslavia). Students choose specific case to research.

HIST 8333. FTE: Master’s. (1 cr. No grade. Prereq—Master’s student, adviser and DGS consent)

HIST 8390. Research in American Indian History. (3 cr; A-F or Aud. Prereq—#) Research and writing skills in American Indian history. With instructor and other participants, students identify their research questions, locate sources with which to answer these questions, conduct original research, and produce a substantial research paper.


HIST 8444. FTE: Doctoral. (1 cr. No grade. Prereq—Doctoral student, adviser and DGS consent)

HIST 8464. Research in Yuan, Ming, and Qing History. (3 cr; A-F or Aud. Prereq—Good working knowledge of classical Chinese, background in history of late imperial China) Basic skills and resources for doing research in history of late imperial China. Bibliographic exercises; reading and translating primary documents.

HIST 8465. Research in Yuan, Ming, and Qing History. (3 cr; A-F or Aud. Prereq—Good working knowledge of classical Chinese, background in history of late imperial China) Basic skills and resources for doing research in history of late imperial China. Students select, translate, and annotate texts appropriate to their research interests and write a research paper centering on these texts.

HIST 8630. Seminar in World History. (3 cr; A-F or Aud. Prereq—#) Critical examination of historical literature dealing with theoretical approaches to world history and teaching of world history.

HIST 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq—Doctoral student who has not passed preliminary oral; no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

HIST 8709. Seminar: History of Sexuality. (3 cr; A-F or Aud) Theories of sexuality (by, e.g., Foucault, Butler, deLauriets), their application in history. Topics may include: feminist critique of Foucault and the classics, psychoanalytic approaches to religious transformations such as the Reformation, varying forms of gender transgression, sexuality in colonial encounters, operation of sexual metaphors in political conflict, and AIDS and the writing of history.

HIST 8715. Research on European Women’s History, 1450-1750. (3 cr; Prereq—5715) Research techniques for completing a major research paper based on primary sources.

HIST 8720. Research Seminar on Central European History. (1-4 cr [max 16 cr]; A-F or Aud) Broad research theme/problem: in most cases preparation for dissertation. Students identify primary/secondary sources, conduct research, write paper, and read/comment upon each other’s drafts. Geographic focus varies with instructor; may include Germany or lands of former Habsburg Austrian empire.

HIST 8770. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq—Max 18 cr per semester or summer; 10 cr total required [Plan A only])

HIST 8857. Seminar: Research in the History of American Women. (3 cr; A-F or Aud. Prereq—5857, #) Students define a historical problem or area of research on a topic in American women’s history; they would like to pursue in depth, identify appropriate sources and accomplish research in primary and secondary sources, write a 25-35 page scholarly article, and read and comment upon each other’s drafts.

HIST 8858. Research in Early American History. (3 cr; A-F or Aud. Prereq—5850 or #) Research and writing skills. With instructor and other participants, students identify their research questions, locate the sources with which to answer these questions, conduct original research, and produce a substantial research paper.

HIST 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

HIST 8900. Topics in European/Medieval History. (1-4 cr [max 16 cr]; A-F or Aud) Topics not covered in regular courses.

HIST 8910. Topics in U.S. History. (1-4 cr [max 16 cr]; A-F or Aud) Topics not covered in regular courses.

HIST 8920. Topics in African History. (1-4 cr [max 16 cr]; A-F or Aud) Topics not covered in regular courses.

HIST 8930. Topics in Ancient History. (1-4 cr [max 16 cr]; A-F or Aud) Topics not covered in regular courses.

HIST 8940. Topics in Asian History. (1-4 cr [max 16 cr]; A-F or Aud) Topics not covered in regular courses.

HIST 8944. Research Seminar: New Directions in African Social History. (3 cr; A-F or Aud. Prereq—#) First of two-part course. Radical transformation in field of African social history during past two decades. Students select major research topic and begin preliminary investigation.

HIST 8945. Research Seminar: New Directions in African Social History II. (3 cr; S-N or Aud. Prereq—8944, #) Second of two-part course. Students conceptualize and write major research paper.

HIST 8950. Topics in Latin American History. (1-4 cr [max 16 cr]; A-F or Aud) Topics not covered in regular courses.

HIST 8960. Topics in History. (1-4 cr [max 16 cr]; A-F or Aud) Topics not covered in regular courses.

HIST 8961. Research Seminar: Intellectual History. (3 cr; A-F or Aud. Prereq—#) Approaches/methods. Readings on or exemplifying intellectual history. Intellectual history as something broader than history of philosophical thought: a set of approaches of broad cross-disciplinary applicability. Each student prepares a research paper on a topic of intellectual history and present it to class for critique.

HIST 8990. Topics in Comparative History-Research. (3 cr; A-F or Aud. Prereq—#) Topics vary. Students read/discuss historical works from different geographic areas, develop proposals for comparative research, or pursue comparative research projects.

HIST 8993. Directed Study. (1-16 cr [max 16 cr]; A-F or Aud. Prereq—Grad student, #) Students work on tutorial basis. Guided individual reading or study.

HIST 8994. Directed Research. (1-16 cr [max 16 cr]; A-F or Aud. Prereq—#) Work on a tutorial basis.

**History of Medicine (HMED)**

**Medical School**

HMED 5002. Public Health Issues in Historical Perspective. (3 cr) Introduction to the evolution of major recurring problems and issues in public health including environment and health, food customs and nutrition, control of alcohol and drugs, venereal diseases and public policy, human resources regulation, and relationship of science to promotion of health.


HMED 5055. Women, Health, and History. (3 cr; Prereq—Grad student or [jr or sr] with prev coursework in hist or #) Women’s historical roles as healers, patients, research subjects, health activists. Biological determinism, reproduction, mental health, nursing, women physicians, public health reformers, alternative practitioners. Gender disparities in diagnosis, treatment, research, careers. Assignments allow students to explore individual interests.

HMED 5200. Early History of Medicine to 1700. (3 cr; A-F or Aud) An introductory survey of the history of medicine in Europe and America.

HMED 5201. History of Medicine from 1700 to 1900. (3 cr; Prereq—5200) An introductory survey of the history of medicine in Europe and America.

HMED 5210. Seminar: Theories and Methods in Medical History. (3 cr; A-F or Aud) Historiography of the history of medicine.

HMED 5211. Seminar: Theories and Methods in Medical History. (3 cr; A-F or Aud. Prereq—5210) Use of archives, primary sources. Supervised research project.

HMED 5940. Topics in the History of Medicine. (3-4 cr [max 16 cr]) Seminar on the historical relations between medicine and the State from the 18th to 20th centuries.

HMED 8112. Historiography of Science, Technology, and Medicine. (3 cr; A-F only. Prereq—#) Models of practice, different schools. Work of representative historians of science, technology, and medicine.

HMED 8113. Research Methods in the History of Science, Technology, and Medicine. (3 cr; A-F only. Prereq—#) Introduction to sources, methods, and problems of research in history of science, technology, and medicine. Preparation of major research paper under faculty supervision.

HMED 8220. Seminar: Current Topics in the History of Medicine. (3 cr [max 9 cr]; A-F or Aud. Prereq—#) Topics vary.

HMED 8333. FTE: Master’s. (1 cr. No grade. Prereq—Master’s student, adviser and DGS consent)

HMED 8444. FTE: Doctoral. (1 cr. No grade. Prereq—Doctoral student, adviser and DGS consent)
Courses

HMED 5631. Directed Study. (1-6 cr; max 12 cr; A-F or Aud. Prereq–#)
HMED 5632. Directed Study. (1-6 cr; max 12 cr; A-F or Aud. Prereq–#)
HMED 8666. Doctoral Pre-Thesis Credits. (1-6 cr; max 12 cr; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; 3 for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)
HMED 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])
HMED 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

History of Science and Technology (HSCI)

Department of History of Science and Technology

HSCI 5211. Biology and Culture in the 19th and 20th Centuries. (3 cr; §HSCI 3231) Changes of concepts of life and methods of biology; changing relationships between biology and the physical and social sciences; broader intellectual and cultural dimensions of developments in biology.


HSCI 5244. History of Ecology and Environmentalism. (3 cr; §HSCI 3244) Development of ecological thought from 18th century natural theology to contemporary ecology and conservation biology; changing views of “balance” and the “economy” of nature; conceptual and methodological developments in ecosystems ecology; connections between ecology and conservation, population and environmental politics.


HSCI 5401. Ethics in Science and Technology. (3 cr; §HSCI 3401) Historical issues involving ethics in science. Ethical problems posed by modern science/technology, including nuclear energy, chemical industry, and information technologies.


HSCI 5993. Directed Studies. (1-15 cr [max 15 cr]; Prereq–#) Guided individual reading or study.

HSCI 5994. Directed Research. (1-15 cr [max 15 cr]; Prereq–#)

HSCI 8111. Historiography of Science and Technology. (3 cr; S-N or Aud. Prereq–Grad HSci maj or #) Review of methods and historiography. Tools needed to perform creative work in the field. Models of historical practice, different schools of history, work of representative historians of science and technology.

HSCI 8112. Historiography of Science, Technology, and Medicine. (3 cr; A-F only) Models of practice, different schools. Work of representative historians of science, technology, and medicine.

HSCI 8113. Research Methods in the History of Science, Technology, and Medicine. (3 cr; A-F only §HSCI 8113) Introduction to sources, methods, and problems of research in history of science, technology, and medicine. Preparation of major research paper under faculty supervision.


HSCI 8125. Foundations for Research in the Scientific Revolution. (3 cr; A-F or Aud. Prereq–Grad HSci major or minor or #) Development of sciences/natural philosophy, 1500-1725.

HSCI 8131. Industrial Revolutions. (3 cr; A-F or Aud) Development of industrial society, from 1700 through 1850. Emphasizes developments in mechanical engineering sciences. Scientific, economic, political, and social dimensions of industrialization.

HSCI 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

HSCI 8421. Social and Cultural Studies of Science. (3 cr) Review of recent work; theoretical and methodological differences among practitioners; selected responses from historians and philosophers of science.

HSCI 8441. Women in Science: Historical Perspectives. (3 cr; Prereq–#) Key literature dealing with patterns of participation in science and medicine since the 18th century. The ways in which modern science is perceived to be gendered, particularly in its practice and in ways that seem to influence theory and applications.

HSCI 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

HSCI 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; 3 for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

HSCI 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

HSCI 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

HSCI 8900. Seminar: History of Early Physical Science. (3 cr; Prereq–#) For advanced graduate students; topics in development of natural and mathematical science before 1800.

HSCI 8910. Seminar: History of Modern Physical Sciences. (3 cr [max 6 cr]; Prereq–#) For advanced graduate students; topics in development of physical sciences since 1800.

HSCI 8920. Seminar: History of Biological Sciences. (3 cr; Prereq–#) For advanced graduate students; topics in development of natural, biological, and medical sciences from Aristotle to the present.

HSCI 8930. Seminar: History of Technology. (3 cr; Prereq–#) For advanced graduate students; topics in development of technology from ancient times to the present.

HSCI 8940. Seminar: History of Science and Technology in the Americas. (3 cr; Prereq–#) For advanced graduate students; topics in development of science and technology, emphasizing the United States and Canada.

HSCI 8950. Seminar: Science and Technology in Cultural Settings. (3 cr; Prereq–#) For advanced graduate students; topics in development of science and technology in or across specific geographic regions or particular cultures.

HSCI 8993. Directed Studies. (1-5 cr [max 15 cr]; Prereq–#)

HSCI 8994. Directed Research. (1-5 cr [max 15 cr])

Hmong (HMNG)

College of Liberal Arts

HMNG 5040. Readings in Hmong Texts. (2-4 cr [max 12 cr]; Prereq–1516 or 3022 with grade of at least B or #) Comprehensive, multidimensional overview of Hmong oral forms/traditions. Hmong legends, mythology, folk songs, birth, marriage/funeral rites. History, social/cultural anthropology. Values, life ways of traditional village society. Societal changes resulting from emigration to U.S.

Horticultural Science (HORT)

Department of Horticultural Science

College of Food, Agricultural and Natural Resource Sciences

HORT 5009. Pesticides in Horticulture: Their Use and Abuse. (3 cr; A-F or Aud. Prereq–[ENT 4015 or ENT 4251], PlPA 2001 or #) History of and practical information about pesticides used by horticulture industry. Pesticide modes of action. Use, application methods, environmental effects. Final three weeks devoted to labs on practical mixing/delivery systems.

HORT 5018. Landscape Operations and Management. (3 cr; Prereq–1001 or #) Business, managerial, and technical aspects of landscape management relative to environmental horticulture and green industry. Tasks associated with maintaining turf and woody/herbaceous plants in landscape. Relationship of those tasks to preparation/justification of labor, equipment, and supply budgets. Labs, demonstrations, hands-on experiences associated with science and technically-based landscape maintenance/operations.


HORT 5031. Sustainable Viticulture and Fruit Production. (2 cr; A-F or Aud. Prereq–[1001, 3050] or #) Principles of fruit production. Temperature fruit crops. Integrated management of fruit cropping systems, including site selection, cultural management practices, taxonomic classification, physiological/ environmental control of plant development. Writing.

For definitions of course numbers, abbreviations, and symbols, see page 169.
HORT 3032. Sustainable Commercial Vegetable Production Systems. (3 cr; A-F or Aud. Prereq—3005, ENT 3005, PLPA 2001, SOL 2125 or #) Principles of commercial vegetable production. Integrated management of vegetable cropping systems. Site selection/environment, seed/stand establishment, cultural management practices, commodity use, handling from harvest to market. Perspectives on types of vegetable cultivars. Origin, historical significance/ improvement through breeding, nutrition/medical aspects, physiological/environmental control of development.

HORT 5041W. Nursery Management. (4 cr; A-F or Aud. Prereq—[1001, 1015] or #) Production, maintenance, and marketing of woody ornamental plants. Establishment/management of nursery or garden centers. Lab, field trips.


HORT 5061. Turfgrass Science. (3 cr; Prereq—4061) For advanced students in turf with career objectives in professional turf management. Emphasis on ecology, physiology, and theory of turf population dynamics and specialized management situations such as golf course, commercial turf production, and fine turf athletic settings.

HORT 5071. Restoration and Reclamation Ecology. (3 cr; Prereq—BIOI 2002 or BIOL 3002, BIOL 1001 or BIOL 3407 or equiv or #) Ecological and physiological concepts as a basis for revegetation of grasslands, wetlands, forests, and other landscapes. Plant selection, land establishment, evaluating revegetation success. State and federal programs that administer restoration and reclamation projects. Field trips within Minnesota.

HORT 5090. Directed Studies. (1-6 cr [max 18 cr]; Prereq—8 cr upper div Hort courses, #) In-depth exploration of concepts, technology, materials, or programs in specific area to expand professional competency/self-confidence. Planning, organizing, implementing, and evaluating knowledge obtained from formal education and from experience.

HORT 8005. Supervised Classroom or Extension Teaching Experience. (2 cr; S-N in Aud. §AGRO 8005, BEE 8005, PLPA 8005, SOL 8005, Prereq—#) Classroom or extension teaching experience in one of the following departments: Agronomy and Plant Genetics; Biosystems and Agricultural Engineering; Horticultural Science; Plant Pathology; or Soil, Water, and Climate. Participation in discussions about effective teaching to strengthen skills and develop personal teaching philosophy.

HORT 8007. Extension Horticulture Practicum. (1-5 cr [max 5 cr]; Prereq—9 grad cr in ag or bio science) Selected activities that may include development of an extension fact sheet, assistance in Dial-U Clinic, or preparation of a workshop or short course.

HORT 8023. Evolution of Crop Plants. (2 cr; A-F or Aud. Prereq—[9 grad cr in ag or bio sciences]) Origin, distribution, and evolution of cultivated plants; implication of the evolution of technological processes on crop breeding for needs of people today.

HORT 8040. Horticultural Seminar. (1 cr [max 3 cr]; Prereq—Grad major in hort or applied plant sciences or hort or plant brdg or hort or plant path or soil or #) Reports and discussions of problems and investigational work.

HORT 8044. Manipulation of Plant Growth and Reproduction. (2 cr; Prereq—PBIO 5412) Impact of environmental and genetic factors on crop growth, development, and reproduction. Emphasis on whole plant physiology and plant response to the environment as determined by genotype and its manipulation for the purpose of producing a crop. Lectures, discussion of current literature, and projects.

HORT 8045. Plant Responses to Environmental Stresses. (3 cr; Prereq—BIOL 3021 or BIOC 4331, PBIO 5412) Examined from molecular to organismal levels.

HORT 8090. Graduate Horticultural Research. (1-12 cr [max 18 cr]; Prereq—#) Conduct literature, lab, and/or field research with horticultural plants and cropping systems.

HORT 8201. Plant Breeding Principles I. (3 cr; A-F or Aud. §AGRO 8201, Prereq—Stat 5301 or equiv) Principles and current methods involved in breeding agronomic and horticultural crops. Use of genotype/environment data to increase genetic gain, population improvement, parent building, alternative selection strategies, breeding for special traits, and new approaches. Introduction of a two-semester sequence including AGRO 8202.

HORT 8270. Graduate Seminar. (1 cr; A-F or Aud. §AGRO 8270. Prereq—Grad major in [hort or applied plant sciences or ent or agr or plant brdg or plant path or soil or #] or #) Reports/discussions on problems, investigation work.

HORT 8280. Current Topics in Applied Plant Sciences. (1 cr; S-N or Aud. Prereq—Grad major in [hort or applied plant sciences or ent or agr or plant brdg or plant path or soil or #] or #) Topics presented by faculty or visiting scientists.

HORT 8305. Physiological Ecology of Plants in Natural and Managed Ecosystems. (4 cr; A-F or Aud. §AGRO 8305. Prereq—BIOI 1009, BIOI 1201-1202, BIOI 3000) Introduction to plants and their reactions and responses in managed and natural ecosystems, including carbon and nitrogen allocation, root biology, microbial interaction, secondary metabolism, and plant response to biotic and abiotic stress.

HORT 8900. Advanced Discussions. (1-3 cr [max 12 cr]; S-N or Aud. §AGRO 8900, Prereq—#) Special workshops or courses in applied plant sciences.

Human Factors (HUMF)

School of Kinesiology

College of Education and Human Development


HUMF 5722. Human Factors Psychology. (3 cr; A-F or Aud. Prereq—Grad student or #) Psychological and sociological factors that underlie human interactions with technological systems. Techniques/methodologies to assess faulty/incorrect system design. Emphasizes human-centered approaches. Rigorous evaluation of human-machine interaction.


HUMF 8002. Proseminal in Human Factors/Ergonomics. (1 cr [max 2 cr]; A-F or Aud. Prereq—Enrollment in good standing, grad HumF minor) Issues and concerns tailored to interests of faculty and students regarding human factors/ergonomics, an interdisciplinary science concerned with interaction of performance and behavior with design factors in performance environment.

HUMF 8541. Decision Support Systems. (4 cr; A-F or Aud. §JE 8541. Prereq—Undergrad-level computer programming course or #; programming skills recommended) Students build a decision support system for a problem of their choice. How to identify appropriate problems. Styles of DSSs, evaluating their effectiveness.

Human Resource Development (HRD)

Work and Human Resource Education

College of Education and Human Development

HRD 5101. Foundations of Human Resource Development. (1 cr) Introduction to human resource development as a field of study and practice.

HRD 5102. Economic Foundation of Human Resource Development. (1 cr; Prereq—5101) Introduction to economics as a core discipline supporting the theory and practice of human resource development.

HRD 5103. Psychological Foundation of Human Resource Development. (1 cr; Prereq—5101) Introduction to psychology as a core discipline supporting the theory and practice of human resource development.

HRD 5104. Systems Foundation of Human Resource Development. (1 cr; Prereq—5101) Introduction to system theory as a core discipline supporting the theory and practice of human resource development.

HRD 5105. Strategic Planning through Human Resources. (3 cr; A-F or Aud. Prereq—5001 or 5101, 5102, 5103, 5104) The theory and practice of strategically developing, utilizing, and aligning human resources as a major contributor to organizational and quality improvement success.

HRD 5106. Evaluation in Human Resource Development. (3 cr; A-F or Aud) Evaluation of human resource development efforts from the perspective of impact on organizations, work processes, and individuals, plus follow-up decisions.

HRD 5111. Facilitation and Meeting Skills. (1 cr) Introduction to the disciplines of planning and running effective meetings. Tools and methods for meeting management and evaluation are presented within the context of organization development.

HRD 5196. Internship: Human Resource Development. (1-10 cr [max 10 cr]; S-N or Aud. Prereq—5001, 5201 or 5301) Students apply and contract for human resource development positions. Contracts describe specific HRD responsibilities to be fulfilled during internship and theory-to-practice learning outcomes.

HRD 5201. Training and Development of Human Resources. (3 cr; A-F or Aud) Training/development of human resources in organizations. Process phases of analysis, design, development, implementation, and evaluation.

HRD 5202. Training on the Internet. (3 cr) Major concepts, skills, and techniques for giving and receiving training on the Internet.

HRD 5301. Organization Development. (3 cr; A-F or Aud) Introduction to major concepts, skills, and techniques for organization development/change.
HRD 5302. Managing Work Teams in Business and Industry. (3 cr; A-F or Aud. Prereq–2 core courses in HRD) Frameworks and strategies for developing effective work teams. Skill development in facilitating resolution of conflicts in organizations. Provides foundational knowledge as well as practical applications for participants (upper-level and graduate students) to become small team leaders.

HRD 5405. Quality Improvement Through Human Resources. (3 cr; A-F or Aud. Prereq–[5201, 5301] or #) Quality management, productivity improvement theory/practice from a human resource perspective. Organization development/training as integral components of quality improvement. HR role within quality standards. History of quality improvement, contributions of major leaders.

HRD 5408. International Human Resource Development. (3 cr) Problems, practices, programs, theories, and methodologies in human resource development as practiced internationally.

HRD 5409. Planning and Decision-Making Skills. (1 cr) Introduction to the disciplines of planning and decision making typically used in process improvement interventions. Tools and methods for facilitating group decisions and problem solving.

HRD 5410. Survey of Research Methods and Emerging Research in Human Resource Development. (3 cr; A-F or Aud. Prereq–[Registered, in attendance] at conference of Academy of HRD) Role of research in HRD. Standards/criteria for evaluating research, critique of conference research papers, identification of emerging research themes. Offered in conjunction with the annual conference of Academy of HRD.

HRD 5496. International Field Study in Human Resource Development. (3 cr; Prereq–5001) Field study of the organization development, personnel training and development, career development, and quality improvement theories and practices in a selected nation.

HRD 5624. Sales Training. (3 cr; A-F or Aud) Strategies and techniques for developing effective sales people.

HRD 5625. Technical Skills Training. (3 cr) Analyzing technical skills training practices in business and industry. Systems and process analysis and trouble-shooting of work behavior; design methods and developing training materials.

HRD 5626. Customer Service Training. (3 cr; A-F or Aud) Overview of customer service strategies used by successful organizations and training practices used to develop customer-oriented personnel.

HRD 5627. Management and Supervisory Development. (3 cr) Problems, practices, programs, and methodologies relating to the training and development of managers and supervisors, including needed competencies, needs assessment, delivery modes, and evaluation.

HRD 5770. Special Topics in Human Resource Development. (1-4 cr [max 12 cr]) Issues, methods, and knowledge in HRD areas. Topics vary.


Human Resources and Industrial Relations (HRIR)

HRIR 5000. Topics in Human Resources and Industrial Relations. (2 cr) [max 8 cr]

HRIR 5021. Systems of Conflict and Dispute Resolution. (4 cr; Prereq–CSOM upper div undergrad major grad) Introduction to theoretical and practical treatment of conflict settlement in interpersonal, work-related, community, business, and international settings. Lectures, discussions, observations of actual dispute resolution sessions, and lab exercises with students participating in dispute resolution simulations applied to real world conflicts.

HRIR 5022. Managing Diversity. (2 cr; Prereq–CSOM upper div undergrad major grad) Ways to effectively manage increasingly diverse workforce. Human resource practices examined with respect to diversity. How to incorporate diversity into decision making to enhance organizational performance.

HRIR 5023. Employment and Labor Law for the HRIR Professional. (2 cr; A-F only. Prereq–[AT least 60 sem cr or 75 qtr cr], 2.00 GPA) Analysis of law and case law to work settings. Civil rights and equal opportunity. Discrimination and harassment. Compensation and benefits. Employee protection and privacy, labor relations. Emphasizes application and ability to recognize legal aspects of HRIR issues.

HRIR 5024. Employee Performance: Appraisal and Management. (2 cr; Prereq–CSOM upper div undergrad major grad) How employee performance is organized, appraised, and managed to achieve organizational/individual performance goals. Job design standards, employee appraisal systems, worker satisfaction.


HRIR 5026. Innovative HR Leadership in the Context of Change and Uncertainty. (2 cr; Prereq–[AT least 60 cr, 2.00 GPA] or grad student or Δ, grad majors must register A-F) Overview of leadership in managing human resources. Historical evolution. Major theories/models. Principles of effective HR leadership in practice. Effects of uncertainty/change on leadership style/practice. HR leadership as powerful management tool.


HRIR 5862. Personnel Economics. (2 cr; Prereq–ECON 1101, at least 60 sem cr, 2.00 GPA or HRIR grad major) Application of economic tools to problems in human resources and industrial relations. Human capital/training. Incentives, information. Hiring, turnover.

HRIR 5991. Independent Study in Human Resources and Industrial Relations. (1-8 cr [max 8 cr]; Prereq–A or Δ) Individual readings or research topics.

HRIR 8000. Graduate Topics in Human Resources and Industrial Relations. (1-8 cr [max 8 cr]; Prereq–[A or Δ, grad majors must enroll A-F only] Selected graduate topics of current relevance to human resource management and industrial relations.


HRIR 8011. Using Data and Metrics in Human Resources and Industrial Relations. (4 cr; Prereq–Grad HRIR major or Δ) Theory/applications of methods of data analysis for using data in HRIR decision-making. Descriptive/inferential statistics, especially hypothesis tests and confidence intervals. Regression analysis. Identification of appropriate techniques. Avoiding unreliable inferences. Introduction to HRIR metrics.

HRIR 8012. Applied Quantitative Methods in Human Resources and Industrial Relations. (2 cr; Prereq–Grad HRIR major or Δ, grad majors must enroll A-F only) Evaluation of applied statistical research in human resources and industrial relations. Appropriate statistical inferences/applications. Sampling issues, multiple regression, advanced topics.

HRIR 8013. Research Methods in Social and Labor Policy. (3 cr; A-F or Aud. IPA 8386, Prereq–8011, grad HRIR major or Δ, grad majors must enroll A-F only) Application of social science research methods to public policy issues.

HRIR 8014. Human Resource Information Systems. (2 cr; Prereq–Grad HRIR major or Δ grad majors must enroll A-F only) Hardware and database fundamentals, software applications, security issues, vendor evaluation, system and software development and design issues, and strategies for gaining user acceptance.

HRIR 8021. Introduction to Human Resources and Industrial Relations. (3 cr; HRIR 3021. Prereq–[3021; Econ 1101, Econ 1102, Psy 1001; grad HRIR majors or Δ grad majors may enroll A-F only]) Human resource management in contexts of labor markets and organizations. Valuing, employing, developing, motivating, and maintaining human resources in an industrial society. Staffing, training, and development; organizational behavior and theory; compensation and benefits; labor market analysis; and labor relations and collective bargaining.

HRIR 8022. Field Project. (4 cr; Prereq–[8011, 8031, 8041, 8051, 8061, 8071, grad HRIR major or Δ grad majors must register A/F; must have instructors consent to drop course) Teams formulate and execute study of actual business problem faced by business, non-profit, or governmental organization. Generally in Twin Cities.

HRIR 8023. International Human Resource Management. (2 cr; Prereq–MBA 6215 or grad HRIR major or Δ grad majors must enroll A-F only) Growing U.S. interdependence with rest of the world and its implications for human resource management policies and practices at home and abroad.

HRIR 8031. Staffing, Training, and Development. (4 cr; Prereq–Pay 1001, grad HRIR major or Δ grad majors must enroll A-F only) Introduction to staffing processes (recruitment, selection, promotion, demotion, transfer, dismissal, layoff, retirement); training development theory and techniques as mechanisms for influencing individual and organizational outcomes, such as performance, satisfaction, and climate.
Courses

HRIR 8032. Staffing and Selection: Strategic and Operative Concerns. (2 cr; Prereq–[8031, HRIR grad student] or Δ; HRIR grad students must register AF) Theory/practice related to staffing decisions (recruitment, selection, promotion, transfer, dismissal, layoff, reorganization). Legal environment in which staffing decisions are made. Staffing from strategic/organizational perspectives.

HRIR 8033. Employee Training: Creating a Learning Organization. (2 cr; Prereq–[8031, HRIR grad student] or Δ; HRIR grad students must register AF) Theory/practice related to design/implement employee training programs. Instructional design, training techniques, transfer of training, program evaluation/costing. Role of employees, firm policies/practices in training.

HRIR 8034. Employee Development: Creating a Competitive Advantage. (2 cr; Prereq–8031 or Δ, grad HRIR major or Δ; grad majors must enroll A-F only) Career development and planning, employee and management development techniques, and organizational and employee concerns related to mobility, job stress, balancing work and family, obsolescence and plateauing, and cross-cultural assignments.

HRIR 8041. Design and Management of Organizations. (4 cr; Prereq–Econ 1101, Econ 1102, Psy 1001 or Δ, grad HRIR major or Δ; grad majors must enroll A-F only) Introduction to micro through macro organizational issues at individual, dyadic, group, organizational, and environmental levels; their implications for organizational design, control, coordination, and development.

HRIR 8042. Organizational Structure and Performance. (2 cr; Prereq–8041 or Δ, grad HRIR major or Δ; grad majors must register AF) How different organizational practices (e.g., employee empowerment, job enrichment, profit sharing, employee stock ownership, individual incentives, information sharing, integration mechanisms) affect organizations in their competitiveness, profitability, workplace safety, employment stability, and wages. Coherence of system of organizational practices.

HRIR 8043. Comparative Organizations and HRM Systems. (2 cr; Prereq–8041 or Δ, grad HRIR major or Δ; grad majors must register AF) Variations in organizational practices related to variations in ownership (profit, nonprofit, government, cooperatives), economic systems, culture, technology, market structure, political practice, employee empowerment, job enrichment, profit sharing, employee stock ownership, individual incentives, information sharing, integration mechanisms, and international comparisons.

HRIR 8044. Motivation and Work Behavior in Contemporary Organizations. (2 cr; Prereq–8041 or Δ, grad HRIR major or Δ; grad majors must enroll A-F only) In-depth study of major topics in microlevel organizational behavior. Accountability, organization citizenship behaviors, forms of organizational attachment, motivation, and issues of equity and justice.

HRIR 8045. Organizational Development, HR Metrics, and the Balanced Scorecard. (2 cr; Prereq–[8041 or Δ, grad HRIR major or Δ) Nature/conduct of organizational change. Enhancing organizational effectiveness, improving quality of work life, increasing productivity, and facilitating problem research, practice relations, interventions, metrics, and scorecards. Intervention/evaluation strategies/processes. HR professional as consultant.

HRIR 8051. Compensation and Benefits. (4 cr; Prereq–Econ 1101, Econ 1102, Psy 1001 or Δ, grad HRIR major or Δ; grad majors must enroll A-F only) Economic and behavioral theory and research on pay program applications. Effect of laws and regulations on pay. Work design, job analysis, and job evaluation. Performance measurement and evaluation. Incentive programs. Managerial and executive compensation. Comparative perspectives. Costing and forecasting.

HRIR 8052. Compensation Theory and Applications. (2 cr; Prereq–8051 or Δ, grad HRIR major or Δ; grad majors must enroll A-F only) Relationship between economic and psychological theories and the design and operation of compensation programs. Determination of program compensation program outcomes. Statistical analysis applied to pay program design and administration. Global pay variations. Current pay issues and controversies.

HRIR 8053. Employer-Sponsored Employee Benefit Programs. (2 cr; Prereq–[8061 or Δ, grad HRIR major or Δ; grad majors must enroll A-F only) Design and administration of nonmandatory compensation benefit programs: medical expense insurance, pensions, profit sharing plans, disability, and other employee benefits. Effects of providing benefits on workers’ incentives with regard to performance, acquisition and maintenance of human capital, mobility, and risk sharing.

HRIR 8061. Introduction to Labor Market Analysis. (4 cr; Prereq–Econ 1101, Econ 1102 or Δ, grad HRIR major or Δ; grad majors must enroll A-F only) Labor supply and demand analysis, its international dimensions; determination of wages, employment and unemployment; accumulation of human capital; and investment in education and training; government regulation in areas of discrimination and workplace safety; role of unions in wage determination.

HRIR 8062. Human Resource Strategy and Planning. (2 cr; Prereq–8061 or Δ, grad HRIR major or Δ; grad majors must enroll A-F only) Case studies used to diagnose strategy.

HRIR 8063. Human Resources and Organizational Performance. (2 cr; Prereq–8061 or Δ, grad HRIR major or Δ; grad majors must enroll A-F only) Impact of human resource policies and practices on organizational productivity and effectiveness. Role of government, unions, and private sector institutions on organizational effectiveness.

HRIR 8064. Topics in Micro Labor Market Analysis. (2-4 cr [max 3 cr]; Prereq–8061 or Δ, grad HRIR PhD student or Δ; grad majors must enroll A-F only) May include micro aspects of unemployment, implicit contracts and efficiency wages, investment in human capital, occupational choice, job search, job matching and turnover, migration, labor force participation, and government program evaluation.

HRIR 8065. Topics in Macro Labor Market Analysis. (2-4 cr [max 3 cr]; Prereq–8061 or Δ, grad HRIR PhD student or Δ; grad majors must enroll A-F only) May include theories of unemployment based on sectoral shocks, theories of wage rigidity, efficiency wage theories, interindustry wage structure, role of labor market in resource allocation, and effects of government intervention in labor market.

HRIR 8071. Labor Relations and Collective Bargaining. (4 cr; Prereq–Econ 1101, Econ 1102 or Δ, grad HRIR major or Δ; grad majors must enroll A-F only) Evolution of U.S. labor unions and public policy, bargaining environment and structure, goals and negotiations, contract administration and results. International comparisons, labor-management cooperation, and newly emerging issues.

HRIR 8072. Labor Movements in a Changing World. (2 cr; Prereq–8071 or Δ, grad HRIR major or Δ; grad majors must enroll A-F only) Labor movement philosophies. Critical evaluation of labor movement growth and adjustment to environmental change. Domestic and international perspectives of labor movement innovations.

HRIR 8073. Dispute Resolution: Labor Arbitration. (2 cr; Prereq–8071 or Δ, grad HRIR major or Δ; grad majors must enroll A-F only) Arbitration to resolve grievances and impasses arising out of the collective bargaining agreement’s administration and termination. Arbitration law and legal issues, procedures and practices, case presentation, management rights, discipline and discharge, evidence, contract language interpretation, and remedies. Newly emerging approaches.

HRIR 8074. Labor-Management Negotiations. (2 cr; Prereq–8071 or Δ, grad HRIR major or Δ; grad majors must enroll A-F only) Analysis of the nature of negotiations with applications to private and public sector collective bargaining. Nature of conflicts and dilemma of competition and cooperation. Determinants of bargaining strategies, tactics, outcomes, and impasses. Newly emerging issues.

HRIR 8101. HRIR in Practice: Strategy, Execution, and Ethics. (2 cr; Prereq–[8031, 8031, 8051, 8071, 8141, 8241, HRIR grad major) Types of strategies. Developing/executing HRIR strategies. Project management. Ethical frameworks, issues, and considerations in HRIR.

HRIR 8102. Capstone Project. (2 cr; Prereq–[8001, 8011, 8031, 8051, 8071, 8141, 8241, grad HRIR major) Application of related knowledge, concepts, and methods to a practical problem in human resources and industrial relations. Benchmarking of related best practices in research and in practice. Full development, analysis, and proposed recommendations for implementation or improvement of the selected problem.

HRIR 8141. Organizational Theory Foundations of High-Impact HRIR. (2 cr; Prereq–[8001, HRIR MA student] or Δ) Economic aspects of individual/group behavior in organizations. Individual/collective rationality, information, incentives, coordination problems, contracts. Impacts on HRIR decisions/outcomes. Solutions/approaches to problems in organizations at micro/macro levels.


HRIR 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

HRIR 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

HRIR 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; Δ for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

HRIR 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer, 10 cr total required [Plan A only])

HRIR 8811. Advanced Quantitative Research Methods in Human Resources and Industrial Relations. (2-4 cr [max 3 cr]; Prereq–HRIR core or Δ, HRIR PhD student or Δ; grad majors must enroll A-F only) General linear model and its assumptions and violations; simultaneous equations; pooling cross-section and time series; limited qualitative dependent variable models; sample selection models; hazard models. Emphasizes application to human resources and industrial relations.

HRIR 8812. Seminar: Human Resources and Industrial Relations Research Methodology. (2-4 cr [max 8 cr]; Prereq–HRIR PhD student or Δ; grad majors must enroll A-F only)

HRIR 8871. Seminar: Higher Education: Human Resource and Industrial Relations. (2 cr [max 3 cr]; grad HRIR core or Δ, HRIR PhD student or Δ; grad majors must enroll A-F only) Application in research projects.
HRIR 8830. Seminar: Staffing, Training, and Development. (1-4 cr [max 8 cr]; Prereq–4831 OR 4 OR HRIR PhD student or A; grad majors must enroll A-F only)

Concepts, problems, and research.

HRIR 8840. Seminar: Organization Theory and Behavior. (1-4 cr [max 8 cr]; Prereq–8841 OR 4 OR HRIR PhD student or A; grad majors must enroll A-F only)

Application in human resources and industrial relations research/practice.

HRIR 8850. Seminar: Compensation and Reward. (1-4 cr [max 8 cr]; Prereq–8851 OR 4 OR HRIR PhD student or A; grad majors must enroll A-F only)

Relevant theoretical models; formulation of research into compensation and reward issues.

HRIR 8860. Seminar: Analysis of Current Labor Market Theory and Empirical Research. (1-4 cr [max 8 cr]; Prereq–8861 or 4; HRIR PhD student or A; grad majors must enroll A-F only)

Functions and operations of labor markets, theory, and research.

HRIR 8870. Seminar: Labor Relations and Collective Bargaining. (1-4 cr [max 8 cr]; Prereq–8871 OR 4 OR HRIR PhD student or A; grad majors must enroll A-F only)

Analysis of contemporary theoretical and empirical research.

HRIR 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

HRIR 8991. Independent Study in Human Resources and Industrial Relations. (1-8 cr [max 8 cr]; A-F or Aud. Prereq–#)

Individual readings and/or research projects.

Industrial Engineering (IE)

Department of Mechanical Engineering

Institute of Technology

IE 5080. Topics in Industrial Engineering. (1-4 cr [max 4 cr]; Prereq–Upper div or grad student)

Topics vary each semester.

IE 5111. Systems Engineering I. (2 cr; A-F or Aud. Prereq–IT upper div or grad student)

Overview of systems-level thinking/techniques in context of an integrated, design-oriented framework. Elements of systems engineering process, including lifecycle, concurrent, and global engineering. Framework for engineering large-scale, complex systems. How specific techniques fit into framework.

IE 5112. Introduction to Operations Research. (3 cr; A-F or Aud. Prereq–Math 2243 or Math 2373 or equiv; one semester of probability or statistics, (IT upper div or grad student))

Survey of Operations Research models/methods in deterministic/stochastic settings. Linear programming, integer programming, networks, forecasting, Markov chains, and queuing systems. Examples from various application areas, such as systems engineering, logistics, design, and project management.

IE 5113. Systems Engineering II. (4 cr; A-F or Aud. Prereq–5111, a course on basic probability. (IT upper div or grad student))

Systems engineering thinking/techniques presented in 5111. Hands-on techniques applied to specific problems. Topics pertinent to effectiveness of design process. Practices and organizational/ reward structure to support collaborative, globally distributed design team.

IE 5441. Engineering Cost Accounting and Cost Control. (4 cr; A-F or Aud)


IE 5511. Human Factors and Work Analysis. (4 cr; A-F or Aud; Prereq–Upper div OR grad student)


IE 5512. Applied Ergonomics. (4 cr; A-F or Aud. Prereq–Upper div OR grad student, 5511)

Small groups of students work on practical ergonomic problems in local industrial firms. Projects cover a variety of ergonomic issues: workstation design, equipment and tool design, back injuries and material handling, cumulative trauma disorders, illumination and noise, and safety.

IE 5513. Engineering Safety. (4 cr; A-F or Aud. Prereq–Upper div OR grad student)

Occupational, health, and product safety. Standards, laws, and regulations. Hazards and their engineering control, including general principles, tools and machines, mechanics and structures, electrical safety, materials handling, fire safety, and chemicals. Human behavior and safety, procedures and training, warnings and instructions.

IE 5522. Quality Engineering and Reliability. (4 cr; Prereq–[4521 or equiv]. upper div or grad student or CNR)

Quality engineering/management, economics of quality, statistical process control design of experiments, reliability, maintainability, availability.

IE 5531. Engineering Optimization I. (4 cr; Prereq–Upper div or grad student or CNR)

Linear programming, simplex method, duality theory, sensitivity analysis, interior point methods, integer programming, branch/ bound/dynamic programming. Emphasizes applications in production/logistics, including resource allocation, transportation, facility location, networks/flows, scheduling, production planning.

IE 5541. Project Management. (4 cr; Prereq–Upper div or grad student)

Introduction to engineering project management. Analytical methods of selecting, organizing, budgeting, scheduling, and controlling projects, including risk management, team leadership, and program management.

IE 5545. Decision Analysis. (4 cr; Prereq–4521 or equiv)

Normative theories of decision making. Emphasizes structuring of hard decision problems arising in business and public policy contexts. Decision trees, expected utility theory, screening prospects by dominance, assessment of subjective probability, multiple attribute utility, analytic hierarchy process, benchmarking with data envelopment analysis, basics of game theory.

IE 5551. Production Planning and Inventory Control. (4 cr; Prereq–CNR or upper div or grad student)

Inventory control, supply chain management, demand forecasting, capacity planning, aggregate production and material requirement planning, operations scheduling, and shop floor control. Quantitative models used to support decisions. Implications of emerging information technologies and of electronic commerce for supply chain management and factory operation.

IE 5552. Design and Analysis of Manufacturing Systems. (4 cr; Prereq–Upper div or grad student)

Flow lines, assembly systems, cellular manufacturing systems, and flexible manufacturing systems. Emphasis is on methodologies for modeling, analysis, and optimization. Lead time analysis, capacity and workload allocation, scheduling, and shop floor control, work-in-process management, facilities planning and layout, and information management.

IE 5553. Simulation. (4 cr; Prereq–Upper div or grad student; familiarity with probability/statistics recommended)

Discrete event simulation. Using integrated simulation/animation environment to create, analyze, and evaluate realistic models for various industry settings, including manufacturing/service operations and systems engineering. Experimental design for simulation. Selecting input distributions, evaluating simulation output.

IE 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

IE 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

IE 8531. Discrete Optimization. (1-4 cr [max 8 cr])


IE 8532. Stochastic Processes and Queuing Systems. (4 cr; Prereq–5521 or #)


IE 8533. Advanced Stochastic Processes and Queueing Systems. (4 cr; Prereq–5532 or #)


IE 8534. Advanced Topics in Operations Research. (1-4 cr [max 8 cr]; Prereq–5531, 5532)

Special topics determined by instructor. Examples include Markov decision processes, stochastic programming, integer/combinatorial optimization, and queuing networks.

IE 8538. Advanced Topics in Information Systems. (4 cr; A-F or Aud. Prereq–8541, college-level computer programming course)


IE 8541. Decision Support Systems. (4 cr; A-F or Aud. §HUMF 8541)

Decision Support Systems (DSSs) to assist people in making better decisions, interpreting complex information, and managing complex situations safely/effectively. Principles of human-centered design, cognitive engineering, and evaluation. Applications in projects of students’ own choosing.

IE 8552. Advanced Topics in Production, Inventory, and Distribution Systems. (4 cr [max 8 cr]; Prereq–5551)

Cutting edge research issues in production, inventory, and distribution systems. Topics vary: stochastic models of manufacturing systems, stochastic inventory theory, multi-echelon inventory systems and supply chains, supplier-retailer and supplier-manufacturer coordination, supplier and warehouse networks, business logistics, transportation.

IE 8666. Doctoral Pre-Thesis Credits. (1-8 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim)

IE 8773. Graduate Seminar. (1 cr; S-N or Aud. §HUMF 8773)

IE 8774. Graduate Seminar. (1 cr; S-N or Aud. Prereq–7773)

Recent developments.
Information and Decision Sciences (IDSC)

Department of Information and Decision Sciences

Curtis L. Carlson School of Management


IDSC 8511. Conceptual Topics and Research Methods in Information and Decision Sciences. (4 cr; Prereq—Business admin PhD student or #) Relationships to underlying disciplines; major research streams; seminal articles, survey literature, and major researchers. Provides framework for organizing knowledge about information and decision science.

IDSC 8521. System Development. (2 cr; Prereq—Business admin PhD student or #) Why it is hard to develop efficient/effective information systems, what can be done to improve situation. Defining efficiency/effectiveness in development process and in systems. Producing/evaluating artifacts (constructs, models, methods, tools) that enable more efficient/effective information systems to be developed.

IDSC 8711. Cognitive Science. (4 cr; Prereq—Business admin PhD student or #) Empirically based concepts of knowledge and reason, mental representation and conceptual systems that guide problem solving and decision making. Computational metaphor of mind drawn from psychology, computer science, linguistics, anthropology, and philosophy. Implications for understanding of knowledge work.

IDSC 8721. Behavioral Decision Theory. (2 cr [max 4 cr]; Prereq—Business admin PhD student or #; offered alt yrs) Traditional/current research. Major models/methodologies. Issues of preference, judgment, and choice under conditions of certainty/uncertainty. Seminar format.

IDSC 8722. Heuristic Decision Making. (2 cr; Prereq—Business Admin PhD student or #; offered alt yrs) How decisions are made, how knowledge is stored/used, how knowledge of variability/feedback influence decisions. Decisions at strategic, operational, individual level. Exceptional performance, pathologies of decision making. Basis for “best practice.” How knowledge is managed in decisions, decision failure. Folly, normal accidents, decision problems in which individuals manipulate information to influence/deceive others.

IDSC 8880. Research Seminar in Information and Decision Sciences. (4 cr [max 20 cr]; Prereq—Business admin PhD student or #) Topics, which vary by semester, are selected from new areas of research, research methods, and significant issues.

IDSC 8881. Research Seminar in Information and Decision Sciences. (2 cr [max 20 cr]; Prereq—Business Admin PhD student or #) New areas of research, research methods, issues.

IDSC 8892. Readings in Information and Decision Sciences. (1-8 cr [max 16 cr]; Prereq—Business Admin PhD student or #) Readings useful to a student’s individual program and objectives that are not available through regular courses.

IDSC 8894. Graduate Research in Information and Decision Sciences. (1-8 cr [max 16 cr]; Prereq—Business Admin PhD student or #) Individual research on an approved topic appropriate to student’s program and objectives.

Infrastructure Systems Engineering (ISE)

Center for the Development of Technological Leadership

Institute of Technology

ISE 5101. Project Management. (3 cr; A-F or Aud. Prereq—ISE student) Broad areas in project management and leadership. Emphasizes practical understanding of business/engineering project management. Project planning, scheduling, controlling. Budgeting, staffing, task/cost control. Communicating with, motivating, leading, and managing conflict among team members. Lectures, discussions, experiential exercises.


ISE 8105. Capstone Project. (1-2 cr [max 3 cr]; A-F or Aud. Prereq—ISE student) Integrates knowledge from courses in Master’s program with job experience. Students prepare proposal, conduct project, and report results in written and oral form. Project involves aspect of design, management, or operation of some feature of infrastructure.

ISE 8333. FTE: Master’s. (1 cr. No grade. Prereq—Master’s student, adviser approval, DGS approval)
Interpersonal Relationships Research (IREL)

College of Education and Human Development

IREL 8001. Proseminar in Interpersonal Relationships Research. (1 cr [max 2 cr]; S-N or Aud. Prereq–Grad Relm mnr)
Survey of major topics, including theoretical assumptions, methods, and samples of current research.

IREL 8021. Seminar: Statistical and Methodological Issues in Research on Dyadic Relationships. (2 cr; S-N or Aud. Prereq–Grad Relm mnr, #)
Survey of topics in design and analysis of research on behavior in two-person interactions.

IREL 8360. Seminar: Topics in Interpersonal Relationships Research. (1-3 cr [max 6 cr]; Prereq–Grad Relm mnr or #)
Intensive study of topics.

Italian (ITAL)

Department of French and Italian

College of Liberal Arts

ITAL 5201. Reading Italian Texts: Poetics, Rhetoric, Theory. (3 cr [max 12 cr]; Ital 3201. Prereq–Grad student or #)
Rhetorical/poetic aspects of language and literature. Interpretive methods, theoretical concepts.

ITAL 5203. Italian Travelers: From the Enlightenment to the Present. (3 cr [max 12 cr]; Ital 3203. Prereq–Grad student or #)
Literary representations of travel, migration, immigration, exile, and tourism in Italy, from Enlightenment to present.

ITAL 5209. Trecento Literature: Ruling the Canon. (4 cr [max 16 cr]; Prereq–3015, 3201 or #)
Works of Boccaccio and Petrarch and their role in establishing the canon of Italian vernacular literature. Taught in English also as MsSt 5610.

ITAL 5289. The Narrow Door: Women Writers and Feminist Practices in Italian Literature and Culture. (4 cr [max 16 cr]; Prereq–3015)
Focuses on issues of gender, sexual difference, equality, and emancipation raised by Italian women writers and thinkers from the 19th century to the present.

ITAL 5305. Staging the Self: Theater and Drama in Modern Italy. (4 cr [max 16 cr]; Ital 3205. Prereq–Grad student or #)
Theatrical representations of the self in modern Italy. Focuses on issues of identity, gender, and class in theatrical works ranging from Alfiieri’s Mirra, Pirandello’s Enrico IV to Dacia Maraini’s Cymbeline.

ITAL 5321. Italian Renaissance Epic. (4 cr [max 16 cr]; Prereq–3015, 3201 or #)
Study of the narrative poems of Boiardo, Ariosto, and Tasso in the context of the fashioning of early modern Europe.

ITAL 5337. Nation and Narration: Writings in the 19th Century. (4 cr [max 16 cr]; Prereq–3015)
Introduces the construction of modern Italian national identity by examining the role that literature plays in this process. Works by Manzoni, Foscolo, Leopardi, Gioia, Verga, Serao, and Deledda studied in the context of a range of sociopolitical and cultural issues.

ITAL 5401. Medio e Dente. (4 cr [max 16 cr]; Prereq–3015, 3201 or #)
Intensive reading of Dante’s Inferno, Purgatorio, and Vita Nuova with emphasis on Dante’s linguistic and cultural contributions.

ITAL 5502. Making of Modern Italy: From the Enlightenment to the Present. (3 cr [max 12 cr]; Ital 3502. Prereq–Grad student or #)
Italian literary, cultural, and symbolic practices, from Enlightenment to present.

ITAL 5550. Topics in 19th Century Italy. (3 cr [max 12 cr]; Prereq–3015 or #)
Explores the literature and culture of Italy in the 19th century. Content will vary depending on the instructor. Topics and readings may include literary, critical, cultural, historical, and/or social issues, a specific author, a genre, or other topics of interest for the period. Specific content will be posted in the department and listed in the Course Guide.

ITAL 5609. World of Dante. (4 cr [max 6 cr]
Taught in English. Intensive reading of Dante’s Inferno, Purgatorio, and Vita Nuova with emphasis on the personal, poetic, and political stakes of the journey of Dante’s pilgrim through hell to the earthly paradise.

ITAL 5640. Topics in Italian Studies. (3 cr [max 12 cr]; Prereq–Ital 3015)
Topics of interest in studies of Italian and/or Italian American culture of the 20th century. Topics and readings may include literary, critical, cultural, historical, and/or social issues, a specific author, a genre, or other topics. Content varies by instructor. Specific content posted in the department and in the Course Guide.

ITAL 5806. Negotiating the Terms: Italian Film and Literature. (3 cr [max 12 cr]; Ital 3806. Prereq–Grad student or #)
Cinematic representations of Italian literary texts. Basic tools of literary/film analysis. How both media impact Italian culture. Taught in English.

ITAL 5970. Directed Readings. (1-4 cr [max 16 cr]; Prereq–#)
Meets unique requirements decided on by faculty member and student. Individual contracts list contact hours, number of credits, written/other work required.

ITAL 6333. FTE: Masters. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

ITAL 6777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

ITAL 6892. Directed Readings. (1-4 cr [max 16 cr]; Prereq–#)
Requirements decided on by faculty member and student: contact hours, number of credits, written/other work.

Japanese (JPN)

Department of Asian Languages and Literatures

College of Liberal Arts

JPN 5040. Readings in Japanese Texts. (2-4 cr [max 12 cr]; A-F or Aud. Prereq–4041 or equiv or #)
Students read authentic materials of various types to increase reading/speaking ability. Topics specified in Class Schedule.

JPN 5071. Communicative Competence for Japan-Oriented Careers. (4 cr; Prereq–4041 or 4042 or #)
Effective communication using spoken and written Japanese in contexts likely to be encountered by a career-oriented professional in Japan.

JPN 5251. History of the Japanese Language. (4 cr; Prereq–3032, 5451 or #)
Development of Japanese grammar from classical to the modern language.

JPN 5593. Directed Studies in Japanese. (1-15 cr [max 15 cr]; Prereq–#)
Individual study with guidance of a faculty member.

JPN 6333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

JPN 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

JPN 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; a for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)
JOUR 5101. Advanced News Writing and Reporting. (3 cr; A-F or Aud. Prereq—JOUR 3004W or JOUR 4302, or approved IDIM major or ICP major or BIS major; ICP, IDIM sections are open to non-majors; prereq does not apply to ICP sections) Legal aspects of journalism as exemplified in, and influenced by, works of American/British writers past/present. Lectures, discussions, weekly papers, critiques.

JOUR 5566W. Literacy Aspects of Journalism. (3 cr; A-F or Aud. SEN&GW 5508. Prereq—Jour major or minor or approved IDM major or ICP major or BIS major; ICP, IDIM sections are open to non-majors; prereqs do not apply to ICP sections) Literacy aspects of journalism as exemplified in, and influenced by, works of American/British writers past/present. Lectures, discussions, weekly papers, critiques.

JOUR 5615. History of the Documentary. (3 cr; A-F or Aud. §JOUR 3615. Prereq—Non-Jour major or major with course appr on prog plan or pre-jour with adviser approval) Social history of photography, film, video. Informational, documentary, propaganda, and entertainment functions of visual communication. Rise/influence of visual media industries and of photo-image making.

JOUR 5725. Management of Media Organizations. (3 cr; A-F or Aud. Prereq—Non-Jour major or major with course appr on prog plan or pre-jour with adviser approval) Introduction to concepts/principles of media management. Strategic planning, leadership, organizational strategies, ethical/legal issues. Working in teams. Balance sheets, income statements. Motivating/promoting people.

JOUR 5771. Media Ethics: Principles and Practice. (3 cr; A-F or Aud. Prereq—Non-Jour major or major, course appr on prog plan or pre-jour, adviser approval. Connecting theoretical approaches to media ethics with real-life case studies. History of ethical standards in print, broadcast, photojournalism, public relations, and advertising. Making ethical judgments in complex situations.

JOUR 5777. Contemporary Problems in Freedom of Speech and Press. (3 cr; A-F or Aud. §JOUR 6030. Prereq—Jour major or minor or approved ICP major or BIS major) Legal/constitutional dimensions of the First Amendment, of press/speech. Emphasizes case law, statutes, judicial theories. Leading cases in privacy torts, prior restraints, news gathering/dissemination. Access to courts/government, including via the Internet. Legal-research techniques.

JOUR 5825. World Communication Systems. (3 cr; A-F or Aud. Prereq—Non-Jour major or major with course appr on prog plan or pre-jour with adviser approval) Mass media systems of world, described/analyzed regionally/nationally. Historical roots. Social, economic, cultural context. Contemporary conditions/prospects. Relevance of journalism/mass communication to international affairs.

JOUR 5990. Special Topics in Mass Communication: Professional. (3 cr [max 6 cr]; A-F or Aud. Prereq—Non-Jour major or approved ICP major or ICP major or BIS major) Professional-skills-learning opportunity not regularly offered. Topics specified in Class Schedule.

JOUR 5991. Special Topics in Mass Communication: Context. (3 cr [max 6 cr]; A-F or Aud. Prereq—Jour major or minor or approved ICP major or ICP major or BIS major) Special context topics not regularly offered. Topics specified in Class Schedule.

JOUR 5993. Directed Study. (1-3 cr [max 6 cr]; A-F or Aud. Prereq—Jour major or minor or approved ICP major or ICP major or BIS major, GPA of at least 3.00, A, A) Directed study/projects.


JOUR 8002. Studies in Mass Communication II. (3 cr; A-F or Aud. Prereq—8001) Literature on history of the field, cultural and humanistic approaches to its study, and legal and ethical questions.
Courses

JOUR 8003. The Changing Media Environment. (3 cr; A-F or Aud. Prereq—graduate student) Nonprofessional skills course. Prepares entering graduate students to work in the changing media environment, emphasizing its political, social, economic, legal, ethical and technological implications nationally and globally; students produce scholarly research about changing media.


JOUR 8192. Proseminar in Advanced Health Journalism. (3 cr; A-F or Aud. Prereq—Enrolled in MA in health journalism) Complex topics in health journalism (e.g., stem cells, biotech, complementary/alternative medicine, chronic illness management, drug industry, screening issues). How journalists have successfully covered these topics.

JOUR 8193. Directed Study: Health Journalism Capstone. (1-6 cr [max 4 cr]; A-F or Aud. Prereq—JOUR 8191, 5195, health journalism MA prog) Individual directed study, capstone course. Students prepare/present a final project that could be a publishable article that addresses an important health topic, an original research paper on a dimension of health/communications, or a multimedia production on a health issue/problem aimed at a particular audience.

JOUR 8195. Seminar: Online Media Creation and Design. (3 cr; A-F or Aud. §JOUR 5195H) Prereq—Health journalism MA grad student or #) Concepts/development of online media products. Health news and informational opportunities in new media.

JOUR 8200. Communication Strategy Research in Rapidly Changing and Complex Media Environments. (3 cr; A-F only. Prereq—Strat Comm MA grad major) Concepts, analytical techniques, and methods to analyze audiences, target markets, and social trends affecting communication strategy in context of complex and rapidly changing media environments.

JOUR 8201. Factors Affecting Communication Strategy. (3 cr; A-F only. Prereq—Strat Comm MA grad major) Literature/research identifying characteristics/analyses of the media and environmental, regulatory, competitive, and economic factors that affect the development of communication strategy.

JOUR 8202. Generation and Selection of Communication Strategies. (3 cr; A-F only. Prereq—Strat Comm MA grad major) Concepts/methods to support analytic/creative processes that lead to development of breakthrough communication strategies. Criteria for selecting among strategic alternatives.

JOUR 8203. Integration of Communication Strategies Across Media. (3 cr; A-F only. Prereq—JOUR 8200, 8201, 8202, strat comm MA grad major) Concepts, analytical techniques, and methodologies used to plan communication strategies and implement communication campaigns utilizing a diverse range of media.

JOUR 8204. Measuring the Effectiveness of Strategic Communication Campaigns. (3 cr; A-F only. Prereq—JOUR 8203, Strat Comm MA grad major) Examination, evaluation, and application of concepts/methods to evaluate effectiveness of strategic communication campaigns and their components.

JOUR 8205. Cases in Strategic Communication. (3 cr; A-F only. Prereq—JOUR 8203, strat comm MA grad major) Case study analysis concerning development, implementation, and evaluation of communication strategies. Cases cover broad range of organizations, focus on such issues as brand introduction, brand reinforcement, revitalizations, crisis communication, issues management, and legal/ethical considerations.

JOUR 8206. Directed Study: Development of an Integrated Strategic Communication Campaign. (3 cr [max 6 cr]; A-F only. Prereq—JOUR 8205, strat comm MA grad major) Project to develop a case study analysis concerning development, implementation, and evaluation of a strategic communication campaign.

JOUR 8317. Seminar: Visual Communication Research. (3 cr; A-F or Aud. Prereq—5316. [B801, 6302] or #) Theoretical approaches, analysis of research methods, development of research designs/projects.


JOUR 8502. Seminar: Multi-method research in Mass Communication. (3 cr; A-F or Aud. Prereq—JOUR 8501, [EPsy 5260 or equiv or EPsy 5260] Quantitative/qualitative research principles/techniques applied to mass communication and kindred questions. Reliability, generalizability, and validity in their classic/contemporary senses. Survey methods, focus groups, interviews, other methods. Emphasizes “triangulation” of diverse methods.


JOUR 8514. Seminar: Mass Communication Theory. (3 cr; A-F or Aud. Prereq—8001, 8002) Research paradigms, concepts, and findings for developing a general theory of mass communication.


JOUR 8620. Seminar: Advertising Research. (3 cr [max 12 cr]; A-F or Aud. Prereq—5251 or #) Advertising as persuasive communication. Current research/theory related to advertising decision-making process.

JOUR 8651. Seminar: Mass Media and Social Change. (3 cr; A-F or Aud. Prereq—8001 or 8002 or equiv) Interplay between social theories and media studies. Pragmatism, structural-functionalism, Marxism, political economy, cultural studies, globalization.


JOUR 8866. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to 4 times, up to 60 combined cr)

JOUR 8871. Seminar: Communication Ethics—Public/Civic Journalism. (3 cr; A-F or Aud) Historical underpinnings, philosophical debate, theoretical dynamics, legal concerns, ethical implications.


JOUR 8875. Seminar: Issues in Information Access and Communication. (3 cr; A-F or Aud) Societal, industry, technological, and policy aspects/developments that affect information access, particularly through mass media.


JOUR 8879. Seminar: Research Methods in Media Ethics and Law. (3 cr; A-F or Aud) Research at intersection of first amendment and media ethics.

JOUR 8881. Seminar: Media and Globalization. (3 cr; A-F or Aud. Prereq—4801 or 5825 or #) Main problems/currents. Concepts, research, policy relevant to global development. Issues of freedom/constraint, media technology, role of journalism in world affairs.

JOUR 8721. Seminar: Communication Agencies as Social Institutions. (3 cr; A-F or Aud) Influence/effects of mass communication, internal dynamics of media organizations, criticism/models of reform. Theoretical frameworks for analysis.

JOUR 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]) No grade. Prereq—Max 18 cr per semester or summer; 10 cr total required (Plan A only)

JOUR 8801. Seminar: Comparative Research in Mass Communication, a Cross-National Approach. (3 cr; A-F or Aud. Prereq—4801 or 5825) Comparative research designs/strategies. Analysis of production, presentation, transmission, and consumption of mass media products/services (particularly news, entertainment, and information) across national borders. Theoretical concerns, empirical problems, policy. Ethical issues involving research on form/content of mass communication within/between countries.

JOUR 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]) No grade. Prereq—Max 18 cr per semester or summer; 24 cr required

JOUR 8890. Special Problems in Mass Communication. (3-4 cr [max 12 cr]; A-F or Aud) Topics specified in Class Schedule.

JOUR 8993. Directed Study. (1-6 cr [max 6 cr]; A-F or Aud. Prereq—Grad comm mass comm major or minor, #, Δ) Directed study.
Courses

Kinesiology (KIN)

School of Kinesiology

College of Education and Human Development

KIN 5001. Foundations of Human Factors/Ergonomics. (3 cr; A-F or Aud. §HUMF 5001) Variability in human performance as influenced by interaction with designs of machines and tools, computers and software, complex technological systems, jobs and working conditions, organizations, and sociotechnical institutions. Emphasizes conceptual, empirical, practical aspects of human factors/ergonomic science.

KIN 5103. Development/Adapted Physical Education. (3 cr; A-F or Aud) Introduction to physical education for students with disabilities, emphasizing conceptual, organizational, and administrative issues. Topics include historical and legal foundations, service components, individualized education plans, professional roles, and assessment of movement skills.

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

KIN 5111. Sports Facilities. (3 cr; A-F or Aud. §REC 5111. KIN 5125) Steps in planning/building facilities for athletics, physical education, and sport for college, professional, and public use.

KIN 5115. Event Management in Sport. (3 cr; A-F or Aud. Prereq—Grad student) Techniques/principles of planning, funding, and managing sport events. Collegiate championships, non-profit events, benefits, professional events. Current issues in the broad field and subfields in kinesiology, or related coursework in areas not normally available through regular offerings.

KIN 5200. Special Topics in Kinesiology. (1-8 cr; max 8 cr) Prereq—Kin major or #) Introduction to financial the study of human movement. Development and emergence of the term kinesiology and the scholarly, political, and educational ramifications of its development.

KIN 5205. Advanced Electrocardiogram, Graded Exercise Testing, and Prescription. (3 cr; A-F or Aud. Prereq—KIN 5103 or KIN 5125) Exercise testing/prescription with modifications required because of special considerations associated with aging, gender differences, environmental conditions, or presence of medical conditions.

KIN 5212. Sport Psychology. (3 cr; A-F or Aud. Prereq—[3112 or equiv] or Aud. Prereq—Grad student) Cognitive, behavioral, and biological factors having important implications for competitive sport participants from early childhood through high school age. Emphasis on translating sport science research into practical implications for youth sport coaches, teachers, and administrators.

KIN 5371. Sport and Society. (3 cr; A-F or Aud. Prereq—KIN 5125, grad student) Theories/techniques in administration/management of sport enterprises. Organizational theory/policy, managerial methodologies to assess faulty/incorrect system interactions with technological systems. Techniques/methodologies to assess faulty/incorrect system interactions.

KIN 5375. Competitive Sport for Children and Youth. (3 cr) Psychological principles that underlie human interactions with technological systems. Techniques/methodologies to assess faulty/incorrect system interactions.

KIN 5385. Exercise for Disease Prevention and Management. (3 cr; A-F or Aud. Prereq—Undergrad [physiology or biology]) Exercise testing/prescription with modifications required because of special considerations associated with aging, gender differences, environmental conditions, or presence of medical conditions.

KIN 5421. Sport Finance. (3 cr; A-F or Aud. Prereq—Grad student) Introduction to financial aspects of sport. Cash flow statements, budgeting issues, traditional/innovative revenue producing strategies available to sport organizations. Discussion, practical analysis of current market.

KIN 5435. Advanced Theory and Techniques of Exercise Science. (3 cr; A-F or Aud. Prereq—[3385, 4385, Kin major]) Theoretical constructs, in-depth description of procedures used in exercise science research and clinical settings. Laboratory exercises, lectures.

KIN 5461. Foundations of Sport Management. (3 cr; A-F or Aud. Prereq—Kin or rec or postbac or grad student) Theories/techniques in administration/management of sport enterprises. Organizational theory/policy, practical examples of sport management strategies.


KIN 5505. Human-Centered Design—Principles and Applications. (2 cr; §KIN 3505) Application of design to meet human needs. Design of fabricated products, tools/machines, software/hardware interfaces, art/culture, living environments, and complex sociotechnical systems.
KIN 5941. Neural Basis of Movement. (3 cr; A-F or Aud. Prereq–3111, 3290 (10 cr or equiv); PHS 3051 or equiv) Overview of various neural subsystems involved in controlling human/primate sensorimotor behavior. Effects of brain lesions on overt behavior, possibilities for rehabilitation. Systems theory approach. Lectures, seminars, class presentations.

KIN 5981. Research Methodology in Kinesiology, Recreation, and Sport. (3 cr; A-F or Aud. §REC 5981. Prereq–3151 or equiv) Defines/reviews various types of research in exercise/sport science, physical education, and recreation studies. Qualitative research, field studies, and methods of introspection as alternative research strategies to traditional scientific paradigm.

KIN 5987. Professional Skills and Grant Writing for Health Sciences. (2 cr Prereq–Grad student) Introduction to structure/function of different organizations (e.g., NIH, AHA). Writing/reviewing grants/manuscripts. Preparing for a job in academia.


KIN 5995. Research Problems in Applied Kinesiology. (1-6 cr [max 6 cr]; A-F or Aud. Prereq–Grad or MEd student in KIN), §) Selected topics in physical activity/human performance.

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

KIN 8126. Seminar: Sport Psychology. (3 cr; A-F or Aud. Prereq–5126 or instr approval) Literature, theoretical constructs, research methodology, design. Focuses on student-selected topics/problems.

KIN 8128. Doctoral Sport Management Seminar. (3 cr; A-F or Aud only §REC 8128, Prereq–PhD student, §) Analysis of current literature, theoretical constructs, research methodology and design relative to sport management. Focuses on student-selected topics.

KIN 8132. Seminar: Motor Development. (3 cr; A-F or Aud. Prereq–4132 or equiv or §) Contemporary research literature focusing on motor skill development from before birth to senescence. Emphasizes interaction between physical, environmental, and performer constraints, and coordination/development of movement.

KIN 8135. Seminar: Motor Control and Learning. (3 cr [max 6 cr]; A-F or Aud. Prereq–4135 or equiv or §) Advanced reading and discussion of research on motor control, motor learning, and human performance.

KIN 8211. Perception and Action. (3 cr; Prereq–[CEHD or Psy] grad student or §) Survey of theory/research on use of perceptual information for control of action. Focuses on behavioral research on perceptual guidance of daily activities (e.g., standing, walking, driving). Perceptual control in context of expertise (e.g., sports). Perceptual-motor development.

KIN 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent) KIN 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent) KIN 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no grade credit for 1st/2nd registrations; up to 12 combined cr, A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr) KIN 8696. Internship: Applied Sport Psychology. (3-6 cr [max 6 cr]; S-N or Aud. Prereq–5126, §29, Kin PhD student, §) Supervised internship: emphasis on educational sport psychology approaches to athletic performance enhancement and psychological adjustment to sport injury.

KIN 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required (Plan A only)) KIN 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

KIN 8980. Graduate Research Seminar in Kinesiology. (1 cr [max 9 cr]; S-N or Aud. Prereq–Grad Kin major, §) Reporting and discussion of student and faculty research projects.

KIN 8995. Research Problems in Kinesiology. (1-9 cr [max 9 cr]; S-N or Aud. Prereq–Kin PhD student or §) Research Problems in Kinesiology

Laboratory Medicine and Pathology (LAMP)

Department of Laboratory Medicine and Pathology

Medical School


LAMP 5125. Chronobiology. (2-6 cr [max 6 cr]; O-N or Aud) How to interpret biologic time series and how to use them in practice as well as in designing chronobiology experiments. Chronobiologic procedures of data collection and analysis, interpretation of the output in clinical practice.

Landscape Architecture (LA)

Department of Landscape Architecture

College of Design

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

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

LA 5203. Ecological Dimensions of Space Making. (6 cr; A-F or Aud. Prereq–LA major or §; recommended for both BED and Grad students) Design studio exploration drawing on ecological, cultural, aesthetic and social context of the site and current development of design ideas responsive to ecological issues and human experience.

LA 5204. Landscape Ecology. (3 cr; Prereq–B.E.D. accelerated status or LA grad student or §) Relationships among spatial patterns, temporal patterns, ecological processes in landscape. Factors affecting landscape patterns, measurement of landscape pattern, material transport through landscape, effects of landscape pattern on population dynamics, landscape planning.

LA 5208. Perceiving/representing material environment. Sketching/drawing conventions, visual phenomena/forms.

LA 5301. Introduction to Landscape Architecture Drawing. (3 cr; LA 1301. Prereq–LA grad student or accelerated B.E.D. student) LA 5302. AutoCAD I. (3 cr; Prereq–B.E.D. major or LA grad or §; may not be taken for graduate credit) Basic concepts, tools, and techniques of computer-aided drawing. Introduction to current AutoCAD Release software. Strategies and techniques for producing dimensioned and annotated drawings. Introduction to 3-D drawing capabilities. Use of dimension variables, attributes, blocks, symbols, and creation of customized menus.

LA 5312. AutoCAD II. (3 cr; Prereq–Arch 5351 or LA 5351, B.E.D. major or LA grad or §; may not be taken for graduate credit) Intermediate concepts, tools, and techniques of computer-aided drawing with current AutoCAD Release software. Strategies and techniques for producing dimensioned and annotated drawing. Use of dimension variables, attributes, blocks, symbols, and creation of customized menus.

LA 5371. Computer Methods I. (1 cr; S-N or Aud. §ARCH 5371. Prereq–B.E.D. accelerated status or LA grad or §) Introduction to current techniques, programs, and new editions of computer programs, and their application to landscape architecture computing.

LA 5372. Computer Methods II. (1 cr; S-N or Aud. §ARCH 5372. Prereq–Arch/LA 5371, LA grad or §) Current techniques and computer programs, and their application to landscape architecture computing.

LA 5373. Computer Methods III. (3 cr; §ARCH 5373. Prereq–LA grad or §) Advanced techniques and computer programs, and their application to landscape architecture computing in design, theory, and technology.

LA 5400. Topics in Landscape Architecture, (1-3 cr [max 12 cr]; Prereq–B.E.D. accelerated status or LA grad or §) Current topics in landscape architecture. Taught by regular or visiting faculty in their areas of specialization.

LA 5401. Directed Studies in Emerging Areas of Landscape Architecture. (1-6 cr [max 12 cr]; Prereq–§) LA 5402. Directed Studies in Landscape Architecture History and Theory. (1-6 or [max 12 cr]; Prereq–§) Independent studies under the direction of landscape architecture faculty.

LA 5403. Directed Studies in Landscape Architecture Technology. (1-6 cr [max 12 cr]; Prereq–§) Independent studies under the direction of landscape architecture faculty.

LA 5404. Directed Studies in Landscape Architecture Design. (1-6 or [max 12 cr]; Prereq–§) Independent studies under the direction of landscape architecture faculty.

LA 5405. Interdisciplinary Studies in Landscape Architecture. (1-6 or [max 12 cr]; A-F or Aud. Prereq–§) Research, planning, or design projects. Topics vary.

LA 5406. Urban Design Journal. (3-4 cr [max 4 cr]; A-F or Aud. Prereq–Admitted to Denmark International Study Program co-sponsored by the University; given in Denmark) Methods and theories in urban design and human behavior. Students develop journal as tool for experiencing, analyzing, and recording the urban landscape, its fabric, spatial elements, and individual components, and for analyzing design solutions.

LA 5407. Landscape Architecture Studio. (3-4 cr [max 4 cr]; A-F or Aud. Prereq–Admitted to Denmark International Study Program co-sponsored by the University; given in Denmark) Individual and small-group projects focusing on urban issues; design process in Danish conditions; solutions based on knowledge of Danish problems in landscape and urban design and an understanding of how these problems are solved within Danish and European contexts.
Courses

LA 5406. Landscape Architecture, Architecture, and Planning. (3 cr; max 9 cr; A-F or Aud. Prereq—Admitted to Denmark International Study Program co-sponsored by the University; given in Denmark) Methods and theories in urban design and human behavior. Study of urban design journals as tool for experiencing, analyzing, and recording the urban landscape, its fabric, spatial elements, and individual components, and for analyzing design solutions.

LA 5413. Introduction to Landscape Architectural History. (3 cr; A-F or Aud. Prereq—One course in history at 1000 or higher) Introductory course examines the multiple roots of landscape architecture by examining the making of types of landscapes over time. Emphasis on ecological and environmental issues, and issues related to political, economic, and social contexts of landscape architectural works.

LA 5431. History of Landscape Architecture: Individual Influences. (3 cr; A-F or Aud) Assessment of influences of individuals on formation of the profession of landscape architecture from 1800 to present. Lectures, presentations, field trips, readings, papers, projects.

LA 5571. Landscape Construction: Landform Systems and Spatial Performance. (3 cr; A-F or Aud. Prereq—Accelerated BED student or LA grad student) Theory and professional applications of landform systems for design. Landform typology, representation methods, manipulation techniques, use of land survey data, earthwork construction issues. Spatial accommodation of vehicles in landscape architecture, including road design.

LA 5572. Plants in Design. (3 cr; A-F or Aud. Prereq—5201, 5203, plant identification course or) Design principles for using plants in landscape architecture. Cultural/ecological principles in design projects of various scales. Lectures, presentations, field trips, readings, projects.

LA 5573. Landscape Technology: Introduction to Geographical Information Systems. (3 cr; A-F or Aud. Prereq—jr or B.E.D. major or LA grad or #) GIS as an analytical tool to solve geographical problems of regional landscape design and resource management. Topics include application techniques, analytical procedures, data characteristics, data sources, input/output methods, and implementation.

LA 5574. Identification of Minnesota Flora. (3 cr; A-F or Aud. Prereq—BED accelerated status or LA grad student or #) Introduction to identification of approximately 500 plants commonly used by landscape architects and environmental designers in Minnesota. Students develop a working knowledge of over 250 plants. Focus on identification techniques, plant landscape associations, and issues of plants for use in standard landscape architectural settings. Regular field sessions.


LA 5721. Proseminar in Metropolitan Design. (3 cr; A-F or Aud. ARCH 5721. Prereq—[Arch 5711 or equiv.] enrolment in CMD prog or #) Reading seminar. Evolution of the contemporary city. Dynamics that created contemporary urban spatial patterns. Planning/design theories that have guided public interventions in the built environment. Thematic text, classroom discussions.

LA 5790. Special Topics in Metropolitan Design. (3 cr [max 6 cr]; A-F or Aud. ARCH 5790. Prereq—Enrollment in CMD prog or #)
Language, Teaching, and Technology (LGTT)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

LGTT 5010. Applications of Technology in Language Teaching. (3 cr)
Explore uses of technology in language teaching; theoretical background, demonstrations, and applications.

LGTT 5110. Technology in the Second Language Classroom. (2 cr; SGLT 5611)
Examine, evaluate, and use technology in language teaching. Theoretical background, demonstration, hands-on exploration.

LGTT 5710. Special Topics in Language Teaching and Technology. (1-3 cr [max 9 cr])
Examine, evaluate, apply specific area of technology to K–higher education, second/foreign language teaching/learning in classroom, independent study, distance education environments.

LGTT 5738. Web-based Second Language Instruction: Issues, Models, and Designs. (3 cr [max 6 cr])

Latin (LAT)

Department of Classical and Near Eastern Studies

College of Liberal Arts

LAT 5012. Latin Prose Composition. (3 cr; Prereq–Grad student or #)
Latin grammar, syntax, diction, and prose style. Graduated exercises in prose composition.

LAT 5032. Text Criticism. (3 cr; Prereq–Grad student or #)

LAT 5033. Epigraphy. (3 cr; Prereq–Grad student or #)
Practical/theoretical introduction to Latin epigraphy (study/interpretation of inscriptions). Reading/discuss of epigraphic texts. Focuses on their value as historical documents, as evidence for development of Latin language, and as literary texts.

LAT 5310. Latin Literature: History. (3 cr [max 12 cr]; Prereq–Grad student or #)
One or more authors.

LAT 5320. Latin Literature: Epistles and Essays. (3 cr [max 12 cr]; Prereq–Grad student or #)
One or more authors.

LAT 5330. Latin Literature: Oratory. (3 cr [max 12 cr]; Prereq–Grad student or #)
One or more authors.

LAT 5340. Latin Literature: Epic and Pastoral. (3 cr [max 12 cr]; Prereq–Grad student or #)
One or more authors.

LAT 5350. Latin Literature: Lyric and Elegiac Poetry. (3 cr [max 12 cr]; Prereq–Grad student or #)
One or more authors.

LAT 5360. Latin Literature: Latin Dramatists. (3 cr [max 12 cr]; Prereq–Grad student or #)
One or more authors.

LAT 5370. Latin Literature: Satire and the Novel. (3 cr [max 12 cr]; Prereq–Grad student or #)
One or more authors.

LAT 5380. Latin Literature: Legal Texts. (3 cr [max 12 cr]; Prereq–Grad student or #)
One or more authors.

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

LAT 5410. Latin of Late Antiquity. (3 cr [max 12 cr]; Prereq–Grad student or #)
Pagan/Christian Latin literature selected from authors of 3rd to 6th centuries AD. Topics specified in Class Schedule.

LAT 5420. Medieval Latin. (3 cr [max 12 cr]; Prereq–Grad student or #)
Literature from 6th to 15th centuries. Authors/genres vary. Topics specified in Class Schedule.

LAT 5621. Latin Paleography. (3 cr; Prereq–Grad student or #)
Analysis of various hands used in manuscripts of Latin authors, with attention to date/provenance. Transmission of ancient Latin literature.

LAT 5715. Introduction to the Historical-Comparative Grammar of Greek and Latin. (3 cr; §GNK 5715; Prereq–4 or 2 ycn greek)
Historical and comparative grammar of Greek and Latin from their Proto-Indo-European origins to the classical norms.

LAT 5717. History of Latin. (3 cr; Prereq–Grad student or #)
Reading/analysis of documents illustrating stylistic registers/evolution of Latin language, from its earliest attestations through Middle Ages.

LAT 5993. Directed Studies. (1-4 cr [max 18 cr]; Prereq–#; A-F or Aud.
Guided individual reading or study.

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

LAT 5996. Directed Instruction. (1-12 cr [max 20 cr]; Prereq–Grad student or #)
Supervised teaching internship.

LAT 8120. Latin Text Course. (3 cr [max 15 cr]; Prereq–#; not for students in dept of Classical and Lng East Studies)
Students attend 3xxx Latin courses. Supplementary work at discretion of instructor.

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

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

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

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

Linguistics (LING)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

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

LING 5005. Applications of Linguistics. (3 cr; Prereq–3001 or 3001H or 3011 or 5001 or #)
Relationships between linguistics and neighboring disciplines. Applications to practical fields such as lexicography, orthography, translation/interpreting, language planning, reading, language teaching, bilingual education, education of the deaf, and correction of language disorders. Computer applications, forensic applications. Topics vary.

LING 5101. Language Types and Linguistic Universals. (3 cr; Prereq–5201 or 5201H or 5001 or #)
Comparison of languages and language types. Cross-linguistic similarities/universals of language, their explanation.

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

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

LING 5201. Syntax I. (3 cr; Prereq–3001 or 3001H or 5001 or #)
Syntactic phenomena/constructions in various languages. Principles of grammar construction/evaluation. Syntactic theories as instruments of grammatical analysis.

LING 5202. Syntax II. (3 cr; Prereq–5201)
Foundation in modern syntactic theory. Syntactic phenomena in various languages. Emphasizes syntactic argumentation, development of constraints on grammar formalisms.

LING 5205. Semantics. (3 cr; Prereq–5201 or #)
Analysis of sentence meaning. Semantic properties. Relations such as analyticity, entailment, quantification, and generality. Philosophical background, formal techniques of semantic analysis, how sentence meaning depends on word meaning, syntax, and context. The role of semantics in grammatical theory.
Courses

LING 5206. Linguistic Pragmatics. (3 cr; Prereq–5201 or #)
The analysis of language phenomena in relation to beliefs and intentions of language users; speech act theory, conversational implicature, presupposition, information structure, relevance theory, discourse coherence.

LING 5301. Phonetics. (4 cr; §LING 3301. Prereq–3001 or 3001H or 5001 or 5001 or #)

LING 5302. Phonology I. (3 cr; Prereq–3001 or 3001H or 5001 or #)
Concepts/types of information needed for describing patterns in sounds of words, for all speakers of all human languages, including current theoretical frameworks. Extensive practice identifying/analyzing phonological patterns in words of a language.

LING 5303. Phonology II. (3 cr; Prereq–5302 or #)
Phonology of human languages. Preparation for reading papers in the literature and for doing research in phonology.

LING 5461. Conversation Analysis. (3 cr; §COMM 5461.
Prereq–3001 or 3001H or 5001 or #)
Discourse processes. Application of concepts through conversation analysis.

LING 5462. Field Research in Spoken Language. (3 cr; §COMM 5462.
Prereq–3001H or 5001 or #)
Transcribing and analyzing talk and movement related to talk. Applying concepts to recorded conversations.

LING 5501. Introduction to Language Acquisition. (3 cr; Prereq–3001 or 3001H or 5001 or #)
First/second language acquisition.

LING 5505. Introduction to Second Language Acquisition. (3 cr; Prereq–3001 or 5001)
Course on phonological/grammatical structure of a language.

LING 5601. Historical Linguistics. (3 cr; §LING 3601.
Prereq–3001 or 3011H or 5001)
Historical change in phonology, syntax, semantics, and lexicon. Linguistic reconstruction. Genetic relationship among languages.

LING 5701. Sociolinguistics. (3 cr; Prereq–3001 or 3001H or 3011 or 5001 or #)
Social determinants of linguistic diversity, variation, and change. Topics may include social and regional dialects, language-shift/register, code-switching, quantitative study of speech, linguistic/social inequality.

LING 5721. Bilingualism. (3 cr; Prereq–3001 or 3001H or 3011 or 5001 or #)

LING 5801. Introduction to Computational Linguistics. (3 cr; Prereq–3001 or 3001H or 3011 or 5001 or #; programming experience helpful)
Methods/Issues in computer understanding of natural language. Programming languages, their linguistic applications. Lab projects.

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

LING 5900. Topics in Linguistics. (1-4 cr [max 12 cr])
Topics vary. See Class Schedule.

LING 5931. Morphology and Syntax of Contemporary English. (3 cr; Prereq–3001 or 3001H or 5001 or #)
Linguistic analysis of word/sentence structure of contemporary English. Focuses on data from recorded/written texts.

LING 5932. Topics in the Structure of Modern English. (3 cr [max 12 cr]; Prereq–[3001 or 3001H or 5001], [5201 or 5301] or #)
Aspects of the morphology, syntax, or semantics/pragmatics of modern English. Emphasizes analysis of written or recorded texts. Topics vary.

LING 5993. Directed Study. (1-3 cr [max 10 cr]; Prereq–A, J)
Directed study for Linguistics.

LING 8005. Research Paper Workshop. (3 cr [max 12 cr]; S or Aud. Prereq–[5105, 5202, 5205, 5302] or #, grad ling major)
Workshop on research methodology/writing in Linguistics.

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

LING 8210. Seminar in Syntax. (3 cr [max 9 cr]; Prereq–5202, 5205 or #)
Current issues in syntactic theory. Topics vary.

LING 8220. Seminar in Semantics. (3 cr [max 9 cr]; Prereq–5202, 5205, 5302 or #)
Current issues in semantics. Topics vary.

LING 8221. Formal Semantics of Natural Language. (3 cr; A-F or Aud. §PHIL 8182. Prereq–Phil 5201 or #)
Truth-conditional model-theoretic semantics applied to treatment of opacity, intensionality, quantification, and related phenomena in natural language.

LING 8300. Topics in Phonetics and Phonology. (3 cr [max 9 cr]; Prereq–5303 or #)

LING 8320. Seminar in Phonology. (3 cr [max 9 cr]; Prereq–5303 or #)
Current issues in phonological theory. Topics vary.

LING 8333, LTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

LING 8444, LTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

LING 8500. Topics in Second Language Acquisition. (3 cr [max 9 cr]; Prereq–[5001, 5005])

LING 8531. Research Methods in Language Acquisition. (3 cr; Prereq–[5001, 5005])
Based on review of published research, students design and carry out their own studies, writing/presenting research reports at end of term. Focuses on first or second language acquisition, or both, depending on instructor.

LING 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; a for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

LING 8777. Thesis Credits: Masters. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

LING 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

LING 8900. Seminar: Topics in Linguistics. (3 cr [max 9 cr]; Prereq–#)
Topics vary. See Class Schedule.

LING 8920. Topics in Language and Cognition. (3 cr [max 6 cr]; Prereq–5001 or #)
Language-related issues in cognitive science from a linguistic perspective. Serves as elective for cognitive science minor, but only for linguistics nonmajors.

LING 8991. Independent Study. (1-4 cr [max 15 cr]; Prereq–#)
Independent Study

Logistics Management (LM)

Department of Marketing and Logistics Management

Curtis L. Carlson School of Management

LM 8892. Readings in Logistics Management. (1-8 cr [max 16 cr]; Prereq–Adviser consent or #)
Readings useful to student’s individual program or objectives that are not available in regular courses.

LM 8894. Graduate Research in Logistics Management. (1-8 cr [max 16 cr]; Prereq–Adviser consent or #)
Individual research on an approved topic appropriate to student’s program and objectives.

Management (MGMT)

Department of Strategic Management and Organization

Curtis L. Carlson School of Management

MGMT 5019. Business, Natural Environment, and Global Economy. (2 cr; A-F only. Prereq–MBA student)
Resource deployment policies that affect the natural environment. Sustainability. Local/global environmental threats, how government policies address these issues. Business strategies/practices that produce “win-win” outcomes.

MGMT 5480. Topics in Natural Resources. (3 cr; A-F Only)
Specific topic for each offering.

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

MGMT 8201. Foundations of Business, Government, and Society. (4 cr; Prereq–Business admin PhD student or #)
Considers works in political and legal philosophy, ethics, and economics.

MGMT 8202. Seminar in International Management. (4 cr; Prereq–Business admin PhD student or #)
Overview of the field of international management research.

MGMT 8204. Topics in BGS—. (2 cr; A-F or Aud. Prereq–PhD student or #)
Topics vary.

MGMT 8205. Topics in Business, Government, and Society II. (2 cr; A-F or Aud. Prereq–PhD student or #)
Topics vary.

MGMT 8301. Seminar in Organizational Behavior. (4 cr; Prereq–Business admin PhD student or #)
Major theories and current research on individual behavior and group processes in organizations from a macro perspective.

MGMT 8302. Seminar in Organizations Theory. (4 cr; Prereq–Business admin PhD student or #)
Major theories and current research on organizational and interorganizational topics from a macro perspective.

MGMT 8304. Topics in Organizations I. (2 cr; A-F or Aud. Prereq–PhD student or #)
Topics vary.

MGMT 8305. Topics in Organizations II. (2 cr; A-F or Aud. Prereq–PhD student or #)
Topics vary.

MGMT 8401. Seminar in Strategy Content. (4 cr; Prereq–Business admin PhD student or #)
Review of research in strategy formulation.

MGMT 8402. Seminar in Strategy Process. (4 cr; Prereq–Business admin PhD student or #)
Examines research on process by which strategy is formulated and implemented in firms.

MGMT 8403. Strategy Seminar. (4 cr; Prereq–Business admin PhD student or #)
Strategic management. Topics vary.
Management of Technology (MOT)

Institute of Technology

MOT 5991. MOT Independent Study. (1-3 cr; S-N or Aud. Prereq–MOT grad student) Independent study in MOT-related topic.


MOT 8211. Managing Organizations in a Technological Environment. (2 cr; A-F or Aud. Prereq–Grad MOT major) General management principles for organizations, people, and business systems in technology-intensive industries. Application of managerial approaches to project, business, and corporate levels of organizations and to demands of entrepreneurial/established technology firms.


MOT 8133. Communication in a Technical Environment. (2 cr; A-F or Aud. Prereq–Grad MOT major) Oral and written communication. Introductory and specialized workshops. Bringing topics such as presentation skills, memo and report writing, listening skills, and visual aid design and integration.


MOT 8213. Macroevironment of Technology. (2 cr; A-F or Aud. Prereq–Grad MOT major) Development of scenarios of anticipated social, political, governmental, and economic changes affecting technological change. Use of scenarios to respond to industry threats, opportunities, and uncertainties. Corporate strategies, including building alliances for global competitiveness.

MOT 8214. Technology Foresight and Forecasting. (2 cr; A-F only. Prereq–Grad MOT major) Tools/techniques for technology forecasting, assessment, and strategic foresight for decision making in business/government. Technology dynamics, R&D strategy, portfolio management, resource allocation.


MOT 8224. Pivotal Technologies. (2 cr; A-F or Aud. Prereq–Grad MOT major) Technologies expected to play pivotal roles in future industrial development of the 21st century. Technological barriers/obstacles for commercialization. Guest expert lectures. Students analyze potential applications of technologies to industry.

MOT 8231. Managing Information Resources in Technology-based Organizations. (1 cr; A-F or Aud. Prereq–Grad MOT major) Managing information resources/technology in an organization where technology is a critical part of value chain. Database management systems, electronic commerce. Managerial issues: strategic planning for IT/IS, infrastructure, outsourcing, competitive value, implementation.

MOT 8232. Managing Technological Innovation. (2 cr; A-F or Aud) How technological innovation is important to business success, can be managed, and may drive business strategy. Organizational dynamics of innovation, how it may be encouraged, and leveraging innovations to marketplace in existing businesses and new ventures.


MOT 8234. Capstone Project. (0.5-2 cr; max 2 cr; A-F or Aud. Prereq–Completion of two semesters, grad MOT major) Applied research activity, specifically related to management of technology, in cooperation with participant’s home organization. Working with a faculty adviser and work mentor, students address an industry-based research project/technology project/venture, process, or challenge. Formal presentation to capstone committee is required.

MOT 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)


MOT 8930. Topics in Emerging Technologies. (1-8 cr; max 16 cr; Prereq–Grad MOT major) Prereq–Grad MOT major) Invited speakers give half- or full-day seminars on emerging technologies (e.g., energy systems, tissue engineering, thermal spray coatings, etc.). Cross-reference: MCOM 5570.

MOT 8940. Managing Intellectual Property. (1.5-1.5 cr; max 1.5 cr; A-F only. Prereq–MOT grad student) Characteristics of Intellectual Property (IP), its role in technology enterprises. Law of patents, trade secrets, trademarks, copyrights, know-how and other IP. Effect of IP rights acquisition and asset valuation on company competitiveness. IP protection/licensing strategy.

MOT 8950. International Management of Technology Project. (1.5 cr; A-F or Aud. Prereq–Grad MOT grad student) Invited speakers give half- or full-day seminars on emerging technologies (e.g., energy systems, tissue engineering, thermal spray coatings, etc.). Cross-reference: MCOM 5570.

Courses

For definitions of course numbers, abbreviations, and symbols, see page 169.
Courses


Manufacturing Systems (MS) Institute of Technology

MS 5101. Manufacturing Strategy and Operations Management. (3 cr; A-F or Aud. Prereq–Grad MS major) Strategic roles of manufacturing, process technology, operations management, and market strategies; their impact on manufacturing. Overview of operations functions such as demand forecasting, capacity planning, inventory control, decision making, materials management, Kanban & JIT, facility selection, strategic alliances, and outsourcing.


MS 5105. Financial Decision Making in Manufacturing. (2 cr [max 3 cr]; A-F or Aud. Prereq–Grad MS major) Fundamental topics in engineering economics, such as risk and uncertainty, equity and debt, accounting, cost accounting, time value of money, investments, and capital. Skills developed in budget management, capital cost justification, cost estimation, value engineering, equipment depreciation and replacement, and creating business plans.

MS 5106. Intelligent Decision Support Systems in Engineering. (3 cr; A-F or Aud. Prereq–Grad MS major) Methods for identifying where to apply DSSs, technologies for building them, strategies for evaluating their effectiveness. Examples from many engineering areas.

MS 5107. Simulation of Manufacturing Systems. (1 cr; A-F or Aud. Prereq–MS grad student) Using integrated simulation/animation environment to create, analyze, and evaluate realistic models for various manufacturing, assembly, and material handling systems. Experimental design for simulation. Random number generation, selecting input distributions, evaluating simulation output.

MS 5199. Topics in Manufacturing Systems. (1 cr [max 7 cr]; A-F or Aud. Prereq–MS grad student) See Class Schedule.

MS 5201. Project Management. (1 cr; A-F or Aud. Prereq–Grad MS major) Practical understanding of project management. Project planning; scheduling; budgeting; staffing; task and cost control; and communicating with, motivating, and managing team members.

MS 5202. Technology Forecasting. (1 cr; A-F or Aud. Prereq–Grad MS major) Introduction to methods of technology assessment/forecasting. Applications to the history of technology/industry. Technological developments and their economic, social, and industrial impacts.


MS 5204. Automated Machining Processes. (1 cr; A-F or Aud. Prereq–Grad MS major) Description and demonstration of automated machine tools and machining cells. Machining center configuration and operation, machine tool controller, machining code generation, in-process sensing and control, control design, and system simulation.


MS 5207. Design for Manufacturability. (1 cr; A-F or Aud. Prereq–Grad MS major) Machine design process plans for assembly of components into systems. Basic design principles.

MS 5208. Plasma Processing. (1 cr; A-F or Aud. Prereq–Grad MS major) Plasma coating processes, manufacturing issues. Details of technologies such as plasma spraying and diamond deposition. Lab demonstrations.

MS 5209. Micro Electrical Mechanical Systems. (1 cr; A-F or Aud. Prereq–Grad MS major) Introduces MEMS by presenting various microfabrication techniques such as integrated circuit microfabrication processes, bulk micromachining, bonding, and high-spectroscopy processes. MEMS design processes. MEMS applications. Future of MEMS.


MS 5502. ISE. Public Interactions. (1 cr [max 4 cr]; A-F or Aud. Prereq–ISE grad student) Techniques for effective public communication. How to run a successful public hearing. Resources for publishing public notices.

MS 5900. Directed Study. (1-3 cr; A-F or Aud) Directed study/research in manufacturing systems. Topics chosen in collaboration with instructor.

MS 8333. FTE. Master’s. (1 cr. No grade. Prereq–Master’s student, adviser and GSG consent)

MS 8760. Computer-assisted Product Realization: Capstone Project. (4 cr; A-F or Aud. Prereq–Grad manufacturing systems major) Students experience the complete part design to production process. Manufacturing process design and commercial software packages for use, in part, in process design.

Marathi (MAR) Department of Asian Languages and Literatures College of Liberal Arts

MAR 5992. Directed Readings. (3-5 cr [max 12 cr]; Prereq–#, Δ, λ) Individualized guided reading or study of modern Marathi texts.

MAR 5994. Directed Research. (3-5 cr [max 12 cr]; Prereq–# Δ, λ) Directed research on a subject agreed upon by student and instructor.

Marketing (MKTG) Department of Marketing and Logistics Management

Curtis L. Carlson School of Management

MKTG 8811. Seminar: Consumer Behavior. (4 cr; Prereq–MKTG–MBA 6210 or equiv, business admin PhD student or #) Theories and research in consumer behavior and related disciplines of social and cognitive psychology. Perspective primarily from information processing or social cognition. Consumer categorization, memory, beliefs, attitudes, and attitude change.

MKTG 8831. Seminar: Inter-Organizational Relations. (4 cr; Prereq–MKTG–MBA 6210 or equiv, business admin PhD student or #) From an efficiency perspective, inter-organizational networks involved in task of moving goods and services from point of production to point of consumption. Literature covering the functional, institutional, analytical, and methodological traditions, as well as the behavioral school of thought and transaction cost and relational contracting.

MKTG 8841. Seminar: Theory and Methods of Measurement. (4 cr; Prereq–MKTG–MBA 6210 or equiv, business admin PhD student or #) Issues surrounding validity and reliability of measures developed as key indicators of constructs in a behavioral context. Various methods of measurement such as indicators of reliability, Multi-Model Method, exploratory factor analysis, and confirmatory factor analysis using Lisrel.

MKTG 8851. Seminar: Marketing Management and Strategy. (4 cr; Prereq–MKTG–MBA 6210 or equiv, business admin PhD student or #) Topics in marketing management and formulation and implementation of marketing strategies. Exposes students to diversity of thought, within marketing and the strategic management literature.

MKTG 8890. Seminar: Marketing Topics. (4 cr [max 8 cr]; Prereq–MKTG–MBA 6210 or equiv, business admin PhD student or #) Current topics and problems of interest considered in depth. Topics vary with each offering.

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

MKTG 8894. Graduate Research in Marketing. (1-8 cr [max 16 cr]; Prereq–MKTG–MBA 6210 or equiv, business admin PhD student or #) Individual research on an approved topic appropriate to student’s program and objectives.
Courses

Master of Business Taxation (MBT)

Department of Strategic Management and Organization

Curtis L. Carlson School of Management

Accounting principles and practices underlying preparation of financial statements and additional disclosures. Includes recent pronouncements on financial accounting.

MBT 5200. Tax Accounting Methods and Periods. (4 cr; A-F or Aud. Prereq.–ACCT 5135, MBT student)
Rules affecting timing of income and deductions for tax purposes. Examination of cash and accrual accounting methods on an overall basis and with respect to individual items of income and deductions; rules for changing accounting methods and periods; annual accounting and transactional concepts, including the claim of right doctrine, the Arrowsmith doctrine, and the tax benefit rule.

MBT 5220. Tax Research, Communication, and Practice. (4 cr; A-F or Aud. Prereq.–ACCT 5135, MBT student)
In-depth treatment of tax research methodology including tax questions, locating potential authority, assessing potential authority, and communicating research results. Substantive material on dealing with the IRS including sources of IRS policy; processing returns, auditing returns; rulings and determination letters; closing agreements; assessments and collections.

MBT 5223. Tax-exempt Organizations. (2 cr; A-F or Aud)
Tax laws and issues concerning Section 501(c)(3) and other tax-exempt organizations, including qualification and procedures. Unrelated business income, private foundations (including intermediate sanctions), joint ventures.

MBT 5226. Negotiation Techniques in Taxation. (2 cr; A-F or Aud)
Hands-on approach. Applications from facilitating business sales, mergers, and acquisitions, to representing a client’s position before IRS, to controlling TV remote. Negotiation process: planning, pre-negotiation preparation, strategy development.

MBT 5230. Corporate Taxation I. (2 cr; A-F or Aud. Prereq.–5135, MBT student)
Federal income taxation of corporations and shareholders. Organization of a corporation; establishment of its capital structure; determination of its tax liability; dividends and other nonliquidating distributions; stock redemptions, and liquidations.

MBT 5236. Introduction to Taxation of Business. (2 cr; A-F or Aud. Prereq.–5135 or Acct 5135)
Introduction to income tax laws governing taxation of corporations, partnerships, limited liability companies, limited liability partnerships, and S corporations. Students write research memorandums.

MBT 5323. Mergers and Acquisitions I. (2 cr; A-F or Aud)
Different types of acquisitions, dispositions, reorganizations, and spin-offs involving C corporations. Tax consequences of acquisition to corporations/shareholders involved. Use of 338 elections, limitations on acquired net operating losses/credits, use of covenants not to compete, consulting agreements, deferred payment terms, treatment of transaction costs.

MBT 5326. Mergers and Acquisitions II. (2 cr; A-F or Aud)
Current corporate transactions serve as case studies for analyzing tax consequences of various transaction structures. Participants prepare present value models of related tax consequences to corporations/ shareholders involved. Use of Section 338(h)(10) for acquisitions of S corporations, international acquisitions.

MBT 5333. Tax Aspects of Consolidated Returns. (2 cr; A-F or Aud. Prereq.–5230, MBT student)
Covers aspects of filing consolidated federal income tax returns. Includes determining affiliated groups; election and filing requirements; intercompany transactions, limitations on certain loss and credit carryforwards; allocation of federal income tax liability; E&P and investment basis adjustments; loss allowance rules; and excess loss accounts.

MBT 5335. Taxation of the Small Business Corporation. (2 cr; A-F or Aud. Prereq.–5230, MBT student)
Federal income taxation of S corporations. Election eligibility; termination of status; treatment of income and deduction items; distributions, basis of stock and debt. Compensation arrangements in closely held corporations; fiscal year issues; personal service corporations; advantages of C corporations vs. S corporations; corporation liquidation and redemption rules; S corporation’s built-in gains tax.

MBT 5340. Taxation of Partners and Partnerships. (2 cr; A-F or Aud. Prereq.–5135, MBT student)
Reviews tax consequences associated with formation, operation, and dissolution of a partnership.

MBT 5341. Taxation of Partners and Partnerships II. (2 cr; A-F or Aud)
Advanced partnership allocation issues (special allocation arrangement, substantial economic effect regulations. Allocations of gains, losses, and depreciation under Code Section 704(c)), advanced partnership disguised sales issues, allocation of partnership liabilities; fiscal year issues; personal service corporations; interaction of section 197 and partnership rules (including antichurning provisions). Issues relating to choice of entity, issues encountered when converting to/from partnership form.

MBT 5346. FAS 109 Computations and Analysis. (2 cr; A-F or Aud)
Financial accounting/reporting standards for effects of income taxes that result from corporate activities. Computation of current/deferred expense or benefit, temporary differences, carryforwards, computation of deferred tax assets/liabilities, valuation allowances, business combinations. Investments in subsidiaries and equity method investments. Foreign operations, tax allocations, interim period tax calculations.

MBT 5350. Taxation of Estates and Gifts. (2 cr; A-F or Aud. Prereq.–5135, MBT student)
Taxation of transfers under federal estate and gift tax laws. Includes property owned by the decedent; retained life estates; transfers taking effect at death; revocable transfers; joint interest; powers of appointment; valuation problems; expenses, debts and taxes; charitable bequests, marital deduction, taxable inter vivos gifts, splitting and credits.

MBT 5351. Estate Planning. (2 cr; A-F or Aud. Prereq.–5135, MBT student)
Addresses various topics related to planning the transfer of property during lifetime and at death.

MBT 5353. Income Taxation of Fiduciaries. (2 cr; A-F or Aud. Prereq.–5135, MBT student)
Simple, complex, and revocable trusts; estates; accumulation distributions, income in respect of decedents; trust accounting income and principal; distributable net income; terminations; and excess distributions.

MBT 5356. Taxation of Compensation Arrangements. (2 cr; A-F or Aud. Prereq.–5135, MBT student)
Federal income taxation of corporate deferred compensation and fringe benefits with emphasis on pension plans, profit sharing plans, stock option plans, individual retirement accounts, annuities and insurance, medical related compensation benefits, and reporting requirements.

MBT 5380. State and Local Taxation. (2 cr; A-F or Aud. Prereq.–5135, MBT student)
Examines state levying of income, corporate income, property, sales, and excise taxes. Tax problems of businesses with multistate operations.

MBT 5381. State and Local Taxation II. (2 cr; A-F or Aud)
Income/sales tax consequences of mergers/acquisitions, corporate reorganizations. Practical application of tax concepts. Planning ideas in drop shipments, investment holding companies, e-commerce, leasing companies, and like tax alternatives. Real property taxation, individual income taxation, state administrative tax procedures, state payroll considerations.

MBT 5383. Taxation of Executive Compensation. (2 cr; A-F or Aud)
Federal income taxation of executive compensation, relevant fringe benefit programs. Benefit programs other than qualified retirement plans. Salary continuation, stock options, non-profit organization plans, health/welfare plans.

MBT 5370. Taxation of Property Transactions. (2 cr; A-F or Aud. Prereq.–5135, MBT student)
Determining realized gain or loss and recognized gain or loss, and tax treatment of that gain or loss on property dispositions. Consequences of property transactions including depreciation, depletion, basis, and capital gains problems.

MBT 5372. Taxation of Inventories. (2 cr; A-F or Aud)
How financial products/derivatives are used and the tax consequences that result. Trends/developments.

MBT 5380. Tax Aspects of International Business I. (2 cr; A-F or Aud. Prereq.–5135, MBT student)
Multinational business operations and transactions involving foreign income. Tax consequences of transactions with foreign organizations and by related foreign companies.

MBT 5381. Tax Aspects of International Business II. (2 cr; A-F or Aud. Prereq.–5135, MBT student)
Foreign tax credit and Subpart F planning opportunities, international structuring (including joint ventures and use of the new entity classification regulations), transfer pricing, and foreign currency. Recent legislative, regulatory, and judicial developments in the international tax area, and the challenges and opportunities presented by these developments.

MBT 5380. Topics in Taxation. (1-4 cr [max 160 cr]; A-F or Aud. Prereq.–MBT student)
Current tax legislation and problems. Topics may vary. S–N grading allowed with MBT program approval.

MBT 5420. Current Topics in Taxation. (1-4 cr [max 4 cr]; A-F or Aud)
Tax research/compliance, other tasks. Students submit summary paper.

Modern macroeconomics and its effects on taxation and public finance including government expenditures. History of taxation and the institution and individuals affecting tax policy. Goals of an effective tax system and various proposed major tax reforms.

MBT 5833. FTE: Master’s. (1 cr; No grade. Prereq.–Master’s student, adviser and DG consent)
MATS 5531. Electrochemical Engineering. (3 cr; §CHEN 5531. Pre-req–MATS 5011 or 5. upper div (or 2nd grad))

Fundamentals of electrochemical engineering. Topics include electrochemical mass transfer, electrodynamics, thermodynamics of cells, modern sensors, formation of thin films and thick coatings of metallic and non-metallic materials. Computer-based problems will be assigned.

MATS 8001. Structure and Symmetry of Materials. (3 cr; A–F or Aud)


MATS 8002. Thermodynamics and Kinetics. (3 cr; A–F or Aud)

First three laws of thermodynamics, free energy, equilibrium constants, fugacity and activity relationships, solution models, order-disorder transitions, phase transitions. Elementary statistical mechanics. Applications to materials systems, including surface energies, multicomponent equilibria, reaction kinetics, mass transport, diffusion.

MATS 8003. Electronic Properties. (3 cr; A–F or Aud)


MATS 8004. Mechanical Properties. (3 cr; A–F or Aud)

Defects in crystalline materials, including point defects, dislocations, and grain boundaries. Structure and movement of defects related to mechanical behavior of materials. Tools used to understand crystals and crystallography.

MATS 8005. Dislocations and Interfaces. (3 cr; A–F or Aud)

Structure and properties at an advanced level. Influence of bonding and crystallography on structures of dislocations cores. CSL and DSCl theory of grain boundaries and of structures of phase boundaries in heterojunctions including thin film epilayers. Effect of defects on electrical, optical, magnetic, and superconducting behavior of materials.

MATS 8114. Structure and Symmetry in Soft Materials. (2 cr; A–F or Aud. Pre-req–#)

Molecular interactions, packing, symmetry operations/structure. X-ray/neutron scattering in soft materials, including organic/liquid crystals, amphiphiles, and polymers.

MATS 8115. Electron Microscopy of Soft Matter. (2 cr; A–F or Aud. Pre-req–Materials science/engineering or chemical engineering grad major or #)

Operation principles of transmission electron microscopy (TEM) and scanning electron microscopy (SEM). How these instruments are applied in study of soft materials (e.g., liquid, semi-liquid material systems). Unique specimen preparation techniques, low image contrast, electron-beam radiation damage, limited signal-to-noise ratio. TEM/SEM digital imaging.

MATS 8204. Computational Methods and Applications to Problems in Materials Science and Engineering. (2 cr; A–F or Aud. Pre-req–Grad student, knowledge of programming languages such as Fortran)

Implementation of computational methods/applications to numerical problems in materials science and engineering. Emphasizes implementation to applications.

MATS 8211. Physical Chemistry of Polymers. (3 cr; §CHEN 8211. Pre-req–Undergrad physical chem or #)

Introduction to polymer physical chemistry. Chain conformations; thermodynamics of polymer solutions, blends, and copolymers; free energy, reaction kinetics, and X-ray scattering; dynamics in dilute solutions and polymer characterization; dynamics of melts and viscoelasticity; rubber elasticity, networks, and gels; glass transitions; crystallization.

MATS 8212. Solid State Reaction Kinetics. (3 cr; A–F or Aud. Pre-req–#)

Reactions between ceramic solids in terms of transport mechanisms. Thermodynamics of point defects in binary and ternary oxides, solidification in the bulk and along grain and interface defects, chemical and electrochemical potential gradients, reactions at interfaces, practical examples drawn from oxidation and solid/solid reactions of ceramics.

MATS 8213. Electronic Properties of Materials. (3 cr; A–F or Aud. Pre-req–#)

Hand theory studied by tight binding, pseudopotential, K.P. and KKR techniques. Optical and transport properties. Experimental techniques for characterizing electronic properties, including photoemission, Auger spectroscopy, and optical microscopy. Microelectronic materials, metal-semiconductor, and other interface phenomena.

MATS 8214. Electronic Properties and Applications of Organic Materials. (3 cr; A–F or Aud. Pre-req–#)


MATS 8215. Electronic Ceramics. (3 cr; A–F or Aud. Pre-req–#)

Electronic properties of ceramics; electronic and ionic conduction; dielectric behavior; ferroelectric, piezoelectric, pyroelectric, and electric properties. Relationships between structure (crystal structure, microstructure) and properties. Introduction to applications (e.g., capacitors, sensors, actuators).

MATS 8216. Contact and Fracture Mechanics. (3 cr; A–F or Aud)

Theories of indentation contact and fracture resistance emphasizing structure/property relationships. Surfaces, thin film interfaces, coatings, and bulk behavior. Theoretical basis and experimental techniques for measuring mechanical behavior at the nano-scale. Lab exercises.

MATS 8217. Advanced Electron Microscopy. (3 cr; A–F or Aud. Pre-req–#)

Theory/application of scanning/transmission electron microscopy.

MATS 8218. Thin Film Growth and Epitaxy. (3 cr; A–F or Aud. Pre-req–#)


MATS 8219. Science of Porous Media. (3 cr; A–F or Aud. §CHEN 5103, CHEN 8103)


MATS 8221. Introduction to Polymer Chemistry. (4 cr; A–F or Aud. §CHEN 4221; CHEM 8221, CHEM 5221; MATS 5221. Pre-req–§CHEN 2302, Chem 2302 or #)

Condensation, radical, ionic, emulsion, ring-opening, metal-catalyzed polymerizations. Chain conformation, solution thermodynamics, molecular weight characterization, physical properties.

MATS 8333. FTE: Master’s. (1 cr; No grade. Pre-req–Master’s student, adviser and DGS consent)

MATS 8444. FTE: Doctoral. (1 cr; No grade. Pre-req–Doctoral student, adviser and DGS consent)

MATS 8666. Doctoral Pre-Thesis Credits. (1-6 cr; max 12 cr; No grade. Pre-req–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)
MATH 594H. Honors Mathematics—Topics. (4 cr; [max 12 cr]; A-F or Aud. Prereq—[2243H with grade of at least B, experience in writing proofs] or A; intended for mathematically-talented students with proven achievement in theoretical mathematics courses) Topics vary, depending on interests of instructor. Theoretical treatment of chosen topic.

MATH 5615H. Honors: Introduction to Analysis I. (4 cr; Prereq—[[2243 or 2573], [2283 or 3283]) or 2574) Axiomatic treatment of real/complex number systems; introduction to metric spaces; convergence, connectedness, compactness. Convergence of sequences/series of real/complex numbers, Cauchy criterion, root/ratio tests. Continuity in metric spaces. Rigorous treatment of differentiation of single-variable functions, Taylor’s Theorem.


MATH 5651. Basic Theory of Probability and Statistics. (4 cr; Prereq—[2263 or 2374 or 2573], [2283 or 2574 or 3283]) recommended; Credit will not be granted if credit has been received for Stat 4101, Stat 5101) Logical development of probability, basic issues in statistics. Probability spaces, random variables, their distributions/expected values. Law of large numbers, central limit theorem, generating functions, sampling, sufficiency, estimation.


MATH 5705, Enumerative Combinatorics. (4 cr; Prereq—[2243 or 2573 or 2574], [2283 or 2574 or 3283]; Credit will not be granted if credit has been received for 4707) Basic enumeration, bijections, inclusion-exclusion, recurrence relations, ordinary/exponential generating functions, partitions, Polya theory. Optional topics include trees, asymptotics, listing algorithms, rook theory, involutions, tableaux, permutation statistics.

MATH 5707. Graph Theory and Non-Enumerative Combinatorics. (4 cr; Prereq—[2243 or 2573 or 2574], [2283 or 2574 or 3283]; Credit will not be granted if credit has been received for 4707) Basic topics in graph theory: connectedness, Eulerian/Hamiltonian properties, trees, colorings, planar graphs, matchings, flows in networks. Optional topics include graph algorithms, Latin squares, block designs, Ramsey theory.

MATH 5711. Linear Programming and Combinatorial Optimization. (4 cr; Prereq—2 or 2 sems soph math [including 2243 or 2573 or 2574]) Simplex method, connections to geometry, duality theory, sensitivity analysis. Applications to cutting stock, allocation of resources, scheduling problems. Flows, matching, transportation problems, spanning trees, distance in graphs, integer programs, branch/ bound, cutting planes, heuristics. Applications to traveling salesman, knapsack problems.

MATH 5900. Tutorial in Advanced Mathematics. (1-6 cr; [max 120 cr]; A-F or Aud) Individually directed study.

MATH 8001. Preparation for College Teaching. (1 cr; [max 3 cr]; S-H or Aud. Prereq—4 math grad student in good standing or #) New approaches to teaching/learning, issues in mathematics education, components/expectations of a college mathematics professor.

MATH 8141. Applied Logic. (3 cr; A-F or Aud) Applying techniques of mathematical logic to other areas of mathematics and computer science. Sample topics: complexity of computation, computable analysis, unsolvability of diophantine problems, program verification, database theory.

MATH 8142. Applied Logic. (3 cr; A-F or Aud) Applying techniques of mathematical logic to other areas of mathematics, computer science. Complexity of computation, computable analysis, unsolvability of diophantine problems, program verification, database theory.

MATH 8151. Axiomatic Set Theory. (3 cr; A-F or Aud. Prereq—5166 or #) Axiomatic development of basic properties of ordinal/cardinal numbers, infinitary combinatorics, well founded sets, consistency of axiom of foundation, constructible sets, consistency of axiom of choice and of generalized continuum hypothesis.

MATH 8152. Axiomatic Set Theory. (3 cr; A-F or Aud. Prereq—8151 or #) Notion of forcing, generic extensions, forcing with finite partial functions, independence of continuum hypothesis, forcing with partial functions of infinite cardinalities, relationship between partial orderings and Boolean algebras, Boolean-valued models, independence of axiom of choice.


MATH 8167. Recursion Theory. (3 cr; A-F or Aud. Prereq—8166) Sample topics: complexity theory, recursive analysis, generalized recursion theory, analytical hierarchy, constructive ordinals.

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

MATH 8173. Model Theory. (3 cr; A-F or Aud. Prereq—8172 or #) Types of elements. Prime models, homogeneity, saturation, categoricity in power. Forcing.

MATH 8180. Topics in Logic. (1-3 cr; [max 12 cr]; A-F or Aud) Offered for one year or one semester as circumstances warrant.

MATH 8201. General Algebra. (3 cr; A-F or Aud. Prereq—4xxx algebra or equiv or #) Groups through Sylow, Jordan-Holder theorems, structure of finitely generated Abelian groups. Rings and algebras, including Gauss theory of factorization. Modules, including projective and injective modules, chain conditions, Hilbert basis theorem, and structure of modules over principal ideal domains.

MATH 8202. General Algebra. (3 cr; A-F or Aud. Prereq—8201 or #) Classical field theory through Galois theory, including soluble equations. Symmetric, Hermitian, orthogonal, and unitary form. Tensor and exterior algebras. Basic Wedderburn theory of rings; basic representation theory of groups.

MATH 8207. Theory of Modular Forms and L-Functions. (3 cr; A-F or Aud. Prereq—8202 or #) Zeta and L-functions, prime number theorem. Dirichlet’s theorem on primes in arithmetic progressions, class number formulas; Riemann hypothesis; modular forms and associated L-function; Eisenstein series; Hecke operators, Poincaré series, Euler products; Ramanujan conjectures; Theta series and quadratic forms; waveforms and L-functions.

MATH 8208. Theory of Modular Forms and L-Functions. (3 cr; A-F or Aud. Prereq—8207 or #) Applications of Eisenstein series: special values and analytic continuation and functional equations of L-functions. Trace formulas. Applications of representation theory. Computations.

MATH 8211. Commutative and Homological Algebra. (3 cr; A-F or Aud. Prereq—8202 or #) Selected topics.

MATH 8212. Commutative and Homological Algebra. (3 cr; A-F or Aud. Prereq—8211 or #) Selected topics.

MATH 8245. Group Theory. (3 cr; A-F or Aud. Prereq—8202 or #) Permutations, Sylow’s theorems, representations of groups on groups, semi-direct products, solvable and nilpotent groups, generalized Fitting subgroups, p-groups, co-prime action on p-groups.

MATH 8246. Group Theory. (3 cr; A-F or Aud. Prereq—8245 or #) Representation and character theory, simple groups, free groups and products, presentations, extensions, Schur multipliers.

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


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

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

MATH 8272. Lie Groups and Lie Algebras. (3 cr; A-F or Aud. Prereq—8271 or #) Solvable and nilpotent Lie algebras and Lie groups; Lie’s and Engel’s theorems; semisimple Lie algebras; cohomology of Lie algebras; Whitehead’s lemmas and Levi’s theorem; classification of complex semisimple Lie algebras and compact Lie groups; representation theory.
MATH 3333. FTE: Master’s. (1 cr; No grade. Prereq: Master’s student, adviser and DGS consent)

MATH 3360. Topics in Topology. (1-3 cr [max 12 cr]; A-F or Aud. Prereq: 8310 or 8381 or offered for one yr or one sem as circumstances warrant)
Selected topics.

MATH 3365. Riemannian Geometry. (3 cr; A-F or Aud. Prereq: 8381 or basic point-set topology or #)
Riemannian metrics, curvature, Bianchi identities, Gauss-Bonnet theorem, Myers’s theorem, Cartan-Hadamard theorem.

MATH 3366. Riemannian Geometry. (3 cr; A-F or Aud. Prereq: 8350 or #)
Gauss, Codazzi equations. Tensor calculus, Hodge theory, spinors, global differential geometry, applications.

MATH 3370. Topics in Differential Geometry. (1-3 cr [max 12 cr]; A-F or Aud. Prereq: 8361 or 8381; offered for one yr or one sem as circumstances warrant)
Current research in Differential Geometry.

MATH 3380. Topics in Advanced Geometry. (1-3 cr [max 12 cr]; A-F or Aud. Prereq: 8301 or 8350)
Current research.

MATH 3385. Calculus of Variations and Minimal Surfaces. (3 cr; A-F or Aud. Prereq: 4xxx partial differential equations or #)

MATH 3386. Calculus of Variations and Minimal Surfaces. (3 cr; A-F or Aud. Prereq: 8395 or #)
Theory of multiple integrals. Geometrical differential equations, i.e., theory of minimal surfaces and related structures (surfaces of constant or prescribed mean curvature, solutions to variational integrals involving surface curvatures), all extremals for variational problems of current interest as models for interfaces in real materials.

MATH 3387. Mathematical Modeling of Industrial Problems. (3 cr; A-F or Aud. Prereq: [8xxx numerical analysis, some computer experience] or #)
Mathematical models from physical, biological, social systems. Industrial applications. Modeling of deterministic/probabilistic, discrete/continuous processes; methods for analysis/computation.

MATH 3390. Mathematical Modeling of Industrial Problems. (3 cr; A-F or Aud. Prereq: 8301 or #)
Techniques for analysis of mathematical models. Asymptotic methods; design of simulation and visualization techniques. Specific computation for models arising in industrial problems.

MATH 3390. Topics in Mathematical Physics. (1-3 cr [max 12 cr]; A-F or Aud. Prereq: 8301 or offered for one yr or one sem as circumstances warrant)
Current research.

MATH 8401. Mathematical Modeling and Methods of Applied Mathematics. (3 cr; A-F or Aud. Prereq: 8400 numerical analysis and applied linear algebra or #)
Dimension analysis, similarity solutions, linearization, stability theory, well-posedness, and characterization of type. Fourier series and integrals, wavelets, Green’s functions, weak solutions and distributions.

MATH 8402. Mathematical Modeling and Methods of Applied Mathematics. (3 cr; A-F or Aud. Prereq: 8401 or #)
Calculation of variations, integral equations, eigenvalue problems, spectral theory, Perturbation, asymptotic methods. Artificial boundary conditions, conformal mapping, coordinate transformations. Applications to specific modeling problems.

MATH 8431. Mathematical Fluid Mechanics. (3 cr; A-F or Aud. Prereq: 8xxx numerical analysis of partial differential equations or #)

MATH 8432. Mathematical Fluid Mechanics. (3 cr; A-F or Aud. Prereq: 8431 or #)

MATH 8441. Numerical Analysis and Scientific Computing. (3 cr; Prereq: [8xxx analysis, 8xxx applied linear algebra] or #)

MATH 8442. Numerical Analysis and Scientific Computing. (3 cr; Prereq: 8441 or #; 5477-5478 recommended for engineering and science grad students)

MATH 8444. FTE: Doctoral. (1 cr; No grade. Prereq: Doctoral student, adviser and DGS consent)

MATH 8445. Numerical Analysis of Differential Equations. (3 cr; A-F or Aud. Prereq: 8xxx numerical analysis, 4xxx partial differential equations or #)
Finite element and finite difference methods for elliptic boundary value problems (e.g., Laplace’s equation) and solution of resulting linear systems by direct and iterative methods.

MATH 8446. Numerical Analysis of Differential Equations. (3 cr; A-F or Aud. Prereq: 8445 or #)
Numerical methods for parabolic equations (e.g., heat equations), methods for elasticity, fluid mechanics, electromagnetics. Applications to specific computations.

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

MATH 8470. Topics in Mathematical Theory of Continuum Mechanics. (1-3 cr [max 12 cr]; A-F or Aud)
Offered for one year or one semester as circumstances warrant.

MATH 8501. Theory of Ordinary Differential Equations. (3 cr; A-F or Aud. Prereq: 8301 or #)
Existence, uniqueness, continuity, and differentiability of solutions. Linear theory and hyperbolicity. Basics of dynamical systems. Local behavior near a fixed point, a periodic orbit, and a homoclinic or heteroclinic orbit. Perturbation theory.

MATH 8502. Dynamical Systems and Differential Equations. (3 cr; A-F or Aud. Prereq: 8501 or #)

MATH 8503. Bifurcation Theory in Ordinary Differential Equations. (3 cr; A-F or Aud. Prereq: 8501 or #)

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

MATH 8506. Applied Dynamical Systems and Bifurcation Theory II. (3 cr; A-F or Aud. Prereq: 8501 or #)
Background on analysis in Banach spaces, linear operator theory. Lyapunov-Schmidt reduction, static bifurcation, stability at a simple eigenvalue. Hopf bifurcation in infinite dimensions invariant manifold theory. Applications to hydrodynamic stability problems, reaction-diffusion equations, pattern formation, and elasticity.

MATH 8520. Topics in Dynamical Systems. (1-3 cr [max 12 cr]; A-F or Aud. Prereq: 8502)
Current research.

MATH 8530. Topics in Ordinary Differential Equations. (1-3 cr [max 3 cr]; A-F or Aud. Prereq: 8502)
Offered for one year or one semester as circumstances warrant.

MATH 8540. Topics in Mathematical Biology. (1-3 cr [max 12 cr]; A-F or Aud. Prereq: 8502)
Offered for one year or one semester as circumstances warrant.

MATH 8571. Theory of Evolutionary Equations. (3 cr; A-F or Aud. Prereq: 8502 or #)
Finite dimensional dynamical systems, global attractors, existence and robustness. Linear semiflows, analytic semigroups. Linear and nonlinear reaction diffusion equations, strong and weak solutions, well-posedness of solutions.

MATH 8572. Theory of Evolutionary Equations. (3 cr; A-F or Aud. Prereq: 8571 or #)

MATH 8580. Topics in Evolutionary Equations. (1-3 cr [max 12 cr]; A-F or Aud. Prereq: 8512 or #; offered for one yr or one semester as circumstances warrant)

MATH 8581. Applications of Linear Operator Theory. (3 cr; A-F or Aud. Prereq: 8xxx applied mathematics or #)

MATH 8582. Applications of Linear Operator Theory. (3 cr; A-F or Aud. Prereq: 8581 or #)

MATH 8583. Theory of Partial Differential Equations. (3 cr; A-F or Aud. Prereq: [Some 5xxx PDE, 8601] or #)
Courses

MATH 6584. Theory of Partial Differential Equations. (3 cr; A-F or Aud; Prereq–8553 or #) Fundamental solutions/distributions, Sobolev spaces, regularity. Advanced elliptic theory (Schauder estimates, Garding’s inequality). Hyperbolic systems.

MATH 6590. Topics in Partial Differential Equations. (1-3 cr [max 3 cr]; A-F or Aud; Prereq–8562; offered for one yr or one sem as circumstances warrant) Research topics.

MATH 6600. Topics in Advanced Applied Mathematics. (1-3 cr [max 12 cr]) Offered for one yr or one semester as circumstances warrant. Topics vary. For details, contact instructor.

MATH 6601. Real Analysis. (3 cr; A-F or Aud; Prereq–5616 or #) Set theory/fundamentals. Axiom of choice, measures, measure spaces, Borel/Lebesgue measure, integration, fundamental convergence theorems, Riesz representation theorem.


MATH 6640. Topics in Real Analysis. (3 cr; max 12 cr; A-F or Aud; Prereq–8662 or #; offered for one yr or one sem as circumstances warrant) Current research.

MATH 6641. Spatial Ecology. (3 cr; S-N or Aud; Prereq–Two semester calculus, theoretical population ecology or four semesters more robust calculus, course in statistics or probability or #) Introduction: role of space in population dynamics and interspecies interaction; includes single species and multispecies models, deterministic and stochastic theory, different modeling approaches, effects of implicit/explicit space on competition, pattern formation, stability, diversity and invasion. Recent literature. Computer lab.


MATH 6652. Theory of Probability Including Measure Theory. (3 cr; Prereq–8651 or #) Conditional distributions and expectations, convergence of sequences of distributions on real line and on Polish spaces, central limit theorem and related limit theorems, Brownian motion, martingales and introduction to other stochastic sequences.

MATH 6654. Fundamentals of Probability Theory and Stochastic Processes. (3 cr; Prereq–8651 or 8602 or #) Review of basic theorems of probability for independent random variables; introductions to Brownian motion process, Poisson process, conditioning, Markov processes, stationary processes, martingales, super- and sub-martingales, Doob-Meyer decomposition.

MATH 6655. Stochastic Calculus with Applications. (3 cr; Prereq–8654 or 8659 or #) Stochastic integration with respect to martingales, Ito’s formula, applications to business models, filtering, and stochastic control theory.

MATH 6659. Stochastic Processes. (3 cr; Prereq–8652 or #) In-depth coverage of various stochastic processes and related concepts, such as Markov sequences and processes, renewal sequences, exchangeable sequences, stationary sequences, Poisson point processes, Levy processes, interacting particle systems, diffusions, and stochastic integrals.

MATH 6660. Topics in Probability. (1-3 cr [max 12 cr]) Offered for one year or one semester as circumstances warrant.

MATH 6666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

MATH 6668. Combinatorial Theory. (3 cr; A-F or Aud) Basic enumeration, including sets and multisets, permutation statistics, inclusion-exclusion, integer/set partitions, involutions and Polya theory. Partially ordered sets, including lattices, incidence algebras, and Mobius inversion. Generating functions.

MATH 6669. Combinatorial Theory. (3 cr; A-F or Aud; Prereq–8668 or #) Further topics in enumeration, including symmetric functions, Schensted correspondence, and standard tableaux; non-enumerative combinatorics, including graph theory and coloring, matching theory, connectivity, flows in networks, codes, and extremal set theory.

MATH 6680. Topics in Combinatorics. (1-3 cr [max 12 cr]; A-F or Aud; Prereq–Grad math major or #; offered as one yr or one sem as circumstances warrant) Selected topics.


MATH 6777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

MATH 6790. Topics in Complex Analysis. (1-3 cr [max 12 cr]; A-F or Aud; Prereq–8702 or #; offered for one yr or one sem as circumstances warrant) Current research.

MATH 8801. Functional Analysis. (3 cr; A-F or Aud; Prereq–8602 or #) Motivation in terms of specific problems (e.g., Fourier series, eigenfunctions). Theory of compact operators. Basic theory of Banach spaces (Hahn-Banach, open mapping, closed graph theorems). Frechet spaces.

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

MATH 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

MATH 8890. Topics in Mathematics. (1-6 cr [max 24 cr]; S-N or Aud; Prereq–#) Readings, research.

MATH 8991. Independent Study. (1-6 cr [max 24 cr]; S-N or Aud; Prereq–#) Individually directed study.

MATH 8992. Directed Reading. (1-6 cr [max 24 cr]; S-N or Aud; Prereq–#) Individually directed reading.

MATH 8993. Directed Study. (1-6 cr [max 24 cr]; S-N or Aud; Prereq–#) Individually directed study.

MATH 8994. Topics at the IMA. (1-3 cr [max 6 cr]) Current research at IMA.

Mathematics Education (MTHE)

Department of Curriculum and Instruction

College of Education and Human Development

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

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

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

MTHE 5100. Topics in Mathematics Education. (1-6 cr [max 12 cr]; Prereq–Ed or grad student) Issues, materials, and instructional techniques focusing on a single current topic of particular relevance to secondary school and college mathematics teachers.

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

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

MTHE 5161. Developing Leadership in School Mathematics. (3 cr; Prereq–Tchg exper or #) Current developments in the psychology and pedagogy of mathematics education as related to the evolving nature of mathematics education objectives. Emerging use of technology in the mathematics classroom. Techniques for the development of supervisory abilities. Characteristics of effective staff development.

MTHE 5170. Historical Topics in the Mathematics Classroom. (1-3 cr [max 3 cr]) Historical underpinnings of school mathematics content and methodology. Cross-cultural contributions in the development of mathematical ideas. Development of lessons, activities, and materials for school use.

MTHE 5171. Teaching Problem Solving. (3 cr) Investigation of fundamental concepts and principles of problem solving, reasoning, and proof. Emphasis on activities and applications appropriate for junior and senior high classes. Pedagogical experiences to prepare teachers to teach problem solving, reasoning, and proof in classrooms.
MTHE 5172. Teaching Probability and Statistics. (3 cr) Investigation of fundamental concepts and principles of probability and statistics. Emphasis on activities and applications appropriate for junior and senior high school classes. Pedagogical experiences to prepare teachers to integrate quantitative literacy accurately and effectively in classrooms.

MTHE 5305. Middle School Mathematics Methods. (2 cr; A-F only. Prereq—Elem ed licence student) The unique needs of middle school students in the mathematics classroom. Mathematics content and pedagogical skills. Adolescent development/psychology. Field placement in a middle school mathematics classroom.

MTHE 5313. Teaching and Learning Mathematics in the Middle School. (3 cr; Prereq—Tchg upper or lower) Mathematics learning, instruction methods, mathematical topics, and assessment procedures appropriate for the middle grades. Examination of new curricular materials. Illustration of successful instructional techniques. Discussion of the relationship between the nature of the learner and effective instruction.

MTHE 5314. Teaching and Learning Mathematics. (3 cr; Prereq—Math Ed or MEd or Ed PhD student or grad student or (4 cr; Methods, materials, and curriculum development. Principles of learning. Review of research. Preparation/evaluation of tests, units, and materials of instruction. Recent developments in mathematics curriculum and in instructional alternatives. Issues in teaching/learning. Program planning/evaluation.


MTHE 5355. Mathematics for Diverse Learners. (3 cr; Prereq—Teaching license or student in elem ed or special ed or (4 cr; Mathematical concepts and methods for exceptional students, both low achieving and gifted. Experimental materials and methods designed for underachieving students.

MTHE 5366. Technology-Assisted Mathematics Instruction. (3 cr) Technology—including computers, programmable and graphing calculators, and video—as instructional tools in mathematics; design and evaluation of technology-based mathematics lessons; the effect of technology on the mathematics curriculum; managing the technology-enriched classroom.

MTHE 5696. Student Teaching in Mathematics. (1-3 cr max 6 cr; S-N only. Prereq—MEd initial licence student or (4 cr; Student teaching in secondary school mathematics classes.

MTHE 5993. Directed Studies in Mathematics Education. (2 cr max 3 cr; S-N or Aud. Prereq—Math ed MEd student, 5991) Secondary school classroom teaching project to improve specific teaching skills, planned by student, approved/directed by student’s advisor.

MTHE 5801. Theory and Classical Research in Mathematics Education. (3 cr; Prereq—Grad math ed major) Critical review of research and relevant theoretical formulations; criteria for appraising research methods; educational implications.

MTHE 5871. Research in Mathematics Education. (3 cr; Prereq—5313, 5801) Designed for advanced graduate students in mathematics education. Presentation and discussion of Ph.D. thesis proposals and other contemporary research.

MTHE 6591. Seminar: Mathematics Education. (1-3 cr max 3 cr; Prereq—Math ed PhD student) Problems of mathematics instruction from kindergarten through junior college; opportunity to develop proposals and design models for empirical research.

MTHE 6895. Problems: Mathematics Education. (1-6 cr; max 12 cr; Prereq—MA or PhD educ major with math educ concentration) Students survey most recent literature and design and prepare research reports on special topics.

For definitions of course numbers, abbreviations, and symbols, see page 169.

Courses


ME 5348. Heat Transfer in Electronic Equipment. (4 cr; Prereq–[3333 or 3324], IT upper div or grad student) Technology trends and packaging needs of microelectronics and microelectromechanical systems (MEMS). Thermal characterization, heat transfer mechanisms, thermal failure modes of electronic/microelectronic equipment. Reliability prediction. Thermal stress/strain in layered structures and solder joints.

ME 5351. Computational Heat Transfer. (4 cr; A-F or Aud. Prereq–IT upper div or grad student, 3322) Numerical solution of heat conduction and analogous physical processes. Develop and use a computer program to solve complex problems involving steady and unsteady heat conduction, flow and heat transfer in ducts, flow in porous media, and other special applications.

ME 5361. Plasma-Aided Manufacturing. (4 cr; A-F or Aud. Prereq–IT upper div or grad student, 3321, 3322 or equal) Properties of plasmas as a processing medium, process control and system design considerations using specific examples of plasma spray coating, welding, and microelectromechanical (MEMS) processing.


ME 5446. Introduction to Combustion. (4 cr; A-F or Aud. Prereq–IT upper div or grad student, 3321, 3322) Thermodynamics, kinetics, energy and mass transport, and pollutants in reacting systems. Reactors, laminar and turbulent flames. Ignition, quenching, and flame stability. Diffusion flames. Combustion in reciprocating engines, furnaces, and turbines, with emphasis on internal combustion engine performance and emissions.

ME 5461. Internal Combustion Engines. (4 cr; A-F or Aud. Prereq–IT upper div or grad student, 3322) Basic spark ignition and diesel engine principles, air, fuel-air and actual engine cycles, cycle modeling, combustion, and knock phenomena, air flow and volumetric efficiency, mixture requirements, ignition requirements and performance. Lectures and complementary labs.


ME 8113. Advanced Aerosol/Particle Engineering. (3 cr; max 4 cr; A-F or Aud. Prereq–IT grad student or #) Introduction to kinetic theory, definition, theory, and measurement of particle properties; elementary particle mechanics, particle statistics; Brownian motion and diffusion, coagulation, evaporation and condensation, sampling.

ME 8221. New Product Design and Business Development I. (4 cr; A-F or Aud. Prereq–BMEN 8401, EMTR 6041, EMTR 6087, OMS 6061, Prereq–IT grad student, some design experience) Students and faculty work with company representatives to develop a product concept, a working physical prototype, and an extensive business plan. Concept design, detail design, manufacturing, marketing, introduction strategy, and profit forecasting. Sponsoring company intends to bring product to market. ME 8222 must be taken in sequence the same year.

ME 8222. New Product Design and Business Development II. (4 cr; A-F or Aud. Prereq–BMEN 8402, Prereq–8221) Students and faculty work with company representatives to develop a product concept, a working physical prototype, and an extensive business plan. Concept design, detail design, manufacturing, marketing, introduction strategy, and profit forecasting. Sponsoring company intends to bring product to market. Must be taken in sequence with 8221 the same year.


ME 8243. Topics in Design. (4 cr [max 12 cr; A-F or Aud) Topics vary with each offering.

ME 8253. Computational Nanomechanics. (3 cr; Prereq–IT grad student) Fundamentals of mechanical properties in nanometer scale. Role of discrete structure and underlying atomic, molecular, and interfacial forces are illustrated with modern examples. Overview of computational atomistic methods. Lectures, hands-on computing using publicly available or personally developed scientific software packages.

ME 8254. Fundamentals of Microelectromechanical Systems (MEMS). (4 cr; A-F only) Major classes, components, and applications of MEMS. Principles behind operation of MEMS devices/systems. Standard microfabrication techniques. Unique requirements, environments, and applications of MEMS. Students apply microfabrication techniques/applications to design/ manufacture of a MEMS device or microsystem.


ME 8287. Topics in Dynamics and Control. (2-4 cr [max 12 cr; A-F or Aud. Prereq–8221) Topics vary with each offering.

ME 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)


ME 8951. Plan B. (2 cr; A-F or Aud. Prereq–8951) Structured environment in which students can complete a M.S. Plan B project.

ME 8953. Plan B. (2 cr; A-F or Aud. Prereq–8951) Structured environment in which students can complete a M.S. Plan B project.

ME 8888. Thesis Credit: Doctoral. (1-24 cr [max 50 cr]; S-N or Aud. Prereq–Max 18 cr per semester or summer; 24 cr total required [Plan A only])

MEDC 8777. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

MEDC 8900. Research in Medicinal Chemistry. (1-4 cr [max 8 cr]; A-F or Aud. Prereq–Grad med chem major or #) Study and experimental investigation.

MEDICAL STUDIES (MEST)
Center for Medieval Studies
College of Liberal Arts

MEST 5510. Advanced Topics in Medieval Studies. (3-4 cr [max 15 cr]; Prereq–One yr work in some area of Middle Ages, reading knowledge of appropriate language, #) From late antiquity through end of Middle Ages (circa 300-1500 A.D.). Current topics specified in Class Schedule.

MEST 8010. Medieval Studies Colloquium. (3 cr [max 9 cr]) Lectures by and discussions with faculty and visiting speakers.

MEST 8110. Seminar in Medieval Studies. (3-4 cr [max 48 cr]; A-F or Aud. Prereq–Appropriate languages, #) Offered when feasible.

MICROBIAL ENGINEERING (MICE)
BioTechnology Institute
College of Biological Sciences

MICE 5309. Biocalcification and Biodegradation. (3 cr; §BIOC 5309, §BIOC 5308) [preprereq through organic chemistry; knowledge of word processing, e-mail, access to World Wide Web, access to college-level science library recommended] Assessing validity of information on biocalcification and biodegradation; fundamentals of microbial catalytic metabolism as it pertains to biodegradation of environmental pollutants; biocalcification for specialty chemical synthesis; display of this information on the Worldwide Web.

MICE 5535. Advanced Fermentation and Biocalcification Laboratory. (1 cr; S-N only; Prereq–§BIOC 5301 or §BIOC 3301; [grad student in microbial engineering or upper-div major in [microbiology or chem engineering or biochemistry]]) Methods in industrial microbiology, lab, and pilot scale fermentation/biocalcification engineering. Lab experiments carried out in fermentation pilot plant. Operation of bench/pilot scale bioreactors. Designing bioreactors. Process optimization, monitoring, and control. Scale-up experiments, data analysis.

MICE 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DDS consent)

MICE 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])
Courses

MICB 8902. Teaching Practicum. (1 cr; max 4 cr; Prereq-Grad MICB major) Supervised experience in classroom laboratory, and/or recitation instruction; develops skills in effective use of instructional techniques, materials, tests, and measurements.

MICG 8990. Biotechnology Seminar. (1 cr; max 2 cr; Prereq-First-year students enroll S-N, as they do not make a presentation; 2nd-year students enroll A-F, as they present a seminar) Student presentations of thesis research and presentations by invited speakers.

Microbiology (MICB)

Department of Microbiology

Medical School

MICB 5205. Microbiology and Immunology for Medical Students. (0-7 cr; max 7 cr) Basic/clinical human immunology, medical microbiology. Molecular/cellular basis of immune responses, tolerance, Immunologic disease, serology, antimicrobial agents, chemotherapy. Basic/medical bacteriology, parasitology, mycology, virology. Unifying principles governing pathogenesis. Diseases are grouped with organisms important in differential diagnosis.

Microbiology, Immunology, and Cancer Biology (MICA)

Department of Microbiology

Medical School

MICA 5000. Practicum: Teaching. (1 cr; max 4 cr; A-F or Aud. Prereq-[MIMP or MICA] grad major or #) Supervised experience in lab instruction. Use of instructional materials, tests/measurement.

MICA 8002. Structure, Function, and Genetics of Bacteria and Viruses. (4 cr; A-F or Aud. Prereq-[One undergrad or grad course each in [microbiology, genetics, biochemistry]] or #) Structure, function, and metabolism of microorganisms. Microbial genetics. Molecular virology.

MICA 8003. Immunity and Immunopathology. (4 cr; Prereq-Upper-level undergrad or grad course in [microbiology, genetics, biochemistry] or #) Lymphocyte activation, signal transduction in lymphocytes, antigen receptor genetics, antigen presentation, lymphoid antibody, adaptive immune responses to microbes, immunodeficiency, immunopathology, cytokines, transplantation, autoimmunity.


MICA 8005. Topics in Microbiology, Immunology, and Cancer Biology. (1-4 cr; max 4 cr; Prereq-8001, two of [8002 or 8003 or 8004]) Colloquium format. Readings/discussion on or 8003 or 8004 or #) MICA 8005. Topics in Microbiology, Immunology, and Cancer Biology. (1-4 cr; A-F or Aud. Prereq-MICA grad student or instr) Concepts in cell adhesion and tissue composition and importance of cell adhesion in tissue function and disease. Topics range from structure/function of assembly of tissue components to cellular adhesion mechanisms.

MICA 8009. Biochemical Aspects of Normal and Abnormal Cell Growth and Cell Death. (2 cr; Prereq-8004 or [BIOC 3021, BIOL 4004] or #) Aspects of mechanisms involved in growth control at level of nuclear function. Neoplasia in hormonal cancers (such as prostate cancer) and role of protein phosphorylation in normal and abnormal growth. Mechanisms of cell death via apoptosis and its implications in normal and abnormal proliferation.

MICA 8010. Microbial Pathogenesis. (3 cr; A-F or Aud. Prereq-MICA grad student or instr) Molecular mechanisms of bacterial/viral pathogenesis. Strategies of disease causation/interaction with host, regulation of virulence factors, mechanism of virulence factor transmission to other microbes.

MICA 8011. Current Topics in Immunology. (3 cr; A-F or Aud. Prereq-MICA 8003 or #) Colloquium format. In-depth reading, discussion.


MICA 8094. Research in Microbiology, Immunology, and Cancer Biology. (1 cr; max 2 cr; S-N or Aud. Prereq-1st-year MICA grad student) One-on-one research training from faculty advisor during laboratory rotation.

MICA 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, advisor and DGS consent)

MICA 8371. Mucosal Immunobiology. (3 cr; A-F or Aud. §CAS 8371, BIOC 8371, Prereq-8001 or #) Host immune processes at body surfaces. Innate/adaptive immunity at mucosal surfaces, interactions/responses of various mucosal tissues to pathogens, current approaches being used to target protective vaccination to mucosal tissues. Lectures, journal club format.

MICA 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, advisor and DGS consent)

MICA 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral, no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

MICA 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq-MAX 18 cr per semester or summer; 10 cr total required [Plan A only])

MICA 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-MAX 18 cr per semester or summer; 24 cr required)

MICA 8910. Seminar: Faculty Research Topics. (1 cr; max 10 cr; S-N or Aud. Prereq-[MIMP or MICA] grad student or #) State-of-the-art information presented by scientific experts within/outside the University.

MICA 8920. Seminar: Student Research Topics. (1 cr; max 10 cr; S-N or Aud. Prereq-[MIMP or MICA] grad student or #) Current thesis topics and other aspects of microbiology, immunology, and cancer biology.

Middle Eastern Languages and Cultures (MELC)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

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

MELC 5526. Islam and Communism. (3 cr; §CAS 5356, CAS 5526, MELC 5356) Development of medieval Islamic culture in Transoxiana; formation of Sufi orders; rise and development of Communist ideology; introduction of socialist principles into Central Asia; clash of Islamic principles with Communist dicta; Pan-Islamism; Pan-Turkism.

MELC 5532. Russia and Central Asia. (3 cr; §CAS 5352, CAS 5532, MELC 5532) Rise and fall of the Mongol Empire, formation of the Chaghatay Khanate and the Golden Horde. Russian expansion into Central Asia and rivalry with Britain. Russia and the Central Asian republics during and after the Soviet period.

MELC 5601. Persian Fiction in Translation. (3 cr; §CAS 3601, CAS 5601, MELC 5601) Impact of westernization on Iran, from 1920s to present. Materials produced by Iranian writers, film makers, and intellectuals. Internal/external forces that bind contemporary Iranian society to world civilization. Works of Hedayat (especially Blind Owl), Chubak, Al-I Ahmad, Daneshvar, and Behrangi are analyzed/interpreted.

MELC 5602. Persian Poetry in Translation. (3 cr; §CAS 3602, CAS 5602, MELC 5602) Major poetic works of Iran dealing with life at the medieval courts, Sufic poetry, and “new” poetry are studied. Rudaki, Khayyam, Rumi, Hafiz, Yushnj, and Farrukhudda are among the poets whose works are examined.

MELC 5993. Directed Studies. (1-10 cr [max 10 cr]; Prereq-#, Δ, Α, Δ) Directed Studies

MELC 5994. Directed Research. (1-10 cr [max 10 cr]; Prereq-#, Δ, Α, Δ) Directed Research

Molecular Cellular Developmental Biology and Genetics (MCDG)

College of Biological Sciences

MCDG 8333. FTE: Master’s. (1 cr; No grade. Prereq-Master’s student, advisor and DGS consent)

MCDG 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, advisor and DGS consent)

MCDG 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral, no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)
MUS 5111. Advanced Piano Pedagogy I. (2 cr; A-F or Aud. Prereq—MUS 5101 or 5111 or 5112) Discussion and demonstration of teaching techniques, methods, and materials for group and individual instruction at the intermediate and early advanced levels.

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

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


MUS 5151. Organ Literature I. (3 cr; A-F or Aud. Prereq—5302, 3803, sr or grad or #) Organ literature from the 14th century to the mid-18th century. Influence of organ design of various periods and national schools on the literature and its performance.

MUS 5152. Organ Literature II. (3 cr; A-F or Aud. Prereq—5302, 3803, sr or grad or #) Organ literature of J. S. Bach and of other 19th- and 20th-century composers. Influence of organ design of various periods and national schools on the literature and its performance.

MUS 5160. Instrumental Accompanying Skills and Repertoire. (2 cr; max 4 cr; A-F or Aud. Prereq—Accomp major) Performance class in accompanying skills particular to orchestral reductions and non-sonata instrumental accompanying. Repertoire to include, but not be limited to, classical and romantic string concertos, and "encore" pieces.

MUS 5170. Vocal Accompanying Skills and Repertoire. (2 cr; max 4 cr; A-F or Aud. Prereq—French, German and Italian diction, accomp or grad vocal major) Performance class (Lieder, melodie, opera) with emphasis on coaching techniques and performance skills of pianists and singers.

MUS 5181. Advanced Piano Literature I. (2 cr; A-F or Aud. Prereq—grad piano major or #) Literature for piano from late Baroque period to mid-20th century.

MUS 5182. Advanced Piano Literature II. (2 cr; A-F or Aud. Prereq—grad piano major or #) Literature for piano from late Baroque period to mid-20th century.

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

MUS 5240. Chamber Singers. (1 cr; max 8 cr; A-F or Aud. Prereq—Audition, #) Mixed choirs of about 24 voices. Performances each semester of works for small choirs.

MUS 5241. Vocal Literature I. (3 cr; A-F or Aud. Prereq—[12 cr in MUS 1304, grad music student or #] Vocal literature of major/minor composers from 17th century to present. Structure, style, performance practice.

MUS 5242. Vocal Literature II. (3 cr; A-F or Aud. Prereq—12 cr in MUS 1304 or MUS 1304, grad music major or #) Vocal literature of major and minor composers from 17th century to present; structure, style, and performance practice.

MUS 5250. Opera Workshop and Ensemble. (1 cr; max 8 cr; A-F or Aud. Prereq—audition, #) Preparation and performance of operatic arias, choruses, and scenes. Participation in fully staged or workshop productions of music theatre repertoire.

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

MUS 5271. Diction for Singers I. (2 cr; A-F or Aud. Prereq—[12 cr in MUS 1304 or grad music major or #] Principles and techniques of singing in English, Italian, Spanish, German, and French. International Phonetic Association alphabet used.

MUS 5272. Diction for Singers II. (2 cr; A-F or Aud. Prereq—12 cr in MUS 1304 or grad music major or #) Principles and techniques of singing in English, Italian, Spanish, German, and French. International Phonetic Association alphabet used.

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

MUS 5277. Vocal Workshop. (1-2 cr; max 8 cr; A-F or Aud. Prereq—Vocal–Music major or #) Short term vocal workshops address specific topics including voice science, pedagogy, and performance of vocal repertoire. One workshop focuses on class voice instruction.

MUS 5279. Group Voice: Performance/Pedagogy. (2-3 cr; A-F or Aud. Prereq—performance only track: 2 cr per semester; performance/pedagogy track: 3 cr per semester, a.) Group voice teaching methods, including voice/motion exercises. Vocal production, anatomy, physiology, terminology. Application of vocal techniques in learning/performance repertoire. Teaching methods, including voice/motion exercises.


MUS 5336. Jazz Arranging. (3 cr; A-F or Aud. Prereq—5302 or #) Beginning techniques of arranging for jazz combo and jazz ensemble; vocal and instrumental.

MUS 5340. Jazz Ensemble. (1 cr; max 6 cr; A-F or Aud. Prereq—Audition, #) A 20-member performing organization covering significant jazz compositions and arrangements written specifically for this medium.

MUS 5341. Jazz Pedagogy. (2 cr; A-F or Aud. Prereq—#) Teaching methods of vocal and instrumental jazz improvisation, basic arranging techniques, and jazz history; bibliographies and materials.

Courses

MUS 5410. University Wind Bands. (1 cr [max 14 cr]; A-F or Aud. Prereq—Aud. or Auditee.) Wind ensemble and symphony bands perform standard and contemporary literature; concerts and tour appearances. Players from all colleges may participate.

MUS 5420. Orchestra. (1 cr [max 8 cr]; A-F or Aud. Prereq—Aud.) Symphony orchestra performs standard repertory and major works with chorus; concerts and tour appearances. Players from all colleges may participate.


MUS 5423. Suzuki Violin Pedagogy Practicum. (1 cr; A-F or Aud. Prereq—5424 or 5425, grad music student or #, grad consent) Supervised teaching of both individual and group lessons. Instructor provides periodic critiques from observation of live or videotaped lessons.


MUS 5425. Advanced Suzuki Violin Pedagogy II. (2 cr; A-F or Aud. Prereq—5424 or #) Intensive examination of Suzuki techniques for intermediate and advanced violin students in Western society. Discussion, playing experience, observation of children’s lessons in the MacPhail Center Suzuki Program, and practical teaching experience.

MUS 5427. Violin Pedagogy I. (2 cr; A-F or Aud. Prereq—Violin or viola major or #) Private teaching of violin students at beginning, intermediate, and advanced levels. Discussion and demonstrations of pedagogical techniques.

MUS 5428. Violin Pedagogy II. (2 cr; A-F or Aud. Prereq—Violin or viola major or #) Private teaching of violin students at beginning, intermediate, and advanced levels. Discussion and demonstrations of pedagogical techniques.

MUS 5430. New Music Ensemble. (1 cr [max 8 cr]; A-F or Aud. Prereq—Δ) Study/performance of contemporary ensemble (including small chamber orchestra) literature. Historical/theoretical analysis of works performed.

MUS 5440. Chamber Ensemble. (1 cr [max 8 cr]; A-F or Aud. Prereq—audience.) Performance of chamber music; duos, trios, quartets, quintets, and other ensemble combinations for instruments and/or voices.

MUS 5450. Orchestral Repertoire. (1-3 cr [max 9 cr]; A-F or Aud. Prereq—#) Investigation of practical and performance problems in standard orchestral repertoire with regard to style and interpretation.

MUS 5460. Ensemble for the Performance of Early Music, c. 900–1750. (1 cr [max 8 cr]; A-F only) Performance of medieval, renaissance, and baroque music (sacred and secular) according to traditions established from c. 900 to 1750. Ensemble consists of a chamber chorus and ensembles of period instruments. Repertoire includes Gregorian chant, masses, motets, chansons, madrigals, and choral/instrumental movements from cantatas, oratorios, passions, all in original languages.

MUS 5464. Cello Pedagogy. (2 cr; A-F or Aud.) Concentrated study of cello teaching methods. Provides students with the strategies for teaching cello privately, develops analytical skills, and increases knowledge of cello repertoire. For practical application in conjunction with string technique course.


MUS 5466. Guitar Pedagogy. (2 cr; A-F or Aud. Prereq—Guitar principal or major or #) Historical survey of methods and techniques from late 18th century to present, reflecting variety of content and approach. Works by Aguado, Sor, Giuliani, Tarrega, Segovia, Carlevaro, Duncan, Iznaloa, Dodgson, and Brindle.

MUS 5470. Woodwind Chamber Ensemble. (1 cr [max 8 cr]; A-F or Aud. Prereq—Audition. or Δ) Chamber music performance using homogeneous or mixed combinations of woodwind instruments.

MUS 5471. Woodwind Literature and Pedagogy I. (3 cr; A-F or Aud. Prereq—Music major or #) A study of the major teaching materials for the five woodwind instruments including methods, duets, and solos used primarily for pedagogical reasons.

MUS 5472. Woodwind Literature and Pedagogy II. (3 cr; A-F or Aud. Prereq—Music major or #) A study of chamber music involving one or more woodwind instruments. May include additional instruments such as piano, strings, and/or voice.

MUS 5473. History and Acoustics of Single Reed Instruments. (2 cr; A-F or Aud. Prereq—Music major or #) Study of clarinet and saxophone history and literature, mechanical and acoustical considerations, modern schools of performance, selected teaching and performance techniques.

MUS 5480. University Brass Choir. (1 cr [max 8 cr]; Prereq—audition. or Δ) The University Brass Choir is an ensemble of 16 brass and percussion players exploring unique literature that spans 400 years. From the rich antiphonal music of Giovanni Gabrieli (1557-1612) to the works of the 20th century. The Brass Choir performs in Twin Cities churches and concert halls.

MUS 5481. Trumpet Pedagogy. (2 cr; Prereq—Sr or grad in music or #) Principles of trumpet pedagogy. Discussion of literature, history, and current teaching aids.

MUS 5485. Transcription for Winds. (2 cr; Prereq—[3502 or 3502]) Principles of music manuscript and examination of transcription examples. Transcription projects with score and parts. Smaller projects that involve arrangements and original compositions.


MUS 5491. Percussion Literature I. (2 cr; A-F or Aud. Prereq—Jr or Sr or grad or #) Repertoire derived from orchestral and band literature for snare drum, timpani, mallet instruments, and various percussion accessories. Major works of the 20th century written for solo percussion, percussion ensemble, and chamber groups of percussion and non-percussion instruments.

MUS 5492. Percussion Literature II. (2 cr; A-F or Aud. Prereq—Jr or Sr or Aud. grad) Repertoire derived from orchestral and band literature for snare drum, timpani, mallet instruments, and various percussion accessories. Major works of the 20th century written for solo percussion, percussion ensemble, and chamber groups of percussion and non-percussion instruments.

MUS 5541. 16th-Century Counterpoint. (3 cr; A-F or Aud. Prereq—[3501, 3504] or pass basic skills exam) Polyphonic counterpoint in modal style of Renaissance. Writing exercises in species counterpoint and in two, three, and four parts. Cantus firmus techniques, mixed values, invertible counterpoint, canon. Representative works by Josquin, Lassus, Palestrina, Victoria, and others. Renaissance treatises by Artusi, Banchieri, Diruta, Morley, Zarlini, and others.

MUS 5550. Class Composition. (2 cr [max 8 cr]; A-F or Aud. Prereq—[3502 or 3502]) Original works in various forms. Development of individual compositional style in a post-tonal idiom. Various forms, performing forces, techniques.

MUS 5581. Orchestration I. (3 cr; A-F or Aud. Prereq—[3502]) Scoring techniques for ensembles in combination and full orchestra; year-long sequence. Score study of representative works from 18th through 20th centuries.

MUS 5582. Orchestration II. (3 cr; A-F or Aud. Prereq—[5561]) Scoring techniques for ensembles in combination and full orchestra; year-long sequence. Score study of representative works from 18th through 20th centuries.

MUS 5571. Schenkerian Analysis for Performers. (3 cr; A-F or Aud. Prereq—[5502]) Theory/analysis of tonal music using principles developed by Henrich Schenker. Basic concepts/notation, their application to excerpts/short pieces from 18th/19th centuries.

MUS 5572. Chromaticism in Tonal Music. (3 cr; Prereq—[5502]) Exploration of chromatic tonal practices through analysis of selected repertoire, completion of written exercises (figured bass, harmonization of melodies, model composition), ear-training, and keyboard exercises.

MUS 5573. Analysis of Late-Romantic Orchestral Literature. (3 cr; A-F or Aud. Prereq—[5502 or Theory IV Exam or # 5304 or equiv recommended] Introduction to advanced tonal analysis. Corpus of dramatic orchestral music by Wagner, Strauss, Tchaikovsky, Rimsky-Korsakov, Moussorgsky, and Rachmaninoff as focus for projects and classroom discussions related to chromatic harmony, form, and orchestration.


MUS 5592. Digital Music Synthesis and Processing Techniques. (3 cr; A-F or Aud. Prereq—[5591 or #]) Study of specific dsp topics such as filtering, formant synthesis, reverberation techniques, and additive synthesis. Work with interactive MIDI applications.

MUS 5597. Music and Text. (3 cr; A-F or Aud. Prereq—[5502]) Designed for music majors only, this course gives an introduction to the analysis of music with texts such as art song and opera.

MUS 5611. Resources for Music Research. (3 cr; A-F or Aud. Prereq—[5603]) Development of skills in identifying, locating, and evaluating resources for research in music. Computer-searching techniques, acquaintance with basic reference sources in the field, preparation of the music research paper.

MUS 5620. Topics in Opera History. (3 cr [max 6 cr]; A-F or Aud. Prereq—grad music major or #) Study of specific operas. Development of opera in context of other artistic, social, cultural, and political events, movements, and changes. Periods/countries vary each semester.

MUS 5621. Baroque Music and Its Contexts. (3 cr; A-F only. Prereq—[5602]) (Grad student in music or #) Genres, styles, and contexts of music composed in Western Europe between 1660 and 1750. Emphasizes works typically not covered in undergraduate music history classes. Individual works as representative
of larger aesthetic, social, political, and theological issues.

MUS 5644. Music in 20th-Century American Culture. (3 cr; A-F or Aud. Prereq–3636 or 5501 or #) Stylistic and cultural bases of cultivated and vernacular traditions and their interactions. Topics include folk and ethnic musics, ragtime, city blues and jazz, rock, musical theater, impact of technology, modernism, nationalism, new accessibility.

MUS 5647. 20th-Century European/American Music. (3 cr; Prereq–3636 or equiv, 5501 or equiv, 12 undergrad cr in music history.) Emphasizes major artistic movements, stylistic turning points, social roles of music. Interactions between high art, popular, ethnic musics; contributions of men and woman as composers and performers.

MUS 5658. History of the Symphony in the 20th Century. (3 cr; A-F or Aud. Prereq–3636, 5501 or #) History of symphony (and related genres) in Europe and America, ca. 1890 to present. Changing aesthetic concerns, structural, harmonic, and timbral innovations. Sociocultural contexts; analysis and criticism.

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

MUS 5668. Beethoven’s Symphonies. (3 cr; A-F or Aud. Prereq–3636, #) Analytical overview of selected movements from Beethoven’s 9 symphonies. Principles of sonata analysis (norm and deformation); introduction to wider contexts of interpretation and understanding (generic, expressive, social).

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

MUS 5905. Topics in Music. (1-4 cr [max 15 cr]) Each offering focuses on a single topic. Topics specified in Class Schedule.

MUS 5903. Directed Studies. (1-4 cr [max 12 cr]; Prereq–#) Guided individual reading or study.

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


MUS 8131. Advanced Keyboard Skills. (2 cr; A-F or Aud. Prereq–Grad student in music or #) Diatonic/chromatic tonal harmony applied to keyboard. Emphasizes harmonization, transposition, and improvisation. Open score and clef reading using alto, tenor, and soprano clefs.

MUS 8133. Seminar in Basso Continuo. (3 cr; A-F or Aud. Prereq–Grad student in Music or #) Realization of figured basses (bass lines annotated with Arabic numerals indicating harmony) and performance of continuo parts in European concerted music from 17th and 18th centuries at keyboard. Emphasizes developing stylistic accompaniment skills at harpsichord/organ.

MUS 8151. Seminar in Organ Repertoire. (3 cr; A-F or Aud. Prereq–Grad student in music or #) Repertoire for pipe organ. Readings/presentations on selected areas of repertoire of 15th through 20th centuries. Organ design/construction of various European and American schools, as well as relevant performance practices.

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

MUS 8171. Song Repertoire and Performance for Pianists and Singers: German Lieder. (2 cr; A-F or Aud. Prereq–Grad student with major in vocal performance or in accompanying or in piano.) Surveys standard German-language song repertoire: Mozart, Schubert, Schumann, Brahms, Strauss, Wolf.

MUS 8172. Song Repertoire and Performance for Pianists and Singers: French Melodies. (2 cr; A-F or Aud. Prereq–Grad student with major in vocal performance or in accompanying or in piano.) Surveys standard French melodies: Faure, Chausson, Duparc, Debussy, Ravel, Poulenc, Caplet, Roussel, Satie.

MUS 8173. Song Repertoire and Performance for Pianists and Singers (20th and 21st Centuries). (2 cr; A-F or Aud. Prereq–Grad student, [major in vocal performance or accompanying or in piano], #) Surveys standard 20th-century songs. Nontraditional notation, avant-garde compositions.

MUS 8174. Song Repertoire and Performance for Pianists and Singers (English Song). (2 cr; A-F or Aud. Prereq–Grad student, [major in vocal performance or accompanying or in piano], #) Surveys standard English songs from Elizabethan age to present, Italian songs, “bel canto” tradition.

MUS 8175. Song Repertoire and Performance for Pianists and Singers: Russian, Spanish, and other languages. (2 cr; A-F or Aud. Prereq–Grad student with major in vocal performance or in accompanying or in piano.) Surveys standard songs in Russian, Spanish, and other languages: Turina, Obradors, Granados, Nin, Rodrigo, Monstsalvatge, Guridi, Tchaikovsky, Rachmaninoff, Prokofiev, Stravinsky, Shostakovich. International Phonetic Alphabet.

MUS 8181. Operatic Accompaniment Skills and Repertoire. (2 cr; A-F or Aud. Prereq–Grad student with major in accompanying or in conducting) Development of skills required in operatic accompanying/teaching work. Standard opera arias, cultivation of orchestral sound at the piano, stylistic traditions, working with conductors.

MUS 8182. Opera History in Context: Monteverdi and Mozart. (3 cr; A-F only. Prereq–Grad student in music or #) Development of opera in context of other artistic, social, cultural, and political events, movements, and changes. Focuses on two representative composers and some of their significant operas.

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

MUS 8255. Choral Literature: Baroque Era to the Present. (3 cr; A-F or Aud. Prereq–#) Survey of sacred and secular choral works.

MUS 8299. Performance in Choral Conducting. (3 cr; A-F or Aud. Prereq–#) Preparation and performance of choral conducting recital, with supporting paper.

MUS 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent) FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

MUS 8450. Graduate Seminar in Conducting. (3-4 cr [max 32 cr]; A-F or Aud. Prereq–Conducting emphasis or #) Development of musicianship, conducting, rehearsal, and analytical skills. Repertoire, gesture, study, interpretation, pedagogy, and performance presentation in wind band, orchestral, and choral conducting. Students meet twice weekly in group seminar, and prepare and participate in weekly conducting labs scheduled with all major University ensembles.


MUS 8471. Wind Ensemble/Band Conducting II. (4 cr; A-F or Aud. Prereq–Wind conducting emphasis or #) Seminar in wind band repertory of 18th, 19th, and 20th centuries emphasizing stylistic and period practices; techniques of score study, analysis, and interpretation. Practical conducting experience.

MUS 8472. Wind Ensemble/Band Conducting II. (4 cr; A-F or Aud. Prereq–#) Seminar in study of music for small wind ensembles and Harmonienmusik tradition; rehearsal techniques and strategies. Music since 1960; contemporary notation systems; rehearsal techniques and strategies. Practical conducting experience.


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

MUS 8489. Performance and Document: Orchestral Conducting. (3 cr; A-F or Aud. Prereq–#) Preparing and performing full orchestral conducting program with supporting document.

MUS 8490. Choral Conducting. (4-12 cr [max 12 cr]; A-F or Aud. Prereq–#) Preparatory and observing careers in conducting. Students study musical scores and conducting/rehearsal techniques.

MUS 8501. Music Theory Pedagogy. (3 cr; A-F or Aud. Prereq–Grad student in music or #) Comparison of pedagogical philosophies/methods in music theory. Pedagogical literature, practice teaching, curriculum design.

MUS 8550. Composition. (3 cr [max 12 cr]; A-F or Aud. Prereq–#) Creation of original musical works in various instrumental and vocal forms; advanced development of writing and realization of musical ideas.

MUS 8560. Readings in Music Theory. (3 cr [max 12 cr]; A-F or Aud. Prereq–#) Seminars on major theoretical text or group of interrelated texts. Pre-tonal, tonal, post-tonal, or non-Western focus in individual offerings.

MUS 8565. Text Setting. (3 cr; A-F or Aud. Prereq–#) Emphasis in composition or choral conducting or voice or accompanying or music education.

MUS 8570. Seminar in Composition. (2 cr [max 4 cr]; A-F or Aud. Prereq–Composition emphasis or #) Aesthetic and professional issues in composition. Survey of professional activities, including resume) and grant writing and concert production.
Courses

MUS 8571. Composers’ Laboratory. (3 cr; [max 12 cr]; A-F or Aud. Prereq—8570) Preparing original music composition to specification for possible radio/TV/theatre/film use. Analytic projects based on research into current practice of music criticism/music journalism. Philosophical and sociological research into creative process.

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

MUS 8580. Topics in Tonal Analysis. (3 cr; [max 12 cr]; A-F or Aud. Prereq—Grad music major who has completed all undergrad requirements in tonal theory and analysis) Seminar. Sample topics: string quartets of Beethoven, chamber music of Brahms, and significant works by other tonal composers.

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

MUS 8582, Schenkerian Theory and Analysis II. (3 cr; A-F or Aud. Prereq—8581 or #) Application of Schenkerian theory to 18th-/19th-century music, coordinated with critical study of major music treatises from that era.

MUS 8590. Topics in 20th-Century Analysis. (3 cr; [max 12 cr]; A-F or Aud. Prereq—Grad music major, #) Seminar explores literatures of 20th-century art music.

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

MUS 8632. Seminar: Music in Early Modern Europe. (3 cr; A-F or Aud. Prereq—Undergrad music degree) Transformation of chanson, madrigal, mass, and motet from 1400 to 1580. Analysis and cultural criticism; social roles of music and performance traditions; current musicoeducational issues.

MUS 8640. Seminar in Musicology. (3 cr; [max 12 cr]; A-F or Aud. Prereq—Musicology or theory emphasis or #) Topics vary; readings, research, strategies, and methods.


MUS 8645. Current Musicology: Readings. (3 cr; A-F or Aud. Prereq—Musicology or theory emphasis or #) Readings and topics in recent scholarly and analytical work.


MUS 8651. Sonata Theory. (3 cr; A-F or Aud. Prereq—#) Principles of the classic sonata: norms, types, and deformations. Structural analysis, analytical methodologies, and fundamentals of sonata hermeneutics.

MUS 8660. Doctoral Pre-Thesis Credits. (1-6 cr; [max 12 cr]) No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr.

MUS 8677. Thesis Credits: Master’s. (1-18 cr; [max 50 cr]; No grade. Prereq—Max 15 cr per semester or summer; 10 cr total required [Plan A only].)


MUS 8888. Thesis Credit: Doctoral. (1-24 cr; [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

MUS 8994. Directed Research. (1-3 cr; [max 12 cr]; A-F or Aud. Prereq—#) Directed research.

MUS 8999. Recital Credits: Doctoral. (4 cr; A-F or Aud. Prereq—#) Registration for recital credits coincides with performance of D.M.A. recital (five recitals for 20 credits).

Music Applied (MUSA)

School of Music

College of Liberal Arts

Note: MUSA 5101 through MUSA 5123 are private instruction and the prerequisites are (2 cr or [max 8 cr]; A-F only. Prereq—Audition).


MUSA 5109. Flute. Elective.

MUSA 5111. Oboe. Elective.


MUSA 5113. Saxophone. Elective.


MUSA 5115. French Horn. Elective.

MUSA 5116. Trumpet. Elective.

MUSA 5117. Trombone. Elective.


MUSA 5119. Tuba. Elective.


Note: MUSA 5401 through MUSA 5424 are private instruction and the prerequisites are (2-4 cr; [max 8 cr]; A-F only. Prereq—Audition).

MUSA 5401. Piano—Secondary.

MUSA 5402. Harpsichord—Secondary.

MUSA 5403. Organ—Secondary.


MUSA 5405. Violin—Secondary.

MUSA 5406. Viola—Secondary.

MUSA 5407. Cello—Secondary.


MUSA 5409. Flute—Secondary.

MUSA 5411. Oboe—Secondary.

MUSA 5412. Clarinet—Secondary.

MUSA 5413. Saxophone—Secondary.


MUSA 5415. French Horn—Secondary.

MUSA 5416. Trumpet—Secondary.

MUSA 5417. Trombone—Secondary.


MUSA 5419. Tuba—Secondary.

MUSA 5421. Percussion—Secondary.

MUSA 5422. Harp—Secondary.

MUSA 5423. Guitar—Secondary.

Note: MUSA 8301 through MUSA 8324 are private instruction and the prerequisites are (2-4 cr; [max 48 cr]; A-F only. Prereq—Audition).

MUSA 8301. Piano—Major.

MUSA 8302. Harpsichord—Major.

MUSA 8303. Organ—Major.

MUSA 8304. Voice—Major.

MUSA 8305. Violin—Major.

MUSA 8306. Viola—Major.

MUSA 8307. Cello—Major.

MUSA 8308. Double Bass—Major.

MUSA 8309. Flute—Major.

MUSA 8311. Oboe—Major.

MUSA 8312. Clarinet—Major.

MUSA 8313. Saxophone—Major.

MUSA 8314. Bassoon—Major.

MUSA 8315. French Horn—Major.

MUSA 8316. Trumpet—Major.

MUSA 8317. Trombone—Major.

MUSA 8318. Euphonium—Major.

MUSA 8319. Tuba—Major.

MUSA 8321. Percussion—Major.

MUSA 8322. Harp—Major.

MUSA 8323. Guitar—Major.

MUSA 8324. Accompanying/Coaching.

Note: MUSA 8501 through MUSA 8524 are private instruction and the prerequisites are (2-4 cr; [max 8 cr]; A-F only. Prereq—Audition).

MUSA 8501. Piano—Beyond Requirement.

MUSA 8502. Harpsichord—Beyond Requirement.

MUSA 8503. Organ—Beyond Requirement.

MUSA 8504. Voice—Beyond Requirement.

MUSA 8505. Violin—Beyond Requirement.

MUSA 8506. Viola—Beyond Requirement.

MUSA 8507. Cello—Beyond Requirement.

MUSA 8508. Double Bass—Beyond Requirement.

MUSA 8510. Flute—Beyond Requirement.

MUSA 8511. Oboe—Beyond Requirement.

MUSA 8512. Clarinet—Beyond Requirement.

MUSA 8513. Saxophone—Beyond Requirement.

MUSA 8514. Bassoon—Beyond Requirement.

MUSA 8515. French horn—Beyond Requirement.

MUSA 8516. Trumpet—Beyond Requirement.
**Music Education (MUED)**

**School of Music**

**College of Liberal Arts**

**MUED 5011. Music in the Elementary Classroom**
(2 cr; Prereq–Mus 1001, elem ed grad student, A)
Fundamentals of music, methods, and materials for incorporating singing, rhythmic activities, classroom instruments, movement, listening, appreciation, and creation into context of classroom curriculum.

**MUED 5112. Research in Music Education: Techniques**
(3 cr; A-F or Aud.)
Methods and techniques employed in investigating and reporting music education problems; proposal development; bibliographic skills involved in conducting a significant review of related research.

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

**MUED 5118. Research in Arts Education: Qualitative**
(3 cr; A-F or Aud.)
Practical/analytic introduction to qualitative research procedures in arts education. Prepares students to develop research proposals. Students participate in a joint field exploration. Those who have established research interests may also work in another setting relevant to their long-term research goals.

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

**MUED 5313. Youth Music: Preferences, Influences, and Uses**
(3 cr; A-F or Aud.)
Prereq–Grad student in music or music education or \[9\]
Youth music preferences and their determinants. How music influences youth behavior. Students/teachers’ uses of commercial styles.

**MUED 5350. Student Teaching in Classroom Music**
(4-8 cr [max 8 cr]; A-F or Aud. Prereq–Music ed major, \#)
 Supervised teaching and observing of classroom and general music in elementary, junior high, and senior high schools. Weekly seminar emphasizing classroom management, curriculum development, and administration of music programs.

**MUED 5433. Techniques and Materials: Choral Ensembles**
(2 cr; A-F or Aud.)
Prereq–Music or music ed major or \[9\]
Research and performance on vocal and choral music education; choral curriculum issues; repertoire selection; rehearsal techniques.

**MUED 5450. Student Teaching in Vocal Music**
(4-8 cr [max 8 cr]; A-F or Aud. Prereq–Music ed major, \#)
Supervised teaching and observing of vocal music in elementary, junior high, and senior high schools. Weekly seminar emphasizing classroom management, curriculum development, and administration of music programs.

**MUED 5500. Guitar Methods for Education/Therapy Professionals**
(2 cr [max 8 cr]; Prereq–3502 recommended)
Accelerated program for developing guitar performance skills. Classroom applications, therapy applications, pedagogy.

**MUED 5550. Student Teaching in Instrumental Music**
(4-8 cr [max 8 cr]; A-F or Aud. Prereq–Music ed major, \#)
 Supervised teaching and observing of instrumental music in elementary, junior high, and senior high schools. Weekly seminar emphasizing classroom management, curriculum development, and administration of music programs.

**MUED 5611. Teaching Music with Related Arts**
(2 cr; A-F or Aud.)
Methods and materials for teaching music in cultural context including other art forms.

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

**MUED 5664. Teaching Music with Technology**
(3 cr; A-F or Aud.)
Home page development techniques, software/materials, audio/video utilities, research applications.

**MUED 5669. Psychology of Music**
(3 cr; A-F or Aud.)
Prereq–Psy 1001 or Psy 3604 or \[9\]
Basic study of the psychology and psychoacoustics of music including: perception, cognition, values and preferences, musical abilities, musical systems, media music effects, the influence of music on human behavior, and psycho-socio-physiological processes involved in musical behavior.

**MUED 5750. Topics in Music Education**
(1-4 cr [max 16 cr]; A-F or Aud.)
Prereq–Grad student in [music education/therapy or education] or \#)
Focuses on single topic, specified in Class Schedule.

**MUED 5800. Introduction to Clinical Music Therapy Practice**
(4 cr; A-F or Aud.)
Prereq–Music therapy major or \#)
Introduction to lab and field studies of music therapy and music behavior. Pre-internship experiences in health, welfare, recreational, and educational settings.

**MUED 5805. Applications of Music Therapy II: Music Therapy in Long Term Care and Psychiatric Care**
(4 cr; A-F or Aud.)
Prereq–Music therapy major or \#)
Methods and materials for music therapy in school and hospital settings; designing and implementing programs for severely and moderately handicapped children and adults.

**MUED 5806. Preparing for a Music Therapy Career**
(4 cr; A-F or Aud.)
Prereq–Music therapy major or \#)
 Identify and explore current controversies, issues, and values encountered in music therapy. Explore and analyze counseling processes and techniques. Students are placed in a health care facility for the term to gain pre-internship experience.

**MUED 5855. Music Therapy Internship**
(6 cr; S-N or Aud.)
Prereq–Music therapy major, \#)
Six-month resident internship in music therapy at an affiliated, approved hospital or clinic.

**MUED 5991. Independent Study**
(1-4 cr [max 8 cr]; A-F or Aud.)
Prereq–Grad student in music or music education, \#)
Independent study project organized by the student in consultation with the appropriate instructor.

**MUED 8112. Introduction to Research Methods and Design in Arts Education**
(3 cr; A-F or Aud.)
Prereq–Grad student in [music or music education], \#)
Methods including bearing and research designs employed in investigating education issues in the arts. Reporting results. Proposal development. Bibliographic skills for conducting a review of related research literature.

**MUED 8113. Advanced Applications of Quantitative Research Methods**
(3 cr; A-F only, \#)

**MUED 8115. Assessment in Arts Education**
(3 cr; A-F or Aud.)
Prereq–Grad student in [music or music education], \#)

**MUED 8211. Advanced Applications of Qualitative Research Methods**
(3 cr; A-F only, \#)

**MUED 8211. Foundations of Music Education**
(3 cr; A-F or Aud.)
Prereq–Grad student in [music or music education] or \#)
Issues in historical foundations of music education. Primary literature in the field. Role and current state of music education.

**MUED 8220. Seminar: Current Trends in Music Education**
(3 cr [max 36 cr]; A-F only, \#)
Current issues/trends in music education: philosophical, historical, psychological, and pedagogical. Course’s focus varies, reflecting the dynamic nature of the field.

**MUED 8281. Seminar: Psychological Issues**
(3 cr; A-F or Aud.)
Prereq–Doctoral student in music or music education or \#)
Issues in psychological foundations of music education.

**MUED 8282. Seminar: Historical Issues**
(3 cr; A-F or Aud.)
Prereq–Doctoral student in music or music education or \#)
Issues in historical foundations of music education.

**MUED 8283. Seminar: Psychological Issues**
(3 cr; A-F or Aud.)
Prereq–Doctoral student in music or music education or \#)
Issues in psychological foundations of music education.

**MUED 8284. Seminar: Research and Scholarly Issues**
(3 cr; A-F or Aud.)
Prereq–Doctoral student in music or music education or \#)
Scholarly/professional expectations of music educators and music therapists in academia and other positions of leadership. Writing for a variety of professional purposes/publications.

**MUED 8333. FTE: Master’s, (1 cr; No grade, Prereq–Master’s student, adviser and DGS consent)**

**MUED 8800. Master’s Research Project**
(1-5 cr [max 5 cr]; A-F or Aud.)
Prereq–Grad student in music or music ed major, \#)
Individual Plan B projects.

**MUED 8900. Seminar: Music Education Doctoral Seminar**
(1 cr [max 8 cr]; A-F only, \#)
Prereq–\#)
Research-oriented collaboration between students and faculty. Models the manner in which research is conceived, primary literature evaluated, methods designed, and research projects carried through to completion.

**MUED 8994. Directed Research**
(1-8 cr [max 8 cr]; A-F or Aud.)
Prereq–\#)

**NPSE 8001. Introduction to Nanoparticle Science and Engineering**
(3 cr; A-F or Aud.)
Prereq–Grad student in [nanoparticle science and engineering, \#)
A broad, interdisciplinary overview of the emerging field of nanoparticle science and engineering. This introductory course, designed for students with diverse backgrounds in science and engineering, covers a wide spectrum of topics—from the synthesis of nanoparticles, to nanoparticle growth and transport, to characterization methods for nanoparticles, to novel nanoparticle-based materials and devices.
COURSES

NPSE 6002. Nanoparticle Science and Engineering Laboratory. (3 cr; A-F or Aud. Prereq–8001, IT grad student or #) Practical exposure to computational and experimental techniques in nanoparticle research. Required for Ph.D. students minoring in nanoparticle science and engineering.

NPSE 8101. Nanoparticle Science and Engineering Seminar. (1 cr; S-N or Aud. Prereq–IT grad student or) Broad overview of current research in nanoparticle science and engineering. Topics include areas of nanoparticle synthesis, nanoparticles characterization, nanoparticle-based materials and devices, environmental impact of nanoparticles, and instrumentation for nanoparticle research. Speakers from the University of Minnesota as well as external experts.

Natural Resources Science and Management (NR)

Department of Forest Resources

College of Food, Agricultural and Natural Resource Sciences

NR 8333. FTE: Master's. (1 cr; No grade. Prereq–Master's student, adviser and DGS consent)

NR 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

NR 8666. Doctoral Pre-Thesis Credits. (-1 cr; max 12 cr; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

NR 8777. Thesis Credits: Master's. (1-18 cr; max 50 cr; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

NR 8888. Thesis Credit: Doctoral. (1-24 cr; max 100 cr; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

Neuroscience (NSC)

Medical School

NSC 5031W. Perception. (3 cr; PSY 5031W. Prereq–Psy 3031 or Psy 3051 or #) Cognitive, computational, and neuroscience perspectives on visual perception. Color vision, pattern vision, image formation in eye, object recognition, reading, impaired vision. Course is biennial: offered fall of odd years.

NSC 5073. Psychology of Hearing. (3 cr; PSY 5073. Prereq–Psy 3073 or #) Biological and physical aspects of hearing, auditory psychophysics, theories and models of hearing, perception of complex sounds including music and speech, clinical and other applications.


NSC 5461. Cellular and Molecular Neuroscience. (4 cr; A-F or Aud. Prereq–NSC grad student or #) Lectures by team of faculty, problem sets in important physiological concepts, discussion of original research papers.

NSC 5462. Neuroscience Principles of Drug Abuse. (2 cr; §PHLC 5462. Prereq–#) Current research on drugs of abuse, their mechanisms of action, characteristics shared by various agents, and neural systems affected by them. Offered biennially, spring semester of even-numbered years.

NSC 5481. Invertebrate Neurobiology. (3 cr; A-F or Aud. §ENT 5481) Fundamental principles/concepts underlying cellular bases of behavior and “systems” neuroscience. Particular invertebrate preparations. Offered annually the last 10 weeks of spring semester.

NSC 5540. Advanced Survey of Biomedical Neuroscience. (2 cr; Prereq–#; intended for members of biomedical community or students with advanced scientific backgrounds) Current topics in biomedical neuroscience, accompanied by supporting, fundamental concepts. Intensive, one week course.

NSC 5561. Itasca Cell and Molecular Neurobiology Laboratory. (4 cr; S-N or Aud. Prereq–Neuroscience grad or #) Intensive lab introduction to cellular and molecular aspects of research techniques in contemporary neurobiology; held at Itasca Biological Station. Electrophysiological investigations of neuronal properties, neuropharmacological assays of transmitter action, and immunohistochemical studies in experimental preparations.


NSC 5661. Behavioral Neuroscience. (3 cr; A-F or Aud. Prereq–Grad NSC major or grad NSC minor or #) Neural coding/representation of movement parameters. Neural mechanisms underlying higher order processes such as memory, perception, memory scanning, and mental rotation. Emphasizes experimental psychological studies in human subjects, single cell recording experiments in subhuman primates, and artificial neural network modeling.

NSC 5667. Neurobiology in Disease. (2 cr; Prereq–#) Basic clinical/pathological features, pathogenic mechanisms. Weekly seminar course.

NSC 5668. Neurodegeneration and Repair. (2 cr; Prereq–#) Pathogenic mechanisms of neuronal death, neurodegenerative disease, neuronal repair. Weekly seminar course.

NSC 5826. Neuro-Immune Interactions. (3 cr; §CMB 5826. PSY 8026, Prereq–[3361, MCB 4131]) Regulatory systems (neuroendocrine, cytokine, and autonomic nervous systems) linking brain and immune systems in brain-immune axis. Functional effects of bidirectional brain-immune regulation. Course is offered fall of even-numbered years.

NSC 8207. Seminar: Psychopharmacology. (1-3 cr; max 12 cr; §PHLC 8207, PSY 8070. Prereq–#) Faculty and postdoctoral fellows interested in psychotropic drugs and chemicals participate. Some seminars devoted to biomedical ethics. Neurochemistry, pharmacology, and behavior as antecedent or consequential variables.

NSC 8211. Developmental Neurobiology. (3 cr; A-F or Aud. Prereq–Neuroscience grad student or #) How neuronal types develop. Emphasizes general mechanisms. Experimental data demonstrating mechanisms.

NSC 8216. Selected Topics in Autonomic and Neuroendocrine Regulation. (1 cr; S-N or Aud. §PHSL 8216. Prereq–#) Advanced seminar. Course is offered fall and spring semesters.

NSC 8217. Systems and Computational Neuroscience. (2 cr; S-N or Aud. Prereq–5561 or #) Advanced seminar.

NSC 8221. Neurobiology of Pain and Analgesia. (2 cr; Prereq–#) Pain and analgesia. Course is triennial.

NSC 8222. Central Regulation of Autonomic Function. (3 cr; A-F or Aud. §PHSL 8222. Prereq–5561) Neural/hormonal sensory pathways affecting central autonomic nuclei involved in maintenance of homeostasis. Current research on physiological control systems at cellular, organ, and integrative levels. Course is offered fall of odd-numbered years.


NSC 8248. Directed Readings in Auditory Physiology. (1-2 cr; max 2 cr; §OTOL 8248) Current research on biophysics and physiology of auditory system; topics selected for each student. Written reports prepared and discussed.

NSC 8320. Readings in Neurobiology. (1-4 cr; max 4 cr) Topics in neurobiology and neurophysiology.

NSC 8321. Career Skills and Understanding Responsibilities as a Neuroscientist. (1.5 cr; max 2 cr; S-N or Aud. Prereq–Neuroscience grad major or #) Information that falls outside of core neuroscience academic curriculum. Areas of practical value for graduate school and career development. Career skills, writing skills, responsible conduct in research.

NSC 8333. FTE: Master's. (1 cr; No grade. Prereq–Master’s student, adviser approval)

NSC 8334. Laboratory Neuroscience. (1-3 cr; max 10 cr; S-N or Aud. Prereq–Grad NSC major) Guided research.

NSC 8411. Teaching in Neuroscience. (1 cr; S-N or Aud. Prereq–inst approval) Grad students serve as primary instructors in 4151 and work with fellow students and faculty mentors to design curriculum, classroom sessions, exams, and course evaluations.

NSC 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

NSC 8481. Advanced Neuropharmacology. (4 cr; A-F or Aud. §CMB 8481, PHM 8481. Prereq–#) Delivery of compounds to central nervous system (CNS) to activate proteins in specific brain regions for therapeutic benefit. Pharmaceutical/pharmacological issues specific to direct drug delivery to CNS.

NSC 8666. Doctoral Pre-Thesis Credits. (1-6 cr; max 12 cr; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; a for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

NSC 8777. Thesis Credits: Master's. (1-18 cr; max 50 cr; No grade)

NSC 8888. Thesis Credit: Doctoral. (1-24 cr; max 100 cr; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)
Neuroscience Department (NSCI)

Department of Neuroscience Medical School

NSCI 5101. Introduction to Neuroscience for Graduate Students. (3 cr; A-F or Aud. Prereq—lecture \textBioc 3021 or Bioc 4331). \( \Delta \) intended for grad students outside neuroscience program who require comprehensive intro

Basic principles of cellular/molecular neurobiology and nervous system. A term paper supplements lectures. Multiple-choice exams.

NSCI 5110. Dental Neuroscience for Graduate Students. (2 cr; A-F or Aud. Prereq—lecture 6110; Bioc 3021, Bioc 4004, \#; intended for grad students who require a comprehensive grad-level neuroscience course)

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

NSCI 5111. Medical Neuroscience for Graduate Students. (S; A-F or Aud. Prereq—lecture 6171; Bioc 3021, Bioc 4004, \#; intended for grad students who require a comprehensive medically-oriented neuroscience course)

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

NSCI 5540. Advanced Survey of Biomedical Neuroscience. (2 cr; Prereq—lecture 5111; Bioc 3021, Bioc 4004, \#; intended for grad students who require a comprehensive grad-level neuroscience course)

Current topics in biomedical neuroscience. Supporting, fundamental concepts. Intensive, one-week course.

NSCI 5913. BrainU 101: Neuroscience in the Classroom. (3 cr; A-F or Aud. Prereq—lecture 5913 or Bioc 5190, \#; application)

Two-week summer workshop. Week one focuses on training teachers in neuroscience through lectures, activities, and discussion sessions. Week two focuses on designing inquiry-based classroom investigations based on neuroscience education given during week one. Follow-up activities held during the academic year include BrainU staff/faculty classroom presentations and use of training materials.

NSCI 5914. BrainU 202: Neuroscience in the Classroom. (3 cr; A-F or Aud. Prereq—lecture 5913 or Bioc 5190, \#; application)

One-week summer workshop. Focuses on critiquing previously implemented neuroscience class activities, developing assessment tools, learning peer mentoring, and expanding neuroscience content knowledge. Follow-up activities held during academic year include BrainU staff/faculty classroom presentations, use of training materials, and peer mentoring sessions.

NSCI 5915. BrainU 303: Neuroscience in the Classroom. (2 cr; A-F or Aud. Prereq—lecture 5913 or Bioc 5190, 5914, \#; application)

One-week summer workshop. Focuses on critiquing previously implemented neuroscience class activities and assessment tools, and expanding neuroscience content knowledge. Follow-up activities held during academic year include BrainU staff/faculty classroom presentations, use of training materials and implementation of neuroscience investigations.

Neurosurgery (NSU)

Department of Neurosurgery Medical School

NSU 8318. Neuroradiological Conference. (1 cr; S-N or Aud) Neuroradiological conference.

NSU 8320. Neurosurgical Conference. (1 cr; S-N or Aud) Neurosurgical conference.

NSU 8324. Readings in Neurobiology. (1-15 cr; [max 15 cr]; Prereq—6104, \#)

Nursing (NURS)

School of Nursing

NURS 5016. Critical Reading of Scientific Literature in Adolescent Health. (1 cr; Prereq—Grad-level research methods course, intermediate statistics course) \& \#; Application of skills, from research methods and statistics courses to critical reading of empirical literature on adolescent health. Relevance of research findings to adolescent health practice.

NURS 5030. Clinical Foundations. (7 cr; [max 21 cr]; A-F or Aud. Prereq—Admission to postbaccalaureate certificate nursing program)


NURS 5031. Human Response to Health and Illness: Adults and Elders. (6 cr; A-F or Aud. Prereq—Postbaccalaureate certificate program)

Individual responses to health/illness, in context of families/environments. Clinical component emphasizes application of nursing process in adult/elderly populations.

NURS 5032. Human Response to Health and Illness: Children and Childbearing Families. (6 cr; A-F or Aud. Prereq—Postbaccalaureate certificate program)

Family responses to health/illness. Emphasizes application of nursing process in children and childbearing families. Seminar and community-based project focus on family as unit of care.

NURS 5033. Population Response to Health and Mental Illness. (6 cr; A-F or Aud. Prereq—Nursing postbaccalaureate certificate program)

Population-based nursing practice. Emphasizes application of nursing process in promoting mental health and public health, and in preventing illness across life span. Clinical experiences include interactions with individuals, families, communities, and systems.

NURS 5034. Clinical Seminar: Nursing Care of Clients With Complex Health Conditions. (2 cr; A-F or Aud. Prereq—5033, 8100; Nursing Postbaccalaureate certificate program)

Exemplar cases from clients. Clinical settings used as basis for development of clinical decision-making. Critical analysis of current/emergent nursing care issues associated with caring for complex/diverse populations.

NURS 5035. Practical Nursing Care for Complex Health Conditions. (4 cr; A-F or Aud. Prereq—Nursing postbaccalaureate certificate program or master of nursing program)

Clinical decision-making, comprehensive nursing care of clients with complex health problems. In collaboration with a clinical preceptor and a faculty advisor, students develop an individualized learning contract.

NURS 5040H. Seeking Solutions to Global Health Issues. (3 cr; Prereq—Grad student or sr nursing honors student or CLA upper div honors or \#)

Global health issues from interdisciplinary perspective. Emphasizes ethical/cultural sensitivity/complexities. Students propose realistic actions that could be taken to resolve these issues.

NURS 5111. Learning Theories for Nursing Education. (1 cr)

Overview of selected learning theories used in academic, patient, and staff education in nursing.

NURS 5113. Web-based Teaching/Learning Strategies. (2 cr; S-N or Aud. Prereq—\#)

Skills necessary to design, produce, implement, and evaluate effective technology enhanced learning environments. Pedagogical/technological issues surrounding teaching with technology.

NURS 5115. Interprofessional Health Care Informatics. (3 cr; A-F or Aud)

Implications of informatics for practice, including nursing, public health, and health care in general. Electronic health record issues. Ethical, legislative, political, and global/future informatics issues.

NURS 5116. Consumer Self-Care Informatics. (1-2 cr; [max 2 cr]; Prereq—Nursing student or \#)

Consumer’s issues in acquiring, understanding, using, or providing health information. Online strategies for improving health. Consumer-provider relationships. Ethical/legal issues.

NURS 5141. Ethical Issues in Health Care of Elders. (3 cr; Prereq—Grad student or nursing or \#)

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

NURS 5170. Research Topics. (1-16 cr; [max 16 cr]; 6170)

Exploration of research topic to meet individual student needs.

NURS 5171. SPSS Programming and Data Analysis. (2 cr; Prereq—Inferential statistics, [grad or professional student] or \#)

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

NURS 5172. Decision Making in Health Care. (2 cr; Prereq—Grad student, \#)

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

NURS 5183. Scholarly Leadership. (1 cr; S-N or Aud. Prereq—Graduate level student, \#)

Implications of dissertation research on advancing science, clinical practice, and leadership in nursing and health care. Principles of scholarly collaboration.

NURS 5200. Holistic Health Assessment and Therapeutics for Advanced Practice Nurses. (3 cr; Prereq—Grad student or nursing postbaccalaureate certificate student)

Health assessment knowledge/skills for advanced nursing practice with patients across age span, including pregnancy. Selected nursing interventions, complementary therapies for application to specific populations/illnesses.

NURS 5202. Introduction to Complementary Healing Practices. (3 cr; Prereq—Grad nursing major, \#)

Historical and cultural context of the allopathic and complementary healing traditions. Philosophies and paradigms of selected complementary therapies and culturally based healing traditions; descriptions of selected interventions.

NURS 5204. Population Focused Assessment and Intervention. (2 cr; Prereq—Grad nursing major, \#)


NURS 5222. Advanced Physiology. (3 cr; Prereq—Grad nursing major or \#)

Systems approach to human physiology/pathophysiology. Physiologic changes across life span. Emphasizes clinical application using population-specific content related to various specialty areas in advanced practice nursing.

NURS 5223. Assessment of Psychopathology for Advanced Practice Psychiatric/Mental Health Nursing. (4 cr; Prereq—Nursing grad student or \#)

Advanced concepts from nursing theory and research, social sciences, neuropsychology, and neurophysiology used in the assessment of psychiatric symptoms and disorders across the age continuum. During clinical, develop proficiency in the assessment of psychopathology in clients with psychiatric symptoms.
Courses

NURS 5224. Clinical Pharmacotherapeutics. (3 cr; Prereq–Nursing grad student in primary care, pharmacology course) Foundation in pharmacotherapeutics across life span. Pharmacodynamics/kinetics/epidemiology, client patterns of medication use, selection of appropriate drugs for selected conditions, and prescriptive writing privileges for advanced practice nurses.

NURS 5225. Psychopharmacology for Advanced Practice Psychiatric/Mental Health Nursing. (3 cr; Prereq–Grad student or RN [with master's degree] or #) Advanced concepts in neuropsychopharmacology, and clinical management related to psychopharmacologic treatment of psychiatric disorders/symptoms. Application to problems in various clinical settings.

NURS 5228. Acute Care Pharmacotherapeutics. (3 cr; A-F or Aud. Prereq–Grad student) Analysis of pharmacodynamics, physiological bases, therapeutic effects, and non-intended effects (common errors, adverse effects, side effects) for selected pharmacologic agents within drug categories commonly used in acute care.


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

NURS 5310. Interprofessional Teamwork for Health Professionals. (1 cr; S-N or Aud. Prereq–Student in nursing or dentistry or medicine or pharmacy or public health or master's in health care administration) Introductory experience to interprofessional teamwork skills. Focuses on patient-centered care.

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

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

NURS 5522. Sociopolitical Context of Women's Health. (1-2 cr [max 3 cr]; S-N or Aud. Prereq–Grad student) Women's health issues from multidisciplinary perspective. Sexual/reproductive health issues across life span. Socio-cultural issues affecting health, such as poverty/violence.

NURS 5601. School Nursing in the Educational System and the Community. (1-3 cr [max 3 cr]; A-F or Aud. Prereq–3 yrs of college level courses, #) School health problems, assessment/intervention strategies. Integration of research findings. Applications with individuals, families, communities.

NURS 5604. Advanced Health Assessment and Interventions with Adolescents. (2 cr; Prereq–Qphy 5303 or equiv or #) Integrated knowledge from nursing, public health, health behavior, and adolescent development as framework for developing health assessment/ intervention strategies for clinical practice with adolescents.

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

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

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

NURS 5803. Transcultural Nursing: Theories and Issues. (2 cr; Prereq–Cultural anth course or #) Study of cultural influences on health behavior and patterns and health risk assessment; approaches to program creation.

NURS 5804. Therapeutic Healing Touch: Research and Practice. (2 cr; S-N or Aud. Prereq–Upper div or grad student in [health sciences or health care]) Therapeutic/Healing Touch as energetic based, biofield healing modality. Art/science of this modality. Research literature related to Therapeutic Touch/ Healing Touch. Explorations for explanations. Practice of Therapeutic Touch, intervention techniques.

NURS 5805. The 'M' Technique. (1 cr; S-N or Aud. Prereq–Undergrad nursing or grad student in health sciences or health professional) Scientific/theoretical foundations/practice of 'm' technique, a touch therapy for promoting relaxation by topically administering essential oils. Appropriate applications. Demonstration/practice of technique. Interdisciplinary course.

NURS 5806. Theoretical Foundations and Experiential Learning in Complementary/Alternative Therapies. (2-3 cr; Prereq–#) Overview of complementary therapies. Demonstration of selected therapies. Theoretical/scientific knowledge supporting use of therapies.

NURS 5807. Stories of Illness. (3 cr) Subjective experiences of various physical/mental illnesses. Social context of illness, society's responses to illness. Ethical implications for patients/practitioners. Uses fiction, art, film, music, first-person accounts of illness, and anthropological, sociological, and historical literature.

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

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

NURS 5810. Health Activism. (3 cr) Interdisciplinary skill-building workshops. Sessions taught by community leaders/activists. Community project focuses on issues of health disparities, environmental justice, and access to care.

NURS 5830. Advanced Clinical Nursing. (1-6 cr [max 6 cr]; Prereq–Grad nursing major, #) Independent study or faculty seminar on special clinical topic.

NURS 5900. Introduction to Principles and Practice of Anesthesia. (6 cr; A-F or Aud. Prereq–Grad student in nurse anesthesia) Administration of anesthesia. Application in operating room setting under one-to-one guidance of Certified Registered Nurse Anesthetist (CRNA).

NURS 5901. Basic Principles and Practice of Nurse Anesthesia. (2 cr; Prereq–Grad major or #) Students apply principles of anesthesia to formulate nurse anesthesia care plans for care of adults undergoing anesthesia.


NURS 5920. Nurse Anesthesia Care: Advanced Principles for Special Populations. (6 cr; A-F or Aud. Prereq–5910) Examination/application of principles used to deliver anesthesia by nurse anesthetists to special populations.

NURS 5940. Contemporary Issues in Nurse Anesthesia. (2 cr; S-N only. Prereq–5930) Analysis of economic, legal, political, ethical, and social factors that influence the practice and profession of CRNAs.

NURS 5941. Nurse Anesthesia Practicum A. (5 cr; S-N or Aud. Prereq–5930) First of a series of three clinical courses that focus on developing proficiency in nurse anesthesia practice. Emphasizes incorporating current research and demonstrating increasing autonomy in decision making and case management.


NURS 5995. Research Dissemination. (2 cr; Prereq–Doctoral student or #) Knowledge dissemination skills for advancement of health/nursing science/practice. Emphasizes interpretation/diffusion of research findings to health professional and scientific audiences in various venues and communication modalities.

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

NURS 8112. Theoretical Foundations of the Discipline. (3 cr; Prereq–5100 or equiv, knowledge of phi of sci) Paradigms in nursing and related methods of inquiry, knowledge structures, and projection of needs for further knowledge development and testing.

NURS 8113. Theory Development in Nursing. (3 cr; S-N or Aud. Prereq–5100 or equiv, 8112 or #) Strategies for theory development, synthesis of theoretical formulations in nursing using selected inductive and deductive theory development strategies.

NURS 8115. Integrated Seminar in Nursing Informatics. (3 cr; A-F or Aud. Prereq–Doctoral student, #) Problem-focused topics related to nursing and health informatics theory, measurement, and ethical/policy issues. Interdisciplinary, cross-institutional relationships. Interpersonal dynamics that support trust-building exchanges.

NURS 8120. Phenomenon of Health. (3 cr; Prereq–Grad major or #) Prevailing and emerging views of health from differing belief systems and methods of inquiry. Philosophical, theoretical, and methodological implications for development of a nursing paradigm based on evolving perspectives of humanness.
NURS 8121. Health Behaviors and Illness Responses. (3 cr; A-F or Aud; Prereq—Doctoral student or #) Theories of health behaviors and responses to illness are analyzed/critiqued. Multivariate research designs. Specification of testable, descriptive, dynamic models of health/illness that incorporate culture, biology, environment, and health systems for diverse individuals, families, communities, and populations.

NURS 8122. Stress, Coping, and Health. (2 cr; Prereq—Research course, grad nurs major, #) Stress and coping theories and related research; adequacy and efficacy of stress-management interventions/programs; directions for future research.

NURS 8123. Complex Care: Theory and Research. (2 cr; Prereq—Research course) Scientific basis of selected complementary therapies such as acupuncture, massage, imagery, music, and massage; hypotheses related to selected interventions; appropriate methodologies.

NURS 8124. Family Health Theory. (2-3 cr [max 3 cr]; Prereq—8110 or #) Emerging theory in family nursing science. Related theories. Research on family systems for structuring a systemic framework to examine clinical problems related to family health care. Applications to selected phenomena of interest to health care.

NURS 8134. Nursing Interventions and Outcomes. (3 cr; A-F or Aud; Prereq—Doctoral student or #) Design/evaluation of intervention/outcomes research. Analysis of classification systems for nursing interventions/outcomes. Use of advanced experimental design and multivariate statistical approaches to specify/test multi-level, theory-based interventions with various populations.

NURS 8140. Moral and Ethical Positions in Nursing. (3 cr; Prereq—Grad nurs major or #) Synthesis of ethical positions, from nursing perspective, on nursing situations from individual, group, population, and policy levels. Normative ethics, theoretical basis for positions taken, and contextual implications for subsequent action.

NURS 8152. Scholarship in Health Care Ethics. (2 cr; Prereq—Doctoral student) Analysis/evaluation of philosophical/empirical research in health care ethics with consideration of human diversity.

NURS 8170. Research in Nursing. (3 cr; Prereq—8170 or inferential stat course taken within two yrs) Research principles/appropriate for problems related to nursing. Critique of research studies, proposal development.

NURS 8171. Qualitative Research Design and Methods. (3-4 cr [max 4 cr]; Prereq—8170 or equiv) Overview and comparative analysis of selected qualitative research methods and analytic strategies. Focuses on developing rigorous qualitative designs that contribute to development of nursing and health care knowledge for diverse populations.


NURS 8173. Principles and Methods of Implementing Research. (3 cr; Prereq—8173, Prereq—8114 or other bее оn gr research methods course, 2 grad stat courses) Integrates statistical, scientific, and practical aspects of research. Inter-relationships among design, sample selections, subject access, human subjects requirements, instrument selection and evaluation, data management, analyses plans, grant writing, and research career issues. Field experiences required.

NURS 8175. Quantitative Research Design and Methods. (3 cr; A-F or Aud; Prereq—8170 or equiv. [bее оn statistics or bее оn statistics]) Designs for quantitative description and/or experimental/experimental evaluation of scientific problems across domain of nursing. Emphasizes evaluation of logic of design/contribution of causality from health and social science perspectives.

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

NURS 8177. Advanced Nursing Research Practicum. (2 cr; S-N or Aud; Prereq—8181 or #8118, PhD nursing student, #, adviser consent) Students collaborate with research team under supervision of faculty mentor in designing/conducting a health-related research project.

NURS 8178. Methods for the Study of Family Health Phenomena. (3 cr; Prereq—8124, 8100 or equiv or #) Conceptual and methodological approaches in study of family health phenomena from nursing perspective. Research designs formulated to study questions in this area.

NURS 8180. Doctoral Proseminar I: Scholarly Development. (1 cr; S-N or Aud; Prereq—Doctoral nursing student) Transition to doctoral study. Begins socialization process to role of practicing scholar/scientist. Career trajectories of nursing scholars who have pursued various roles.

NURS 8181. Protection of Research Subjects. (1 cr; Prereq—[PhD student or #]. [Responsible Conduct of Research or RCR I or RN ethics course required]) Ethical research conduct from design to dissemination. Application of Code of Federal Regulations for protecting human subjects, role of and relationship with Institutional Review Boards, risk management, safety monitoring and reporting of adverse events. Data management. Misconduct policies.

NURS 8182. Policy Implications of Nursing Research. (1 cr; S-N only; Prereq—Nursing doctoral student or #) Nursing research as a foundation for health policy. Research utilization for resolution of local, national, and state policy issues affecting population health and health service delivery. Political analysis to effect policy change.

NURS 8190. Critical Review in Nursing Research. (2 cr; A-F or Aud; Prereq—Advanced statistics course or #) Skills needed to critique a body of scientific literature in focused areas of nursing research and related fields. Construction of literature reviews for planning research projects and for research utilization.

NURS 8193. Special Topics in Nursing Research. (1-6 cr [max 6 cr]; Prereq—#) Seminar and/or individual study of research design, methodologies, or instruments.

NURS 8194. Problems in Nursing—Plan B. (1-6 cr [max 6 cr]; Prereq—#) Using a scholarly process to address a specific issue relevant to science/practice of nursing.

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

NURS 8241. Health Care Leadership for a Changing World. (2 cr or [max 3 cr]; Prereq—AHC grad student or #) Application of leadership theory/research to strengthen students’ capacity to facilitate change in health care delivery system.

NURS 8242. Population Focused Health Care Delivery Systems. (2 cr; Prereq—Grad nurs student or #) Health care organization/delivery systems, their relation to health of diverse populations. Models of population focused care, use of research to improve health care delivery, effect of economic/social factors on health/hospital services.


NURS 8301. Oncology Clinical I. (3 cr; Prereq—#8300, grad nurs major, Minnesota RN licensure) Synthesis and clinical application of knowledge of cancer risk factors and advanced practice interventions to modify cancer risk behaviors of individuals, families, and communities. Use of research and clinical models to analyze, manage, and evaluate responses to cancer and treatment.


NURS 8304. Advanced Practice Nursing for Acute Health Needs II. (3 cr; Prereq—#8300, 8100 or advanced physiology, 8302, [pathophysiology or immunobiology], advanced pharmacology) Evaluation of theories/models/research in management of symptoms. Application of theory/research to support clinical decision making for adults experiencing alterations in metabolic, alimentary, and regulatory phenomena. Emphasizes client outcomes related to advanced practice nursing outcomes.

NURS 8305. Research-based Clinical Reasoning and Management in Acute Care II. (4 cr; Prereq—#8300, 5222, 8100, 8170, 8303, [advanced pharmacology or pathophysiology or immunobiology]) Synthesis/utilization of knowledge/research in care of adults with acute/critical illness. Advanced clinical decision making. Management of responses to acute metabolic, alimentary, and pulmonary functions.

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

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

NURS 8309. Research-based Clinical Reasoning and Management in Acute Care III. (4 cr; Prereq—#8300, [5222 or pathophysiology or immunobiology], 8100, 8140, 8170, 8240, 8303, 8305, advanced pharmacology) Synthesis/utilization of knowledge/research in care of adults with acute/critical illness. Advanced clinical decision making. Management of responses to acute alterations in immunological, hematological, and psychological functions.
Courses

NURS 8311. Specialized Focus in Research-based Clinical Reasoning and Management in Acute Care. (3-4 cr; Prereq–Preq–5200, 5222, 8110, 8110, 8170, 8240, 8303, 8305, 8309, advanced pharmacology, [pathophysiology or immunobiology])

Synthesis of knowledge/research in care of adults with acute/critical illness. Participation in a clinical area of interest in advanced decision making and in management of clients requiring restorative care.

NURS 8314. Intervention Models for Adults/Elders with Chronic Health Conditions. (3-4 cr [max 4 cr]; A-F or Aud. Prereq–5222, 5800, 8100, 8140, 8170, #)

Development of theory/research-based nursing intervention models for adults/elders with chronic health conditions. Students implement/evaluate intervention models in an advanced practice role with chronically ill adults/elders.

NURS 8315. Advanced Practice Nursing for Adults. (4-5 cr [max 5 cr]; A-F or Aud. Prereq–5222, 5800, 8100, 8140, 8170, #)

Development of clinical expertise in provision of advanced nursing care to adults with acute health problems needing restorative care. Students utilize theory/research to manage/evaluate acute health problems in a selected adult specialty area.

NURS 8316. Implementing Advanced Practice Roles in Adult Nursing. (4 cr; A-F or Aud. Prereq–5222, 5800, 8100, 8140, 8170, 8314, 8315)

Clinical nurse specialist roles of care management, teaching, consultation, and collaboration. Students use theory/research to provide advanced nursing care to adults within context of selected specialty area.

NURS 8320. Multidisciplinary Seminar on Social Perspectives of Aging. (3 cr)

Literature/policy on key social aspects of aging, emphasizing service, policy, and ethical implications; generation of research questions.

NURS 8321. Advanced Nursing Care of the Elderly I. (4-6 cr [max 6 cr]; A-F or Aud. Prereq–Grad student in nursing, #)


NURS 8322. Primary Health Care for Elders. (3-6 cr [max 6 cr]; A-F or Aud. Prereq–3321, #)

Data-based primary care management of common acute/chronic conditions of elderly. Physiological, psychosocial, and pharmacological interventions. Age-related, cultural, family, and community variations. Implementation, evaluation of interventions.

NURS 8323. Advanced Nursing Care of the Elderly II: For Nurse Practitioners. (5-6 cr [max 6 cr]; A-F or Aud. Prereq–5232, 5xxx advanced gerontological nursing course, grad nurses major, #)

Synthesis and application of theory and research to effectively implement advanced gerontological nursing practice. Focuses on comprehensive primary care management across settings, evaluation of care, role analysis, and impact of contextual factors on health care services for the elderly.

NURS 8324. Advanced Nursing Care of the Elderly II: For Clinical Nurse Specialists. (6 cr; A-F or Aud. Prereq–Grad nurses major, #)

Synthesis and application of theory and research to effectively implement an advanced gerontological nurse. Comprehensive client care management across settings, evaluation of care, role implementation, and influences of contextual factors on health care services for the elderly.

NURS 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

NURS 8340. Advanced Practice Psychiatric/Mental Health Nursing with Individuals and Their Families. (7 cr; Prereq–5200, 5223, 5225, 8100, 8121, 8140, 8170)

Evaluation of theory and research; their application to advanced clinical management of biological, psychological, and emotional responses of individuals and families to psychiatric illness. Developing clinical expertise in assessment, diagnosis, treatment planning, and management of individuals and their families.

NURS 8341. Advanced Practice Psychiatric/Mental Health Nursing in Groups and Community. (7 cr; Prereq–5340, 8340, 10240, 10242)

Application of theory and research to advanced practice psychiatric/mental health nursing with groups and community systems, including populations at risk. Clinical practicum provides experiences for developing advanced practice roles in variety of healthcare settings.

NURS 8360. Advanced Clinical Nursing. (1-6 cr [max 6 cr]; Prereq–Grad nursing major, #)

Independent study or faculty seminar on special clinical topic when interest exists.

NURS 8361. Special Topics in Nursing. (1-4 cr [max 4 cr]; Prereq–Grad nursing major, #)

Students select and study a topic of interest.

NURS 8402. Primary Care: Assessment and Management of Health for Advanced Practice Nurses. (2-4 cr [max 4 cr]; A-F or Aud. Prereq–5200, 5222, 8121, 10242)

Data-based assessment/management of preventive health services and common acute/chronic conditions of primary care populations. Emphasizes clinical reasoning and independent/collaborative practice health care plans.

NURS 8403. Primary Care Practice for Family Nurse Practitioners: Assessment and Management of Health. (4 cr; S-N or Aud. Prereq–5200, 5222, 8402)

Application of advance practice comprehensive health histories and physical assessments in formulating client centered databases. Development/implementation of care plans. Follow-up evaluation of primary care delivered to families across life span.

NURS 8404. Family Practice Practicum I. (2 cr; A-F or Aud. Prereq–5200, 5222, 5224, 8402, 8601)

Comprehensive advanced nursing assessment for acute/chronic health conditions of primary care population across life span. Synthesis/application of nursing theory/research in implementing/safe/effective nursing interventions to promote health and prevent illness.

NURS 8405. Family Practice Practicum II. (2 cr [max 4 cr]; A-F or Aud. Prereq–5200, 5222, 5224, 8402, 8601)


NURS 8406. Health Care of Children for the Family Nurse Practitioner. (3 cr; A-F or Aud. Prereq–8406)

Application of midrange theories, models applicable to promotion, maintenance, restoration of health of infants, children, adolescents within context of their families/communities. Current research evaluated/used for designing age-specific interventions for children and their families.

NURS 8407. Health Care of Children Practicum for the Family Nurse Practitioner. (2 cr; A-F or Aud. Prereq–5200, 5222, 5224, 8422, 8402)


NURS 8423. Childbearing-Childrearing Family Nursing. (4 cr; Prereq–8100, 8150, grad nurses major or #)

Maintenance, promotion, and restoration of health for clients in the childbearing-childrearing family. Theories and concepts related to parents, children, and families. Practicum includes conferences, written assignments, and use of grounded theory methods of investigation.

NURS 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

NURS 8450. Primary Care: Health Assessment and Care of Well Children. (3 cr; Prereq–5200, 5222, 8451)

Study of age-specific and family-centered assessment, prevention, and health promotion nursing interventions for infants through adolescents. Emphasis on theories and concepts related to comprehensive health supervision. Stress the use of critical thinking for clinical decision making to implement and evaluate advanced practice nursing interventions.

NURS 8451. Primary Care Practicum: Health Assessment and Care of Well Children. (2-3 cr [max 3 cr]; A-F or Aud. Prereq–5200, 8450, #)

Focus on age-specific, family-centered nursing assessments/interventions to promote wellness of children, infants through adolescence. Emphasizes compiling/evaluating interventions for children/families. Practicum includes exposure to models of primary prevention.

NURS 8452. Primary Care: Common Acute Health Conditions Affecting Children. (2 cr; Prereq–8450, 8451, 8453)

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

NURS 8453. Primary Care Practicum: Common Acute and Chronic Health Conditions Affecting Children. (3 cr; Prereq–8451, 8442, 8452, #)

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

NURS 8454. Primary Care Practicum: Synthesis of Advanced Nursing Practice for the Child, Family, Community. (4 cr; Prereq–8452, 8453)

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

NURS 8455. Health Care for Children and Youth with Special Health Care Needs. (2 cr; Prereq–8454)

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

NURS 8456. Health Care for Children and Youth with Special Health Care Needs Practicum. (3 cr; Prereq–8454, 8452#

NURS 457. Assessment and Intervention Models in Families of Children with Special Health Care Needs. (4 cr; Prereq–BIOC 1004 or equiv, PUBH 1004, 1106)
In-depth, systemic, and theory-based study of family health assessment methods and intervention models. Practice, intervente, and evaluate intervention models related to patterns of functioning in families of children with complex health-care needs.

NURS 459. Advanced Nursing Care of Children With Acute Illness for Pediatric Clinical Nurse Specialists. (2 cr; Prereq–Nursing grad student admitted to pediatric clinical nurse specialist area of study or #) Synthesis/application of theory/research to effectively implement pediatric clinical nurse specialist role. Focuses on comprehensive care management across settings, evaluation of care, role implementation, and contextual factors affecting health care for children with special health needs and families.

NURS 4550. Reproductive Health Care for Women. (2 cr; Prereq–8241, 8243, 8242, 8244) Focuses on development of knowledge, skills, and attitudes toward the health care needs of women in childbearing families. Preparation for the Nurse Practitioner.


NURS 5630. Public Health Nursing Leadership Practicum. (3 cr; Prereq–8240, 8241, 8170, 8241, 8242, 8600) Synthesis of leadership and advanced public health nursing theories and research; their applicability within public health nursing leadership situations.

NURS 5666. Doctoral Pre-Thesis Credits. (1-6 cr; max 12 cr) No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; or for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

NURS 7870. Nursing and Health-Care Systems Administration II. (4 cr; A-F or Aud. Prereq–8701, #) Intensive study of nursing and healthcare administration and leadership. Application of nursing, organization, care delivery, and population health improvement theories to health systems administrative practice. Planning, organizing care systems, assembling, and developing material and human resources.

NURS 8702. Nursing and Health-Care Systems Administration II. (4 cr; A-F or Aud. Prereq–8701, #) Intensive development of competencies associated with skilled administration of healthcare services. Application of organization, nursing, political, and economic theories in operationalizing and evaluating administrative and leadership practice of nurses in healthcare delivery systems.

NURS 8720. Teaching Learning Process in Nursing. (3 cr; Prereq–8240, 8140, 8240, 8720, educational measurement course, grad nursing major or #) Teaching practitioners: comprehensive implementation/ evaluation of effectiveness of personal teaching models in classroom/clinical settings in an academic environment. Roles/responsibilities of faculty. Issues affecting curriculum design/development.

NURS 8777. Thesis Credits: Doctoral. (1-16 cr; max 50 cr) No grade. Prereq–Max 16 cr per semester or summer; 10 cr total required [Plan A only]

NURS 8800. Methods for the Study of Family Health Phenomena. (2 cr; Prereq–8124, 8175 or equiv or #) Exploration of conceptual and methodological approaches in study of family health phenomena from a nursing perspective. Formulation of research design to study questions in family health.

NURS 8888. Thesis Credit: Doctoral. (1-24 cr; max 100 cr) No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

Nutrition (NUTR)

Department of Food Science and Nutrition
College of Food, Agricultural and Natural Resource Sciences

NUTR 5621. Nutrition and Metabolism. (4 cr; Prereq–BIOC 3021, PHSL 3051, FSCN 4612) Carbohydrate, lipid, and protein metabolism. Use of metabolism as a "holistic" approach to emphasize metabolic pathways interrelated.


NUTR 5623W. Regulation of Energy Balance. (2 cr; Prereq–5621 or FSCN 4621) Regulation of energy balance in humans, including regulation of food intake and energy expenditure.


NUTR 8333. FTE: Master’s. (1 cr; No grad. Prereq–Master’s student, adviser and DGS consent)

NUTR 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

NUTR 8610. Nutrition Graduate Seminar. (1 cr; S-N or Aud. Prereq–Nur grad student, #) Presentation of thesis (M.S. or Ph.D.) or plan B project work in public seminar.

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

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

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

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


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

NUTR 8621. Presentation Skills. (1 cr; S-N or Aud. Prereq–A) Orientation to nutrition graduate program. Presenting scientific seminars, using electronic presentation programs/equipment.

For definitions of course numbers, abbreviations, and symbols, see page 169.
Courses

NUTR 8666. Doctoral Pre-Thesis Credits. (1-6 cr; max 12 cr); No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

NUTR 8695. Independent Study: Nutrition. (1-10 cr [max 30 cr]; Prereq–Written report for master’s plan B project)

NUTR 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

NUTR 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

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

Occupational Therapy (OT)

Department of Physical Medicine and Rehabilitation

Medical School

OT 5121. Issues in Mental Health. (1 cr; S-N or Aud. Prereq–One course gen psych, one course abnorm psych) Psychiatric/neuropsychological assessment/treatment. Issues related to medical/community management and to roles of OT/PT with respect to clients with mental health needs. Interaction between physical/mental health and disability.

OT 5122. Descriptive Neurology. (2 cr; A-F or Aud. Prereq–OT student or #) Relates neuroanatomical/neuropsychological principles to neurological conditions commonly seen in occupational/physical therapy practice.

OT 5161. Study of Physical Medicine and Rehabilitation Applied to Medical Sciences. (2 cr; A-F or Aud. Prereq–OT student or #) Diagnostic procedures. Medical, surgical, and rehabilitation management of patient problems in orthopedics, surgery, pediatrics, dermatology, medicine, cancer, and speech. Correlation to current practice. Presentation of patients.

OT 5182. Functional Neuroanatomy and Neurophysiology. (4 cr; A-F or Aud. Prereq–Registered occupational therapy student or #) Neuronaluxiatomic/neuropsychological principles to neurological conditions commonly seen in occupational/physical therapy practice.

OT 5300. Concepts for Occupational Therapy Practice. (4 cr; A-F or Aud. Prereq–enrolled OT student or #) Critical thinking, ethics, professional resources/organizations, patient-therapist relationship. Level I fieldwork experience.

OT 5313. Therapeutic Occupation. (4 cr; A-F or Aud. Prereq–enrolled OT student or #) Occupational therapy philosophy, history, and frames of reference. Activity analysis applied to purposeful, therapeutic activities for individuals and groups.

OT 5341. Introduction: Evaluation and Intervention I. (4 cr; A-F or Aud. Prereq–OT 5392; S-N or Aud. Prereq–OT 5342 or #) Assessment concepts/techniques. Application to patient populations with both mental health/physical disabilities. Treatment planning/documented.

OT 5342. Compensatory Rehabilitation: Evaluation and Intervention II. (4 cr; A-F or Aud. Prereq–OT 5390, 5313 or #) Assessment of daily living performance areas; adaptation techniques to compensate for performance deficits. Level I fieldwork experience.

OT 5343. Speciality Topics: Evaluation and Intervention III. (4 cr; A-F or Aud. Prereq–OT 5342 or #) Applies critical thinking model to assessment/intervention of selected patient populations with mental/physical problems requiring specialized approaches. Focus on habilitation/rehabilitation of populations with multiple performance component deficits. Fieldwork.

OT 5344. Neurorehabilitation: Evaluation and Intervention IV. (5 cr; A-F or Aud. Prereq–OT 5343 or #) Assessment/intervention related to perception, cognition, reflexes, sensory integration, and motor control. Application to individuals with multiple performance component deficits.

OT 5360. Dynamics of Group Models. (2 cr; A-F or Aud. Prereq–OT 5313 or #) Application of group/team dynamics in diverse professional settings.

OT 5370. Theory of Occupation. (1 cr; A-F or Aud. Prereq–enrolled OT student or #) Occupational therapy frames of reference, role of activity, and historical development of profession.

OT 5375. Community Resources and Health-Care Issues. (2 cr; A-F or Aud. Prereq–OT 5390, 5342 or #) Analysis of community health-care systems, including cultural/functional influences on individual health and decision making. Students identify current trends in health care and determine responses to them at social, political, or legislative level.

OT 5376. Adult Education and Planning. (1 cr; A-F or Aud. Prereq–OT 5313 or #) Skills needed to plan, implement, and evaluate adult educational programs/materials for patient/family education, peer/professional education, and education of others in order to carry out therapeutic interventions. Student teaching unit, community based activity.

OT 5380. Management of Occupational Therapy Services. (3 cr; A-F or Aud. Prereq–[5300, 5342] or #) Administration/management of occupational therapy services within managed care environment. Issues in Medicare, HMOs, TQM, consultation, human resources, promotion of profession. Emphasizes program development in current organizational structures.

OT 5391. Occupation Across the Life Span. (3 cr; A-F or Aud. Prereq–OT 5357, 5376 or #) The well elderly, school therapy, work-related/industrial rehabilitation. Fieldwork.

OT 5392. Research in Occupational Therapy. (3 cr; A-F or Aud. Prereq–OT 5313 or #) Analysis of scientific literature, development of research proposals.


OT 5394. Orthotics. (3 cr; A-F or Aud. Prereq–OT 5341 or #) Design, analysis, and design of construction of orthotic devices.

OT 5395. Independent Study in Occupational Therapy. (1-4 cr; max 16 cr; Prereq–Enrolled OT student or #) OT 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Operations and Management Sciences (OMS)

Department of Operations and Management

Curtis L. Carlson School of Management

OMS 5170. Simulation Modeling and Analysis. (4 cr; A-F or Aud. Prereq–MBA 6109 or BA 1550 or #) Techniques and application of computer simulation modeling and analysis. Includes animations of existing or proposed real-world facilities and processes. Experiments in simulation programming language and environment. Simulation models and animations demonstrating actual operation of models. Planning, analysis, and interpretation of simulation experiment results.

OMS 8651. Experimental Design. (3 cr [max 4 cr]; A-F or Aud. Prereq–MBA 6120 or equal or business admin PhD student or #; offered alt yrs) Analysis of variance for one-way, two-way, and multi-way data. Basic concepts of statistical design and analysis of results. Randomized block, Latin square, cross-over, factorial designs, confounding, estimation and comparison of effects, response surfaces, and applications to management.

OMS 8652. Regression Analysis. (3 cr [max 4 cr]; A-F or Aud. Prereq–MBA 6120 or equal, business admin PhD student or #; offered alt yrs) Regression and correlation models, inferences in simple and multiple regression, multicollinearity, indicator variables, variable selection techniques, treatment of assumption violations, applications to management problems, basic concepts of experimental design.

OMS 8681. Linear Programming. (3 cr [max 4 cr]; A-F or Aud. Prereq–MBA 6120 or equal, business admin PhD student or #; offered alt yrs) Revised simplex, primal-dual, and large-scale methods, including decomposition and partitioning and methods for bounded variables.

OMS 8671. Simulation Analysis. (3 cr [max 4 cr]; A-F or Aud. Prereq–credit will not be granted if credit has been received for: CI 3031, Business admin PhD student or #; offered alt yrs) A treatment of underlying probabilistic and statistical aspects of computer simulation. Random number generators, variate and process generation, statistical analysis of simulation output, ranking and selection of simulation models, and variance reduction techniques.

290
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**OMS 8572. Stochastic Modeling and Analysis.** (3 cr [max 4 cr]; A-F or Aud. Prereq-Business admin PhD student or #; offered alt yrs)

Probabilistic modeling of dynamic processes, including Markov chains; Poisson, renewal, continuous-time processes, and queuing models. Statistical estimation of selected models; applications to managerial problems, such as brand shift, industrial migration, manufacturing, and computer/communications networks.

**OMS 8681. Queuing Theory: A Computational Approach.** (3 cr [max 4 cr]; A-F or Aud. Prereq-Business admin PhD student or #)

Theory of Stochastic Service Systems (theory of queues) from an algorithmic point of view. Prepares students to model and analyze complex stochastic service systems via classical methods and algorithmic methods and approximations.

**OMS 8711. Research in Operations Strategy.** (3 cr [max 4 cr]; A-F or Aud. Prereq-Business admin PhD student or #; offered alt yrs)

Operations performance; competitive advantage; focused factory, product, and process innovation; and operations strategy implementation. Research results and models.

**OMS 8721. Management of Technological Operations.** (3 cr [max 4 cr]; A-F or Aud. Prereq-Business admin PhD student or #; offered alt yrs)

Theories and models used to address problems of managing technological operations and operations in manufacturing and service firms. Technology strategy, economic/orientational perspectives on technology, productivity analysis, technology valuation, project selection and evaluation, learning, etc.

**OMS 8735. Operations Forecasting and Inventory Research.** (3 cr [max 4 cr]; A-F or Aud. Prereq-Business admin PhD student or #; offered alt yrs)

Research on forecasting, inventory control, materials requirements planning, just-in-time manufacturing, aggregate planning, scheduling, routing, sequencing, and dispatching in manufacturing and service industries. Research papers and methods are discussed.

**OMS 8745. Research on Quality Management.** (3 cr [max 4 cr]; A-F or Aud. Prereq-Business admin PhD student or #; offered alt yrs)

Research literature, methods, and results. Research on quality strategy, economics of quality, statistical process control, vendor management, off-line quality, and quality practice.

**OMS 8800. Research Topics in Operations and Management Science.** (2-4 cr [max 16 cr]; A-F or Aud. Prereq-Business admin PhD student or #)

Topics selected from new areas of research. Research methods, issues in operations/management science.

**OMS 8892. Readings in Operations and Management Science.** (1-8 cr [max 16 cr]; Prereq-Business admin PhD student or #)

Readings useful to student’s individual program and objectives that are not available in regular courses.

**OMS 8994. Graduate Research in Operations and Management Science.** (1-8 cr [max 16 cr]; Prereq-Business admin PhD student or #)

Individual research on an approved topic appropriate to student’s program and objectives.

**Oral Biology (OBIO)**

**General Information**

**OBIO 5001. Methods in Research and Writing.** (2 cr)

Skills necessary to begin a research project, including literature review, hypothesis formation, research design, and writing. Each student develops a research protocol.

**OBIO 8021. Oral Microbiology.** (2 cr; Prereq-Dental specialist or oral research trainee or #)


**OBIO 8022. Oral Neuroscience.** (2 cr; Prereq-Dental specialist or oral research trainee or #)

Background lectures and student presentations on current research topics to evaluate questions in general motor/sensory function related to oral/nasal structures. Taste, smell, and other chemical senses as they relate to those structures.

**OBIO 8023. Physical Biology of the Oral Cavity.** (2 cr; A-F or Aud. Prereq-Dental specialist or oral research trainee or #)


**OBIO 8024. Genetics and Human Disease.** (1 cr; Prereq-Dental specialist or oral research trainee or #)

Principles of medical genetics. Emphasizes oral diseases. Twins, chromosomes, recombinant DNA, major gene traits, genes in populations, chromosomal abnormalities, complex traits, facial clefts, dental caries, periodontal diseases.

**OBIO 8025. Topics in Cardiology.** (2 cr; A-F or Aud. Prereq-Dental specialist or oral research trainee or #)

Lectures, assigned readings, and discussions of basic epidemiological, biological, and chemical aspects of dental caries. Etiology, epidemiology, and pathogenesis of dental caries. Influence of dietary, salivary, plaque, and microbial factors on caries process.

**OBIO 8026. Salivary Glands and Secretions.** (2 cr; A-F or Aud. Prereq-Dental specialist or oral research trainee or #)


**OBIO 8027. Structural and Biological Aspects of Dental Biomaterials.** (1 cr; Prereq-Dental specialist or oral research trainee or #)

Relates composition/structure of dental biomaterials to their behavior in a biological environment. Cause/mechanism of such effects. Materials that have beneficial effects. Dental implantology, guided tissue regeneration.

**OBIO 8028. Molecular Basis of Cellular and Microbial Adhesion.** (2 cr; A-F or Aud. Prereq-Dental specialist or oral research trainee or #)

Biochemical basis of adhesion phenomena. Cells of immune system, development of organs, tissue formation, bacterial colonization of the human.

**OBIO 8030. Oral Biology Seminar.** (1 cr [max 10 cr]; S-N or Aud. Prereq-Dental specialist or oral research trainee or #)

Faculty and student discussion of current topics in oral biology.

**OBIO 8093. Tutorial in Oral Biology.** (1-2 cr [max 2 cr]; S-N only, Prereq)

Semester-long apprenticeship with faculty members to familiarize students with faculty research interests. Individual study of selected topics.

**OBIO 8094. Directed Research.** (1-10 cr [max 10 cr]; S-N or Aud. Prereq)

**OBIO 8333. FTE: Master’s.** (1 cr; No grade. Prereq-Master’s student, adviser and DGS consent)

Host immune processes at body surfaces. Innate/adaptive immunity at mucosal surfaces. Interactions/responses of various mucosal tissues to pathogens. Approaches to target protective vaccination to mucosal tissues. Lectures, journal.

**OBIO 8334. FTE: Doctoral.** (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

**OBIO 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined; A for 3rd/4th registrations, up to 24 combined; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

**OBIO 8777. Thesis Credits: Master’s.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

**OBIO 8888. Thesis Credit: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

**Otologyngy (OTOL)**

**Department of Otologyngy**

**Medical School**

**OTOL 5101. Introduction to the Basic Sciences in Otologyngy I: Ear.** (2 cr; A-F or Aud. Prereq-Otologyngy major or #)

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

**OTOL 5102. Introduction to the Basic Sciences in Otologyngy II: Head and Neck.** (2 cr; A-F or Aud. Prereq-Otol major or #)

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

**OTOL 5993. Directed Studies.** (1-12 cr [max 24 cr]; A-F or Aud. Prereq)

Directed readings and preparation of reports on selected topics.

**OTOL 8230. Clinical Otorhinolaryngology.** (4 cr; A-F or Aud. Prereq-Grad otol major)

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

**OTOL 8231. Surgery of the Ear, Nose, and Throat.** (3 cr; A-F or Aud. Prereq-Grad otol major)

Surgical training and experience with broad scope of surgical problems encountered in otorhinolaryngology provided at Fairview-University Medical Center, St. Paul Ramsey Medical Center, Veterans Administration Medical Center, and Hennepin County Medical Center. Clinical practica and weekly special group conferences.

**OTOL 8232. Maxillofacial Surgery.** (1 cr; A-F or Aud. Prereq-Grad otol major)

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

**OTOL 8233. Plastic and Reconstructive Surgery: Head and Neck.** (1 cr; A-F or Aud. Prereq-Grad otol major)

Otorhinolaryngologic cosmetic surgery emphasizing rhinoplasty and otoplasty.
Courses

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

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

OTOL 8235. Roentgenology of the Head and Neck. (1 cr [max 12 cr]; A-F or Aud. Prereq–Grad otol major)

Principles and procedures in roentgenology for otolaryngologic and head and neck problems.

OTOL 8236. Pharmacology in Otolaryngology. (1 cr [max 12 cr]; A-F or Aud. Prereq–Grad otol major)

Principles of pharmacology as they relate to otolaryngology.

OTOL 8237. Endoscopy. (1 cr [max 12 cr]; A-F or Aud. Prereq–Grad otol major)

Deductive and practical instruction in laryngoscopy, esophagoscopy, bronchoscopy, and mediastinoscopy. General management principles emphasized.

OTOL 8238. Pathology of the Ear, Nose, and Throat. (1 cr [max 12 cr]; A-F or Aud. Prereq–Grad otol major or #)

Gross pathology and histopathology of diseases of the ear, nose, throat, and related regions.

OTOL 8239. Otoneurology. (1-2 cr [max 12 cr]; Prereq–Grad otol major or #)

Instruction and experience in diagnosis and management of oto-neurologic problems, including training in electronystagmographic analysis of vestibular function.

OTOL 8240. Allergy. (1 cr [max 12 cr]; A-F or Aud. Prereq–Grad otol major)

Concepts and management of otolaryngologic allergy.

OTOL 8241. Cancer of the Head and Neck. (1 cr [max 12 cr]; A-F or Aud. Prereq–Grad otol major)

Clinical head and neck oncology; etiology, treatment (both surgical and nonsurgical), and other principles of management.

OTOL 8242. Audiology and Speech Pathology. (2 cr; Prereq–Grad otol major or #)

Clinical audiology and speech-language pathology, including diagnosis and treatment of conductive, sensorineural, and central hearing loss; voice disorders; swallowing disorders; velopharyngeal insufficiency related to cleft lip/palate and craniofacial anomalies; alaryngeal speech; and speech disorders related to head and neck cancer.

OTOL 8243. Introduction to Research Methodology. (1 cr; Prereq–Grad otol major or #)

Statistical methods, experimental design, and execution of otolaryngologic research. Ethics of research with human and animal subjects.

OTOL 8244. Seminar: Current Literature. (1 cr; Prereq–Grad otol major or #)

Presentation and discussion of selected articles. Required for all otolaryngology graduate students.

OTOL 8247. Anatomy and Physiology of Hearing and Balance. (3 cr; §NSC 8247. Prereq–#)

Structure and function of auditory and vestibular systems. Network analysis of middle and inner ear mechanics, hair cell biophysics, auditory nerve and CNS electrophysiology, information processing, neural mechanisms subserving balance and gaze, cellular morphology, and computer models.

OTOL 8248. Directed Readings in Auditory Physiology. (1-2 cr [max 2 cr]; §NSC 8248. Prereq–#)

Current research on biophysics and physiology of auditory system; topics selected for each student. Written reviews prepared and discussed.

OTOL 8249. Current Topics in Cochlear Anatomy. (1 cr; Prereq–#)

Review of current research papers concerning cochlear anatomy and pathology.

OTOL 8250. Advanced Biochemistry of the Auditory System. (1 cr; Prereq–MDBC 6100, MDBC 6101 or equiv or #)

Review of recent progress in biochemical aspects of auditory end organs.

OTOL 8262. Advanced Clinical Audiology. (2 cr; Prereq–Grad otol major, 8242 or #)

Comprehensive reading and practice in auditory evaluation of patients. Assumes basic knowledge of clinical audiology. Each session devoted to aspect of auditory evaluation or aural rehabilitation, including behavioral audiometry, electrophysiologic evaluation, hearing aid selection, and cochlear implants.

OTOL 8333. FTI: Master's. (1 cr; No grade. Prereq–Master's student, advisor and DGS consent)

OTOL 8444. FTI: Doctoral. (1 cr; No grade. Prereq–Doctoral student, advisor and DGS consent)

OTOL 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

OTOL 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

OTOL 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

Pharmacy (PHM)

Department of Pharmacy

College of Pharmacy

PHM 5200. New Drug Development Process. (1 cr)

New-drug development process in the U.S. pharmaceutical industry.

PHM 5100. Seminar: Pharmacueticals. (1 cr [max 4 cr]; S-N or Aud. Prereq–Grad Phm major)

Current literature.

PHM 5110. Pharmacokinetics Research Seminar. (1 cr [max 12 cr]; S-N or Aud. §PHM 5223. Prereq–Grad Phm major)

Current concepts and literature review.

PHM 8285. Research Problems in Pharmacueticals. (1 cr [max 20 cr]; S-N or Aud. Prereq–#)

Experimental investigation of problems in pharmacueticals.

PHM 8333. FTI: Master's. (1 cr; No grade. Prereq–Master’s student, advisor and DGS consent)

PHM 8411. Stabilization of Pharmacueticals. (3 cr; Prereq–Physical and organic chem survey courses)

Application of physiochemical principles (e.g., chemical kinetics) to elucidate and minimize stability problems in pharmaceutical systems.

PHM 8421. Advanced Pharmacokinetiics. (4 cr; A-F or Aud)

Topics in kinetics of drug absorption, distribution, metabolism, and excretion.

PHM 8431. Controlled Release: Materials, Mechanisms, and Models. (3 cr; A-F or Aud. §IMEN 6431. Prereq–Differential equations course including partial differential equations or #)

Physical, chemical, physiological, and mathematical principles underlying delivery of devices for drugs. Small molecules, proteins, genes. Emphasizes temporal controlled release. Concepts may be applicable to controlled release of other chemical agents.

PHM 8441. Solubility and Solid-State Properties of Drugs. (3 cr; A-F or Aud. Prereq–Physical chem survey course or #)

Physical/physicochemical properties of drugs in solid state as related to drug delivery.

PHM 8444. FTI: Doctoral. (1 cr; No grade. Prereq–Doctoral student, advisor and DGS consent)

PHM 8481. Advanced Neuropharmaceutics. (4 cr; A-F or Aud. §CMB 8481, NSC 8481. Prereq–#)

Delivery of compounds to central nervous system (CNS) to activate proteins in specific brain regions for therapeutic benefit. Pharmaceutical/pharmacological issues specific to direct drug delivery to CNS.

PHM 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

PHM 5110. Introduction to Pharmacology. (3 cr; A-F or Aud. Prereq–Grad student or #)

Basic principles of Pharmacology. Focuses on molecular mechanisms of drug action.

PHM 5111. Pharmacoeconomics. (3 cr; A-F or Aud. Prereq–Grad student or #)


PHM 5112. A Graduate Student Toolkit: Scientific Speaking, Grant Writing, and Responsible Conduct of Research. (2 cr; A-F only. Prereq–#)

Presentation skills, scientific writing, responsible conduct of research. Practical workshops in each area. Preparing for preliminary exams.

PHM 5210. Pharmacology. (1 cr; A-F or Aud. Prereq–Grad student or #)

Principles of pharmacology. Meets with 5211.

PHM 5211. Pharmacology. (2 cr; A-F or Aud. Prereq–5210 or #)

Continuation of 5210. Meets with 5211. Lectures on the major classes of drugs.

PHM 5212. Pharmacology. (3 cr; A-F or Aud. Prereq–5211 or #)

Continuation of 5211. Meets with 5212. Lectures on the major classes of drugs.

PHM 5462. Neuroscience Principles of Drug Abuse. (2 cr; §NSC 5462. Prereq–#)

Current research on drugs of abuse, their mechanisms of action, characteristics shared by various agents, and neural systems affected by them. Offered biennially, spring semester of even-numbered years.

PHM 5110. Advanced Pharmacology. (4 cr; A-F or Aud. Prereq–5110 or #)

Contemporary research concepts, experimental approaches in investigative pharmacology. Mechanisms of action of drugs on systems (whole animal), organ, and cellular levels.

PHM 8200. Seminar: Selected Topics in Pharmacology. (1 cr [max 8 cr]; Prereq–6112 or #)

Student-presented seminars.
PHIL 5021. Symbolic Logic I. (4 cr; Prereq—3001 or #) Study of syntax and semantics of sentential and first-order logic. Symbolization of natural-language sentences and arguments. Development of deductive systems for first-order logic. Metatheoretic proofs and methods, including proof by mathematical induction and proof of consistency and completeness.

PHIL 5022. Symbolic Logic II. (4 cr; Prereq—5201 or #) Elements of set theory, including the concepts of enumerability and nonenumerability. Turing machines and recursive functions; the results of Church, Godel, and Tarski and the philosophical significance of those results.

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

PHIL 5221. Philosophy of Logic. (3 cr; Prereq—5202 or #) Attempts to answer the question, “What is logic?” Scope of logical Disputes about alternative logics. Theories concerning logical truth (e.g., conventionalism: view that logical truths are contingent).

PHIL 5222. Philosophy of Mathematics. (3 cr; Prereq—College level logic or mathematics course or #) Major philosophical questions arising in connection with mathematics. What is mathematics about? How do we know the mathematics we do? What is the relation between mathematics and the natural sciences? Selected readings of leading contributors such as Frege, Dedekind, Russell, Hilbert, Brouwer, Godel, Quine.

PHIL 5232. Education and Social Change. (4 cr; A-F or Aud. §PHIL 4325) Connections between education, social change. Theories of democratic/popular education, their application through in-depth practicum in community education setting.

PHIL 5324. Ethics and Education. (3 cr; §PHIL 4324. Prereq—6 cr in [philosophy or education] or #) What constitutes good education in terms of educational outcomes and of processes that promote learning. Connections between concepts of good education and of good society.

PHIL 5325. Biomedical Ethics. (3 cr; Prereq—Grad or #) A survey of major topics and issues in biomedical ethics including patients’ rights and duties, informed consent, confidentiality, ethical issues in medical research, the initiation and termination of medical treatment, euthanasia, abortion, and the allocation of medical resources.


PHIL 5415. Philosophy of Law. (3 cr; Prereq—1003 or 1004 or 3302 or social science major or #) Analytical accounts of law and legal obligation.

PHIL 5601. History of the Philosophy of Science. (3 cr; Prereq—#) History of logical empiricism, from its European origins in first half of 20th century to its emergence as nearly universal account of science in post-war Anglo-American philosophy.

PHIL 5602. Scientific Representation and Explanation. (3 cr; Prereq—#) Contemporary issues concerning representation and explanation of scientific facts.

PHIL 5603. Scientific Inquiry. (3 cr; Prereq—#) Philosophical theories of methods for evaluating scientific hypotheses, of role of experimentation in science, and of how hypotheses come to be accepted within a scientific community.

PHIL 5605. Space and Time. (3 cr; §PHIL 4605. Prereq—Courses in [philosophy or physics] or #) Philosophical problems concerning nature/structure of space, time, and space-time.


PHIL 5611. Philosophy of the Social Sciences. (3 cr; §PHIL 4611. Prereq—[9 cr of [philosophy or social science], grad student] or #) Criteria for describing/explaining human actions. Problems of objectivity, reduction, freedom.

PHIL 5622. Philosophy and Feminist Theory. (3 cr; §GWSS 4122, GWSS 5122. PHIL 4622. Prereq—6 cr in [philosophy or women’s studies] or #) Encounters between philosophy/feminism. Gender’s influence in traditional philosophical problems/methods. Social role of theorist/theorizing as they relate to politics of feminism.

PHIL 5760. Selected Topics in Philosophy. (3 cr [max 9 cr]; Prereq—3xxx–5xxx course in phil or #) Philosophical problems of contemporary interest. Topics specified in Class Schedule.

PHIL 5993. Directed Studies. (1-3 cr [max 6 cr]; Prereq—#, A, W) Guided individual reading or study.

PHIL 8010. Workshop in History of Philosophy. (1 cr [max 4 cr]; Prereq—3xxx–4xxx hist of phil course, #) Topics vary by offering.

PHIL 8080. Seminar: History of Ancient and Medieval Philosophy. (3 cr [max 6 cr]; Prereq—#) Topics vary by offering.

PHIL 8081. Seminar: History of Philosophy—Ancient Philosophers. (3 cr) Major developments in ancient Greek philosophical thought; methods and role of history of philosophy in discipline of philosophy.

PHIL 8085. Seminar: History of Philosophy—Modern Philosophers. (3 cr [max 6 cr]; Prereq—#) Major developments in modern philosophic thought; methods and role of history of philosophy in discipline of philosophy.

PHIL 8090. Seminar: History of Modern Philosophy. (3 cr [max 6 cr]; Prereq—#) Topics vary by offering.

PHIL 8100. Workshop in Epistemology and Metaphysics. (1 cr [max 4 cr]; Prereq—4xxx [epistemology or metaphysics] course, #) Topics vary by offering.

PHIL 8110. Seminar: Metaphysics. (3 cr [max 6 cr]; Prereq—4101 or #) Topics vary by offering.

PHIL 8120. Seminar: Epistemology. (3 cr [max 6 cr]; Prereq—4105 or #) Topics vary by offering.

PHIL 8130. Seminar: Philosophy of Science. (3 cr [max 6 cr]; Prereq—#) Problems in the theory of knowledge. Topics specified in [Class Schedule].

PHIL 8131. Epistemology Survey. (3 cr) Survey, against background of traditional issues, of contemporary developments in theory of knowledge.

PHIL 8132. Feminist Theories of Knowledge. (3 cr; §GWSS 8133) Interdisciplinary seminar; feminist approaches to knowledge and criticism of paradigms of knowledge operative in the disciplines. Feminists’ use of concepts of subjectivity, objectivity, and intersubjectivity; feminist empiricism, standpoint theory, and contextualism, and postmodern and postcolonial theorizing.

PHIL 8180. Seminar: Philosophy of Language. (3 cr [max 6 cr]; Prereq—4231 or #) Topics vary by offering.
PHIL 8182. Formal Semantics of Natural Language. (3 cr; A-F or Aud; §§ST 8221. Prereq—§§ST 5201 or §)
Truth-conditional model-theoretic semantics applied to treatment of opacity, intensionality, quantification, and related phenomena in natural language.

PHIL 8200. Workshop in Logic and Philosophy of Mathematics. (1 cr [max 4 cr]; Prereq—§§ST logic or 400x phil or math) No grade. Prereq—§§ST 8221. Prereq—§§ST 5201 or §)
Topics vary by offering.

PHIL 8210. Seminar: Logical Theory. (3 cr [max 6 cr]; Prereq—§§ST 5201, 5205 or §)
Topics vary by offering.

PHIL 8220. Seminar: Philosophy of Mathematics. (3 cr [max 6 cr]; Prereq—§§ST 5202 or §§ST 5200 math course or §)
Topics such as significance of limiting metamathematics (Gödel, et al.), assessment of major foundational programs (set theoretical, modern Hilbertian, constructivist), modal/structuralist alternatives to standard platonism.

PHIL 8300. Workshop in Moral and Political Philosophy. (1 cr [max 4 cr]; Prereq—§§ST 400x moral phil or 400x pol phil) No grade. Prereq—Master’s student, adviser and DGS consent
Topics vary by offering.

PHIL 8310. Seminar: Moral Philosophy. (3 cr [max 9 cr]; Prereq—§§ST 4310 or §§ST 4330 or §)
Concepts/problems relating to ethical discourse.

PHIL 8320. Seminar on Medical Ethics. (3 cr [max 6 cr]; Prereq—§§ST 400x or §§ST 500x ethics course or §)
Topics vary by offering.

PHIL 8410. Seminar: Political Philosophy. (3 cr [max 6 cr]; Prereq—§§ST 4144 or #)
Topics vary by offering.

PHIL 8444. FTE: Doctoral. (1 cr; No grade. Prereq—Doctoral student, adviser and DGS consent
Topics vary by offering.

PHIL 8500. Workshop in Aesthetics. (1 cr [max 4 cr]; Prereq—§§ST aesthetics course, #)
Topics vary by offering.

PHIL 8510. Seminar: Aesthetics Studies. (3 cr [max 6 cr]; Prereq—§§ST 4521 or #)
Topics vary by offering.

PHIL 8550. Seminar: Philosophy of Religion. (3 cr [max 6 cr]; Prereq—§§ST 4521 or #)
Topics vary by offering.

PHIL 8600. Workshop in the Philosophy of Science. (1 cr [max 4 cr]; Prereq—§§ST phil of sci course, #)
Topics vary by offering.

PHIL 8606. Seminar: Philosophy of Medicine and the Biomedical Sciences. (3 cr)
Aims and goals of medicine; concepts of health, illness, and disease; nature of reasoning in clinical medicine; theoretical evolution in medicine; and role of values in practice of medicine and healthcare.

PHIL 8610. Seminar: History of Modern Physical Sciences. (3 cr [max 6 cr]; Prereq—§)
Topics specified in [Class Schedule].

PHIL 8620. Seminar: Philosophy of the Biological Sciences. (3 cr [max 6 cr])
Topics vary by offering.

PHIL 8640. Seminar: Philosophy of the Cognitive Sciences. (3 cr [max 6 cr]; §§ST 8000. Prereq—§)
Philosophical framework for analyzing cognitive sciences. Recent developments in metaphysics/epistemology. Nature of scientific theories, methodologies of cognitive sciences, relations among cognitive sciences. Relation of cognitive science to epistemology and to various philosophical problems. Topics vary by offering.

PHIL 8660. Seminar: Social and Cultural Studies of Science. (3 cr [max 6 cr]; §§ST 8221. Prereq—§§ST 5201 or §)
Review of recent work; analysis of theoretical and methodological differences among practitioners; selected responses from historians and philosophers of science.

PHIL 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr.; 3 for 3rd/4th registrations, up to 24 combined cr.; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr.)

PHIL 8670. Seminar: Philosophy of Science. (3 cr [max 6 cr]; Prereq—§)
Topics vary by offering.

PHIL 8710. Seminar: Feminist Philosophy. (3 cr [max 6 cr]; Prereq—§§ST 4622 or §§ST 5622 or §§ST 5122 or §)
Topics vary by offering.

PHIL 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq—Max 18 cr per semester or summer; 10 cr total required [Plan A only])

PHIL 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

PHIL 8993. Directed Study. (1-3 cr [max 6 cr]; Prereq—§)

PHIL 8994. Directed Research. (1-3 cr [max 6 cr]; Prereq—§)

Physical Medicine and Rehabilitation (PMED)

Department of Physical Medicine and Rehabilitation

PMED 8200. Physical Medicine and Rehabilitation Service. (1-15 cr [max 15 cr]; Prereq—enrolled in PMED residency training program)

PMED 8207. Basic and Applied Psychiatry. (1 cr; Prereq—enrolled in PMED residency training program)

PMED 8210. Research in Physical Medicine. (1-15 cr [max 15 cr]; Prereq—enrolled in PMED residency training program)

PMED 8212. Electromyography. (1-15 cr [max 15 cr]; Prereq—enrolled in PMED residency training program)

PMED 8214. Readings in Electromyography. (1-3 cr [max 3 cr]; Prereq—enrolled in PMED residency training program)

PMED 8220. Seminar: Physical Medicine and Rehabilitation. (1-15 cr [max 15 cr]; Prereq—enrolled in PMED residency training program)

Department of Physical Therapy (PT)

Physical Therapy (PT)

Department of Physical Medicine and Rehabilitation

Medical School

PT 8131. Research Seminar I. (1 cr; A-F or Aud; Prereq—Grad PT major)
Scientific thinking in physical therapy. Preparation to execute research project or literature review. Analysis of current literature. Basic features of research design. Elements of evaluating treatment efficacy. Students interact with their research adviser and with research faculty in various specialties.

PT 8132. Research Seminar in Physical Therapy II. (1 cr; A-F or Aud; Prereq—§§ST 8131, Grad PT major)
Scientific thinking in physical therapy. Preparation to execute research project or literature review. Analysis of current literature. Basic features of research design. Elements of evaluating treatment efficacy. Students interact with their research adviser and with research faculty in various specialties.

PT 8153. Research Problems in Physical Therapy. (1-7 cr [max 7 cr]; A-F or Aud; Prereq—Grad PT major)
Process of developing/completing a scholarly research project or literature review related to rehabilitation science. Type of research experience is determined by adviser.

PT 8333. FTE: Master’s. (1 cr; No grade. Prereq—Master’s student, adviser and DGS consent)

PT 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq—Max 16 cr per semester or summer; 10 cr total required [Plan A only])

School of Physics and Astronomy

Institute of Technology

Physics (PHYS)

PHYS 5001. Quantum Mechanics I. (4 cr; Prereq—§§ST 4101 or equiv or §)

PHYS 5002. Quantum Mechanics II. (4 cr; Prereq—§§ST 5001 or equiv)
Symmetry in quantum mechanics, space-time symmetries and the rotation group, Clebsch-Gordan coefficients and the Wigner-Eckart theorem. Scattering theory. Method of second quantization with elementary applications. Relativistic wave equations including Dirac equation.

PHYS 5011. Classical Physics I. (4 cr; Prereq—§§ST 4001, 4002 or §)
Classical mechanics: Lagrangian/Hamiltonian mechanics, orbital dynamics, rigid body motion, special relativity.

PHYS 5012. Classical Physics II. (4 cr; Prereq—§§ST 5011 or §)
Classical electromagnetism: electrostatics, magnetostatics, Maxwell’s equations, electromagnetic waves, radiation, interaction of charged particles with matter.

PHYS 5022. Relativity, Cosmology, and the Universe. (4 cr; §§ST 5022. Prereq—§§ST 5021 or §)

PHYS 5041. Mathematical Methods for Physics. (4 cr; Prereq—§§ST 2601 or §)
Survey of mathematical techniques needed in analysis of physical problems. Emphasizes analytical methods.

PHYS 5042. Analytical and Numerical Methods of Physics II. (4 cr; Prereq—§§ST 5041 or §)
Survey of mathematical techniques, both analytic and numerical, needed for physics. Application to physical problems.

PHYS 5071. Physics for High School Teachers: Experimental Foundations and Historical Perspectives. (3 cr; Prereq—Gen physics, §; no cr for physics grad or physics minor) In-depth examination of a conceptual theme in physics, its experimental foundations and historical perspectives. Kinematics and dynamics from Aristotle through Einstein; nature of charge and light; energy and thermodynamics; electricity, magnetism, and quantized fields; structure of matter.

PHYS 5072. Best Practices in College Physics Teaching. (1-3 cr [max 5 cr])
Pedagogies for introductory physics classes. Topics from educational research/practice as applied to classroom.

PHYS 5081. Introduction to Biopolymer Physics. (3 cr; §§ST 4911. Prereq—working knowledge of [thermodynamics, statistical mechanics])
Introduction to biological and soft condensed matter physics. Emphasizes physical ideas necessary to
PHYS 5201. Thermal and Statistical Physics. (3 cr; A-F or Aud) PHYS 5201, PHYS 5202 or equivalent) Principles of thermodynamics and statistical mechanics. Selected applications such as kinetic theory, transport theory, and phase transitions.

PHYS 5401. Physiological Physics. (4 cr; Prereq–1301 or 1401) Musculoskeletal system, circulatory system/membrane transport, biological control systems, propagation/ action potential in nervous system, biomagnetism, electromagnetism at cellular level.

PHYS 5402. Radiological Physics. (4 cr; Prereq–1302 or 1402) Signal analysis, medical imaging, medical x-rays, tomography, radiation therapy, nuclear medicine, MRI, and similar topics.

PHYS 5701. Solid-State Physics for Engineers and Scientists. (4 cr; Prereq-Grad or advanced undergrad in physics or engineering or the sciences) Crystal structure and bonding; diffraction; phonons; thermal and dielectric properties of insulators; free electron model; band structure; semiconductors.

PHYS 5702. Solid State Physics for Engineers and Scientists. (4 cr; Prereq–5701 or #) Diamagnetism and paramagnetism; ferromagnetism and antiferromagnetism; optical phenomena; lasers; superconductivity; surface properties; ferroelectricity.

PHYS 5950. Colloquium Seminar. (1 cr; S-N or Aud. Prereq–Grad student or advanced undergrad in physics, major) Colloquium of School of Physics and Astronomy.

PHYS 5980. Introduction to Research Seminar. (1-3 cr; max 15 cr) S-N or Aud. Prereq–Grad or senior undergrad in physics or astronomy.) Introduction to the research activities of the School of Physics and Astronomy.

PHYS 5993. Directed Studies. (1-5 cr [max 15 cr]; Prereq–Grad. Independent, directed study in physics in areas arranged by the student and a faculty member.

PHYS 5994. Directed Research. (1-5 cr [max 15 cr]; Prereq–Grad. Problems, experimental or theoretical, of special interest to students. Written reports.

PHYS 6001. Advanced Quantum Mechanics. (3 cr; Prereq–5001 or #) Topics in non-relativistic quantum mechanics; second quantization. Introduction to Diagrammatic and Green’s function’s technique and to relativistic wave equations. Application of relativistic perturbation theory to particle interactions with electromagnetic field. Invariant interactions of elementary particles.


PHYS 8012. Quantum Field Theory II. (3 cr; Prereq–8011 or #) Aspects of general theory of quantized fields, including space-time and discrete transformation properties, the CPT theorem, and the spin-statistics connection. Introduction functional and path-integral methods. Renormalization group and asymptotic freedom. Semi-classical methods and instantons in gauge theories.

PHYS 8013. Special Topics in Quantum Field Theory. (3 cr; Prereq–8012 or #) Includes non-perturbative methods in quantum field theory, supersymmetry, two-dimensional quantum field theories and their applications, lattice simulations of quantum fields, topological quantum field theories, quantum field theory methods applied to condensed matter physics, and string theory.

PHYS 8160. Seminar: Problems of Physics Teaching and Higher Education. (1 cr [max 3 cr]) Lectures and informal discussions of courses and curricula, techniques, and materials important in undergraduate physics instruction; relation to general problems of higher education.

PHYS 8161. Atomic and Molecular Structure. (3 cr; A-F only. Prereq–Level of mathematics associated with BS in physical sciences) Emphasizes interpretation of quantum numbers and selection rules in terms of symmetry. Experimental data summarized and compared with theoretical predictions.

PHYS 8200. Seminar: Cosmology and High Energy Astrophysics. (1 cr [max 6 cr]; S-N or Aud. Prereq–#) Current topics in cosmology and high energy astrophysics.

PHYS 8301. Symmetry and Its Application to Physical Problems. (3 cr; Prereq–5002 or #) Fundamental invariance principles obeyed by laws of physics. Group theory as tool for using symmetry and invariance to help understand behavior of physical systems. Applications made to atomic, molecular, nuclear, condensed-matter, and elementary particle physics.

PHYS 8311. Biological Physics of Single Molecules. (3 cr; Prereq–[5201 or Chen 4707], 5011 or #) Biological molecules, based on statistical mechanics, kinetics, optics, and other physics ideas. Physics of DNA/proteins, their interactions. Force spectroscopy (optical tweezers, atomic force microscopy). Concepts of optical spectroscopy. Single molecule fluorescence/imaging.

PHYS 8312. Biological Physics of Macroscopic Systems. (3 cr; Prereq–[5201 or Chen 4707], 5011 or #) Macroscopic systems, based on physics such as fluid dynamics, statistical mechanics, non-linear dynamics, and chaos theory. Super-molecular aggregates, biological physics of the cell. Biological physics of populations/evolution.

PHYS 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

PHYS 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

PHYS 8500. Plan B Project. (4 cr; Prereq–#) may be taken once to satisfy Plan B master’s project requirement, no cr toward PhD. Project topic arranged between student and instructor. Written report required.

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

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

PHYS 8600. Seminar: Space Physics. (1 cr [max 6 cr]; S-N or Aud.) Current topics in space physics and plasma physics.

PHYS 8611. Atomic and Molecular Structure. (3 cr; Prereq–5002 or #) Theory of interaction of particles with electromagnetic field. Invariance interactions of elementary particles.

PHYS 8621. Plasma Physics I. (3 cr; Prereq–4621, 5012 or #) Theory of plasma waves and instabilities in plasma systems, magnetohydrodynamics, nonlinear waves in plasmas, wave propagation in inhomogeneous plasmas.

PHYS 8622. Plasma Physics II. (3 cr; Prereq–8601 or #) Theory of plasma waves and instabilities, collisions, radiation, transport, nonlinear wave-particle and wave-wave interactions, instabilities in inhomogeneous plasmas.

PHYS 8811. Cosmic Ray and Space Physics. (3 cr; Prereq–5012 or #) Properties of energetic particles in heliosphere and in astrophysical environments; solar physics, including radiation and magnetic effects; solar wind and magnetosheath physics; physics of radiation belts.

PHYS 8850. Advanced Topics in Space and Plasma Physics. (3 cr [max 9 cr]; Prereq–8602 or 8611 or #) Topics in plasma waves and instabilities, solar physics, cosmic ray physics, atmospheric physics or planetary physics.

PHYS 8866. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

PHYS 8870. Seminar: Condensed Matter Physics. (1 cr [max 6 cr]; S-N or Aud. Prereq–#) Current research.


PHYS 8872. Statistical Mechanics and Transport Theory II. (3 cr; Prereq–8701 or #) Equilibrium properties of macroscopic classical and quantum systems. Phase transitions and Renormalization Group. Transport theory. Applications to soft condensed matter systems.


PHYS 8750. Advanced Topics in Condensed Matter Physics. (3 cr [max 9 cr]; Prereq–8712 or #) Sample research topics: magnetism, superconductivity, low temperature physics, superfluid helium.

PHYS 8777. Thesis Credits. Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

PHYS 8880. Seminar: Nuclear Physics. (1 cr [max 6 cr]; S-N or Aud.) Current research topics.

PHYS 8881. Nuclear Physics I. (3 cr; Prereq–5001 or concurrent req in 5001) Properties of nuclei based on hadronic and quark-gluon degrees of freedom. Relativistic field theory at finite temperature and density applied to many-body problems, especially nuclear matter and quark-gluon plasma. Applications to lepton and hadron scattering, nucleus-nucleus collisions, astrophysics and cosmology.

PHYS 8882. Nuclear Physics II. (3 cr; Prereq–8801 or #) Properties of nuclei based on hadronic and quark-gluon degrees of freedom. Relativistic field theory at finite temperature and density applied to many-body problems, especially nuclear matter and quark-gluon plasma. Applications to lepton and hadron scattering, nucleus-nucleus collisions, astrophysics and cosmology.

PHYS 8880. Advanced Topics in Nuclear Physics. (3 cr [max 9 cr]; Prereq–8802 or #) Research topics.

PHYS 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)
PHYS 8900. Seminar: Elementary Particle Physics. (1 cr; [max 8 cr; S-N or Aud])
Elementary particle physics, high energy physics, particle astrophysics and cosmology.

PHYS 8901. Elementary Particle Physics I. (3 cr; Prereq–8001 or #)

PHYS 8902. Elementary Particle Physics II. (3 cr; Prereq–8901 or #)

PHYS 8911. Introduction to Supersymmetry. (3 cr; A-F only; Prereq–8011 or #)

PHYS 8950. Advanced Topics in Elementary Particle Physics. (3 cr; [max 9 cr]; Prereq–8902 or #)
Research topics.

PHYS 8994. Research in Physics. (1-12 cr; max 24 cr; Prereq–#)
Research under faculty direction.

Department of Physiology

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

PHSL 5094. Research in Physiology. (1-5 cr; max 20 cr; Prereq–#)
Independent lab research project in physiology, supervised by physiology faculty.

PHSL 5095. Problems in Physiology. (1-5 cr; max 20 cr; Prereq–#)
Individualized study in physiology. Students address selected problem through library or lab research, supervised by physiology faculty.


PHSL 5115. Advanced Clinical Physiology I for Nurse Anesthetists. (3 cr; A-F or Aud Prereq–#)
Cellular mechanisms underlying systems physiology. Cellular physiology of excitable tissues, renal physiology, cardiovascular physiology.

PHSL 5116. Advanced Clinical Physiology II for Nurse Anesthetists. (3 cr; A-F or Aud Prereq–5115, #)
Respiratory physiology, acid-base physiology, gastrointestinal physiology, metabolism, endocrinology, physiology of pregnancy and labor.

PHSL 5201. Computational Neuroscience I: Membranes and Channels. (3 cr; Prereq–5201; Prereq–calcus through differential equations) Neural excitation (ion channels, excitation models, effects of neural morphology) using UNIX workstations to simulate empirical results. Includes the Hodgkin-Huxley model, nonlinear dynamic systems analysis, voltage and ligand gated ion channels, ion transport theories, and impulse initiation and propagation.

PHSL 5444. Muscle. (3 cr; Prereq–5444. Prereq–3061 or 3071 or 5061 or BIOC 3021 or BOC 4331 or #)

PHSL 5510. Advanced Cardiac Physiology and Anatomy. (2-3 cr; Prereq–#)
Fundamental concepts, advanced topics related to clinical/biomedical cardiac physiology. Lectures, laboratories, workshops, anatomical dissections. Intense, one week course.

PHSL 5511. Advanced Neuromuscular Junction Physiology. (2-3 cr; Prereq–#)
Fundamental concepts and advanced topics related to clinical/biomedical aspects of neuromuscular junction physiology. Lectures, laboratories, workshops, anatomical dissections. Intense, one week course.

PHSL 5520. Advanced Pulmonary Mechanics: Physiology and Pathophysiology. (2-3 cr; Prereq–#)
Fundamental concepts and advanced topics related to mechanical aspects of pulmonary function (e.g., elastic recoil, airway resistance). Lectures, laboratories, demonstrations. Intense, one week course.

PHSL 5530. Physiology of Drug Absorption, Distribution, and Elimination. (1-2 cr; max 2 cr; Prereq–Two semesters of calculus, #)

PHSL 5540. Advanced Exercise Medicine: Physiology and Bioenergetics. (1-2 cr; max 2 cr; Prereq–(grad student or practicing health professional), #)
Three-day intensive course. Physiology, bioenergetics, nutrition, and sports medicine. Focuses on application of principles to treatment of diseases and functional deficits. Lectures, demonstrations, hands-on experiences in an exercise medicine facility.

PHSL 5701. Physiology Laboratory. (1-2 cr; max 2 cr; A-F or Aud Prereq–#)
Experiments in physiology. Emphasizes quantitative aspects, including analysis of organ systems.

PHSL 8123. Research Ethics in the Plant and Environmental Sciences. (5 cr; S-N or Aud. Prereq–Grad student in (applied plant sciences or plant pathology or plant biological sciences or soil sciences))

PHSL 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

PHSL 8334. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

PHSL 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

PHSL 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

PHSL 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

Plant Biological Sciences (PBS)

PBS 8081. Integrative Plant Biology: Connecting Molecules to Ecosystems. (3 cr; A-F only. Prereq–Plant biological sciences grad student or #)

Background information and review of selected recent literature. For first-year students in plant biological sciences and other biological science graduate programs.

PBS 8123. Research Ethics in the Plant and Environmental Sciences. (5 cr; S-N or Aud. Prereq–Grad student in (applied plant sciences or plant pathology or plant biological sciences or soil sciences))
Courses

Plant Biology (PBIO)
Department of Plant Biology
College of Biological Sciences

PBIO 5109. Current Questions in Fungal Biology. (2 cr; A-F or Aud)
Diversity of fungi and their interactions with other organisms. Pathogenic/mutualistic interactions with animals/plants. Use of fungal systems for drug discovery and understanding pathogenicity, signal transduction, morphogenesis, and evolution.

PBIO 5301. Plant Genomics. (3 cr; SPLA 5301. Prereq–Intro course in genetics, intro course in biochemistry) or #)
Introduction to genomics. Emphasizes plants and relevant model organisms. DNA marker/sequencing technology, comparative genomics, whole genome sequencing, DNA chips/microarrays, EST libraries and SAGE analysis, gene-knockout systems, genome databases, sequence comparison/clustering algorithms, visualization tools.

PBIO 5412. Plant Physiology. (3 cr; Prereq–BIOL 2022 or BIOL 3002 or BIOL 3007, BIOL/BIOC 3021 or BIOC 4351)
Physiological and biochemical bases of plant systems with emphasis on higher plants.

PBIO 5416. Plant Morphology, Development, and Evolution. (4 cr; Prereq–BIOL 2022 or BIOL 3002 or BIOL 3007)
Evolutionary history of land plants. Morphological changes in vegetative and reproductive structures. Morphology of green algal ancestors, nonvascular land plants, and spore bearing and seed bearing vascular plants are analyzed in an evolutionary framework.

PBIO 5514. Plant Molecular Genetics and Development. (3 cr; Prereq–BIOC 3021 or BIOL 3021 or BIOL 4003 or BIOC 4352 or equiv)
Survey topics in plant molecular biology. How advances in molecular/genomic biology are used to understand plant physiology and developmental biology. Uses of transgenic plants in research/biotechnology.

PBIO 5516. Plant Cell Biology. (3 cr; SPBIO 4516W. Prereq–(BIOL 2022 or BIOL 3007 or BIOL 3022), (BIOL 3021 or BIOC 3021 or BIOL 4003))
Structure, function, and dynamic properties of plant cellular components such as organelles, cytokinetic, and cell wall. How cellular structures are assembled, how it contributes to cell growth/division. Cell fate/differentiation. Responses to hormones and external signals.

PBIO 5960. Special Topics. (1-3 cr [max 6 cr]; Prereq–Plant biology course)

PLPA 5102. Plant-Microbe Interactions. (3 cr)

PLPA 5201. Biology of Plant Diseases. (4 cr; Prereq–BIOL 1009 or equiv)
Principles and concepts of plant disease caused by selected viruses, bacteria, fungi, nematodes, and environmental factors. Pathogen biology, interaction of pathogens and the environment; epidemiology and control measures appropriate to plant disease.

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

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

PLPA 5204. Plant Disease Management. (3 cr; A-F or Aud. Prereq–2001 or 3001 or 3002)

PLPA 5300. Current Topics in Molecular Plant Pathology. (1 cr [max 2 cr]; S-N only. Prereq–[BIOC 4125, course in [plant pathology or molecular biology], course in genetics, [lab in [molecular biology, Biotechnology] or equivalent] or #] or #)
Interactive class. Students read, discuss, and critique publications in molecular plant pathology. Each week, students focus on one article and examine it from different dimensions (underlying principles, experimental strategies, data analysis, impact on the broader discipline).

PLPA 5301. Plant Genomics. (3 cr; SPBIO 5301. Prereq–Intro course in genetics or #)
Introduction to genomics. Emphasizes plants and relevant model organisms. DNA marker/sequencing technology, comparative genomics, whole genome sequencing, DNA chips/microarrays, EST libraries and SAGE analysis, gene-knockout systems, genome databases, sequence comparison/clustering algorithms, visualization tools.

PLPA 5302. Genomics of Plant-Associated Microbes. (3 cr; A-F or Aud. Prereq–[BIOC 4125, course in [plant pathology or molecular biology], course in genetics, [lab in [molecular biology, Biotechnology] or equivalent] or #]

PLPA 5999. Special Workshop in Plant Pathology. (1-4 cr [max 4 cr])
Workshops on a variety of topics in plant pathology offered at locations other than the Twin Cities campus. See Class Schedule or department for current offerings.

PLPA 8005. Supervised Classroom or Extension Teaching Experience. (2 cr; S-N or Aud. SAGRO 8005, BBE 8005, HORT 8005, SOIL 8005, PRERE-#)
Teaching experience in one of the following departments: Biosystems and Agricultural Engineering; Agronomy and Plant Genetics; Horticultural Science; Soil, Water, and Climate; or Plant Pathology. Discussions and specific teaching to strengthen skills and develop a personal teaching philosophy.

PLPA 8090. Advanced Procedures and Research in Plant Pathology. (1-8 cr [max 8 cr])
Special assignment in lab and field problems in plant pathology research.

PLPA 8101. Causal Organisms of Plant Disease. (4 cr; Prereq–5201 or equiv)
Laboratory-based intensive examination of bacteria, viruses, and nematodes as causal agents of plant disease.

PLPA 8102. Epidemiology and Genetics of Host-Parasite Interactions. (3 cr [max 4 cr]; A-F or Aud. Prereq–5201, GCD 3022)

PLPA 8123. Research Ethics in Plant and Environmental Sciences. (5 cr; S-N or Aud. SAGSC 8123, SOIL 8123. Prereq–Enrolled in a plant/environmental graduate research program)

PLPA 8200. Seminar. (1 cr; A-F or Aud)
Critical review and presentation of current problems and progress in plant pathology.

PLPA 8302. Genomics of Plant-associated Microbes. (3 cr; A-F or Aud. Prereq–[BIOC 4125, course in [plant pathology or microbiology], course in genetics, [lab in [molecular biology/biotechnology or equivalent] or #]

PLPA 8333. FTE: Master's. (1 cr; No grade. Prereq–Master's student, adviser and DGS consent)

PLPA 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

PLPA 8500. Perspectives in Plant Pathology. (2 cr [max 4 cr]; S-N or Aud)
Integrative overview of the field. For Ph.D. students nearing end of formal classroom experience.

PLPA 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr])
No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr, or a 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr.

PLPA 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr])
No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required (Plan A only)

PLPA 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr])
No grade. Prereq–Max 18 cr per semester or summer; 24 cr required

For definitions of course numbers, abbreviations, and symbols, see page 169.
Courses

Polish (PLSH)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

PLSH 5900. Topics. (1-4 cr [max 3 cr]) Topics specified in Class Schedule.

PLSH 5993. Directed Readings. (1-3 cr [max 3 cr]) Guided individual reading or study in Polish language, literature, and culture.

Political Science (POL)

Department of Political Science

College of Liberal Arts

POL 5210. Topics in Political Theory. (3 cr) (max 9 cr); A-F or Aud. §POL 4210. Prereq—§3210, grad student. Δ


POL 5252. Renaissance, Reformation, and Revolution: Early Modern Political Thought. (4 cr; §POL 3252. Prereq—grad student) Thinkers, theories, and discourses from the Renaissance to the French Revolution. Renaissance Humanists; Machiavelli; More; Reformation; Luther; Calvin; Natural Law; Grotius; Divine Right; Common Law; Bacon; English Revolutionaries; Hobbes; Locke; Astell; Enlightenment; Rousseau; French Revolutionaries; Hume; Burke; Wolfenstein.

POL 5253. Modernity and its Discontents: Late Modern Political Thought. (4 cr; §POL 4253. Prereq—§3253) Theoretical responses to and rival interpretations of Western economy, society, politics, and democratic culture in the modern age; theories of history; class struggle; end of metaphysics and death of God; technology and bureaucracy; psychology of culture in Hegel, Marx, Toqueville, Mill, Nietzsche, Weber, Freud.

POL 5275. Contemporary Political Thought. (3 cr; §POL—§4275; grad student; 1201 recommended) 20th-century crisis of Western humanism in major works of contemporary political thought from World War II to present. Force and freedom. Ideology and truth. Authority and resistance. Thinkers may include Arendt, Camus, Beauvoir, Fanon, Foucault, Habermas, Rawls, Sartre. Ideas may include communitarianism, feminism, postcolonialism, postmodernism, socialism.

POL 5280. Topics in Political Theory. (3-4 cr; §POL—§4280; grad student) Topics in historical, analytical, or normative political theory. Topics vary, see Class Schedule.

POL 5303. American Democracy in Crisis. (3 cr; §POL 4303. Prereq—grad student or #) Compares performance of American political system with promises of democracy. Interpretations of democratic government and American national governing process.

POL 5306. Presidential Leadership and American Democracy. (3 cr; §POL 4306. Prereq—grad student or #) Examines whether president’s political and constitutional powers are sufficient to satisfy citizens’ high expectations and whether president should be expected to dominate American politics.


POL 5309. Justice in America. (3 cr; Prereq—§4309; [1001 or 1002, [non-pol sci grad major or equiv or #]) American judiciary, selection of judges, how/why these individuals/institutions behave the way they do. What influences judicial decisions. What impact decisions have. Why people comply with them.

POL 5310. Topics in American Politics. (3 cr; Prereq—grad student or #) See Class Schedule for description.

POL 5315. State Governments: Laboratories of Democracy. (4 cr; §POL 4315W. Prereq—grad student or #) Political behavior, governmental institutions, and public policies in American states. Comparison among states, between state and national government. Emphasizes Minnesota.

POL 5322. Rethinking the Welfare State. (3-4 cr; Prereq—§4322; grad student) Competing arguments about welfare states in advanced industrial countries. Whether welfare states result from sectional interests, class relations, or citizenship rights. Compares American social policy with policies in other western countries.

POL 5327. Politics of American Cities and Suburbs. (3 cr; Prereq—§4327; [1001 or 1002], [non-pol sci grad major or equiv] or #) Development/role of American local government. Forms and structures. Relationships with states and federal government. Local politics and patterns of power/influence.

POL 5331. Thinking Strategically in Domestic Politics. (3-4 cr; Prereq—§4331; grad student) Applications of rational-choice and game theories to important features of domestic politics in the United States and elsewhere.


POL 5410. Topics in Comparative Politics. (3 cr; Prereq—grad student) Topics of current analytical or policy importance. Topics vary, see Class Schedule.

POL 5441. Environmental Policy. (3 cr; §POL 3441. Prereq—non-pol sci grad student or #) How American political system deals with environmental issues. How third world countries deal with environmental protection/economic growth. How international community deals with global environmental problems.

POL 5461. European Government and Politics. (4 cr; §POL 4461W. Prereq—grad student or #) European political institutions in their social settings. Power and responsibility. Governmental stability. Political decision making. Government and economic order.

POL 5465. Southeast Asian Politics. (3 cr) U.S. involvement in region. Progress toward and resistance to democratic political systems and economic development.

POL 5473. Chinese Politics. (3 cr; Prereq—§4473; EAS 4473; grad student) Fundamental conflicts in Chinese society. Democracy movement, human rights, class divisions, gender struggles, environmental issues, capitalist vs socialist development strategies. Secondary topics include Chinese foreign relations and domestic/foreign political issues in Taiwan.

POL 5477. Challenges and Issues in the Middle East. (4 cr; Prereq—§4477; 1054 or 3051 or non-pol sci grad student or #) Turkey, Iran, Israel, and Arab states. Domestic politics of religious/secular, ethnic, economic, environmental, and other policy/identity issues. Regional politics of water access, Israeli/Palestinian/Arab world relationships, oil and Persian/Arabian Gulf, human rights.

POL 5478. Contemporary Politics in Africa and the Colonial Legacy. (4 cr; §AFRO 4478, AFRO 5478, POL 4478W. Prereq—grad student or #) How current politics in mainly, though not exclusively, sub-Saharan Africa have been shaped by pre-colonial/colonial processes. Poverty of independence, recurrent political/economic crises. Global context and prospects for effective democracy.


POL 5481. Governments and Markets. (3-4 cr; S-H or Aud. §POL—§4481; 1054 or 3051 or non-pol sci grad student or #) Connection between democracy and markets. Focuses on countries in North America, Europe.


POL 5487. Struggle for Democratization and Citizenship. (4 cr; §POL 4487. POL 4501W. Prereq—grad student) History of democratic movement from its earliest moments in history to present. Attempts to draw balance sheet. Emphasizes how disenfranchised fought to become included.

POL 5501. Supreme Court and Constitutional Interpretation. (3 cr; Prereq—grad student or #) Historical/analytical approaches to Court’s landmark decisions. Theory/techniques of judicial review. Court’s authority related to wider political/social context of American government.

POL 5502. Supreme Court, Civil Liberties, and Civil Rights. (3 cr; Prereq—§4502; 1001 or 1002 or equiv or non-pol sci grad student or #) Supreme Court’s interpretation of Bill of Rights, 14th amendment. Freedom of speech, press, religion. Crime/punishment. Segregation/desegregation, affirmative action. Abortion/pregnancy.

POL 5525. Federal Indian Policy. (3 cr; A-F or Aud. §POL—§4525. Prereq—§3255) Determination, implementation, evolution, comparison of Indian policy from pre-colonial times to self-government of new millennium. Theoretical approaches to federal Indian policy. Major federal Indian policies. Views/attitudes of policy-makers. Reactions of indigenous nations to policies. Effect of bodies of literature on policies.

POL 5561. Comparative Legal Systems. (3 cr; §POL 4561. Prereq—grad student or #) Survey of principal legal systems of Western world. Role of legal system in relation to various political/ economic systems. Contrast between common law and civil law traditions.

POL 5577. American Political Parties. (3 cr; §POL 4577W. Prereq—grad student or #) American two-party system. Party influence in legislatures/executives. Decline of parties, their future.

POL 5576. American Political Culture and Values. (3-4 cr; §POL—§4766; 1001 or equiv or non-pol sci grad student or #) Individualism, freedom, equality. Dominant beliefs about democratic principles, materialism, capitalism, citizenship, patriotism/herosim.

POL 5577. Public Opinion and Voting Behavior. (3 cr; §POL—§4767W. Prereq—grad student or #) Major factors influencing electoral decisions. Political attitude formation/change. Data analysis lab required.

POL 5580. Topics in International Politics and Foreign Policy. (3 cr [max 6 cr]; Prereq—§4580. Prereq—§3250 or grad student) Selected issues in contemporary international relations. Topics vary, see Class Schedule.
Courses

POL 5833. The United States in the Global Economy—U.S. Foreign Economic Policy. (3 cr; Prereq—§: 4533; grad student; 3835 recommended)
Domestic/international politics of United States. Foreign economic policy (trade, aid, investment, monetary, migration policies). Effects of policies and international economic relations on U.S. economy/politics.

POL 5872. Global Environmental Politics. (3 cr; Prereq—§: 3872; non-pol sci grad only)
Emergence of the environment as a key aspect of the global political agenda. Non-governmental and governmental international organizations. Politics of protection of the atmosphere, rain forests, seas and other selected issues. International security and the environment.

POL 5881. International Law. (3 cr; §POL 4881. Prereq—grad student or #)

POL 5883. Global Governance. (3 cr; Prereq—§: 4883; 3835 or non-pol sci grad student or #)
Rise/role of inter-governmental organizations such as United Nations, non-governmental organizations. Peacekeeping, international law, human rights, security and arms control, self-determination, refugees, health, environment. Seminar discussions, class simulations.

POL 5885. International Conflict and Security. (3 cr; §POL 4885W. Prereq—grad student)
Alternative theories of sources of militarized international conflict. Theories applied to past conflicts. Theories’ relevance to present.

POL 5887. Thinking Strategically in International Politics. (3 cr; A-F or Aud. Prereq—§: 4887; grad student)
Applications of game theory to international politics. Conflict/competition, global environmental commons, deterrence/reputation.

POL 5889. Governments and Global Trade and Money. (3 cr; §POL 4889. Prereq—§: 3855 or grad student or #)
Politics of international trade and monetary affairs, including north-south and east-west relations.

POL 5970. Individual Reading and Research. (1-4 cr [max 4 cr]; Prereq—§: A, #)
Guided individual reading or study.

POL 8060. Research Proseminar in Political Science. (2 cr [max 8 cr]; S-N only; Prereq—Pol sci grad student)
Readings, discussion, guest speakers. Topics vary by semester.

POL 8070. Advanced Research and Writing in Political Science. (2 cr [max 4 cr]; S-N only; Prereq—ABD student in pol sci)
Commentary/guidance at all stages of dissertation research process, from conceptualization of topic/project to editing of nearly final drafts.

POL 8101. Introduction to Political Science. (3 cr [max 4 cr]; A-F or Aud. Prereq—Grad pol sci major or #)
History, scope, and methods of political science as a discipline; current subfields; major research programs (including statistical, pluralism, institutionalism, realism, behaviorism, rational choice, and critical theory); problems of theory, interpretation, concept-formation, comparison, measurement and experimentation; design for research.

POL 8104. Professional Development I. (1 cr [max 2 cr]; S-N or Aud. Prereq—Pol sci student, ABD, #)
Research ethics. Completion of dissertation prospecti or early dissertation chapters.

POL 8105. Professional Development II. (1 cr [max 2 cr]; S-N or Aud. Prereq—Pol sci student, ABD, #)
Research ethics. Skills training teaching undergraduate courses in political science. Completion of dissertation prospecti or early chapters.

POL 8120. Core Course in Political Methodology: Modeling Political Processes. (3 cr; Prereq—Grad pol sci grad major or #)
Methods and potential for creating models of political processes. Designing political institutions, discerning/forecasting election outcomes, producing early warnings of international conflicts, increasing turnout in elections. Using mathematics to study political strategy and collective decision making in committees/legislatures. Using statistics to measure political variables, design experiments with human subjects, and test micro/macroeconomic political theories.

POL 8122. Positive Theory. (3 cr; Prereq—Grad pol sci major or #)
Survey of positive political theory and rational-choice models. Information and transaction costs; institutions; models of elections, voting, coalitions.

POL 8123. Introduction to Quantitative Political Research. (3 cr; A-F or Aud. Prereq—Pol sci grad student or #)
Principles of regression analysis, use of regression model in political science.

POL 8124. Game Theory. (3 cr; Prereq—§: 8122. grad pol sci major or #)
Application of noncooperative game theory in political science. Equilibrium concepts, bargaining, repeated games, games of incomplete information, signaling games, reputation, learning in games.

POL 8125. Dynamic Analysis. (3 cr; Prereq—§: Pol sci grad student or #)
Time series method, its application in political science.

POL 8126. Qualitative Methods. (3 cr; Prereq—Grad pol sci major or #)
Broad introduction to qualitative methods in social science. Practical, hands-on training through fieldwork projects devised and carried out during the semester. Interviewing, participant observation, narrative interpretation, ethical problems, and issues of gender and race in fieldwork.

POL 8127. Survey Research Methods: Measuring Public Opinion. (3 cr; Prereq—Grad pol sci major or #)
Theoretical/empirical issues in survey research methodology aimed at assessing political attitudes/behavior (including questionnaire design, scientific sampling). Skill areas necessary to analyze, design, or conduct surveys to examine political phenomena.

POL 8131. Advanced Methods and Models. (3 cr, Prereq—Grad pol sci major; 6 cr 81xx seminars or #)
Interception of statistical methodology and deductive modeling: issues in merging inductive and deductive research. Sample topics: parties and elections, probabilistic voting, strategic modeling of international relations.

POL 8160. Topics in Models and Methods. (1-3 cr [max 12 cr]; Prereq—Grad pol sci major or #)
Seminars on selected topics.

POL 8201. Understanding Political Theory. (3 cr [max 4 cr]; Prereq—Grad pol sci major or #)
Key concepts and major approaches.

POL 8215. Philosophy of Political Inquiry. (3 cr; Prereq—Grad pol sci major or #)
Major schools in philosophy of science as applied to political inquiry: pragmatism, positivism, hermeneutics, critical rationalism, critical theory, realism. Themes of political inquiry: explanation, interpretation, theory, criticism. Political issues raised by philosophy of science: liberalism, democracy, control, multiculturalism.

POL 8225. American Political Thought. (3 cr; Prereq—Grad pol sci major or #)
Colonial era to present: Puritans, American Revolution, Constitution, rise of individualism, Federalism, anti-slavery, civil war and reconstruction, industrialism, westward expansion, Native Americans, immigration, populism, socialism, social Darwinism, growth of corporations and unions; Great Depression; growth of American power at home and abroad.

POL 8235. Democratic Theory. (3 cr; Prereq—Grad pol sci major or #)
Competing models of democracy: classical, republican, liberal, radical, Marxist, neo-Marxist, pragmatist, populist, pluralist, postmodern, participatory. Domestic and international struggles over meaning of “democracy”; social science models of and findings on democracy.

POL 8251. Ancient and Medieval Political Thought. (3 cr; Prereq—Grad pol sci major or #)

POL 8252. Early Modern Political Thought. (3 cr; Prereq—Grad pol sci major or #)
Theorists and texts from Renaissance to French Revolution. Selectively includes Machiavelli, More, Calvin, Luther, Grotius, Bodin, Hobbes, Winstanley, Harrington, Locke, Montesquieu, Rousseau, Hume, Smith, Burke, and Wollstonecraft; key debates over liberty, law, power, and knowledge.

POL 8253. Late Modern Political Thought. (3 cr; Prereq—Grad pol sci major or #)
Theoretical responses to and rival interpretations of Western economy, society, politics, and political culture in the modern age; theories of history; classical struggle; the end of metaphysics and the death of God; technology and bureaucracy; psychology of culture, in Hegel, Marx, Toqueville, Mill, Nietzsche, Weber, Freud.

POL 8260. Topics in Political Theory. (1-3 cr [max 6 cr]; Prereq—Grad pol sci major or #)
Readings and research in special topics or problems.

POL 8275. Contemporary Political Thought. (3 cr; Prereq—Grad pol sci major or #)
From approximately World War II to the present. Survey of range of texts or intensive focus on such authors as Adorno, Arendt, Derrida, Foucault, Habermas, Horkheimer, Rawls, Said. Sample topics: feminism, postmodernism, constructivism, Frankfurt School, postcolonialism.

POL 8301. American Politics. (3 cr [max 4 cr]; Prereq—Grad pol sci major or #)
Seminar on main themes of theory and research in American politics, institutions, law, and policy. Major works on individual, mass, elite, and institutional behavior and their relationship to each other. Foundation for advanced seminars in American politics.

POL 8302. Public Opinion and Political Participation. (3 cr; Prereq—Grad pol sci major or #)
Major theoretical perspectives and research on political participation, voting behavior, and public opinion. Voter turnout, importance of party identification, effects of campaigns, long-term change in public opinion, and designing and conducting research.

POL 8303. Political Parties. (3 cr; Prereq—Grad pol sci major or #)
Party systems and subsystems; party organizational characteristics, goals, and incentives; distribution of power and authority within the party; chief party functions; party as an organizer of governmental power; determinants of party structure and role.

POL 8305. Interest Groups and Social Movements. (3 cr; Prereq—Grad pol sci major or #)
Theoretical/empirical work on role of interest groups and social/political movements in American politics and policy-making processes. Theories of interest group and social/political movement formation, maintenance, and decline. How interest groups and social/political movements attempt to influence public policy. Impact/effectiveness groups/movements as agents of democratic representation, particularly for marginalized groups.

POL 8307. Proseminar in Political Psychology. (1 cr; S-N or Aud. §PSY 8211. Prereq—Grad pol sci major or pol psych minor or #)
Readings, discussion, and guest speakers. Topics vary by semester.
POL 8306. Proseminar in Political Psychology II. (1 cr; S-N or Aud. 695Y 8306. Prereq—Grad pol sci major or pol psych minor or #) Readings, discussions, and guest speakers. Topics vary by semester.

POL 8311. Political Psychology and Socialization. (3 cr; A-F or Aud. Prereq—Grad pol sci major or pol psych minor or #) Introduction to political psychology: Personality and politics; political cognition, emotion, and political behavior; political expertise; media and politics; aggression, authoritarianism, and political behavior; altruism and politics.

POL 8312. Legislative Process. (3 cr; Prereq—Grad pol sci major or #) Introduction to study of legislative politics; theories of legislative institutions and individual behavior; congressional elections; congressional committees, parties, and leaders.

POL 8313. Executive Process. (3 cr; Prereq—Grad pol sci major or #) Tension between leadership and democracy in context of American presidency in terms of President’s relationship with federal bureaucracy, Congress, and making of diplomatic and military policy.

POL 8314. Judicial Process. (3 cr; Prereq—Grad pol sci major or #) Judicial systems and roles; selection of judges; organizing and supporting litigation; influences on judicial decisions; impact and enforcement of judicial decisions; courts and other institutions of government.

POL 8320. Social Psychology of Prejudice and Intergroup Relations. (3 cr; A-F or Aud) Approaches, findings, and controversies in research on social psychology of prejudice, racial attitudes, and intergroup relations. Focuses on approaches based in social psychology and on related work from political science and sociology.

POL 8321. Urban Politics. (3 cr; A-F or Aud. Prereq—Grad pol sci major or #) Selection of local leadership; relationship of political system to governmental forms and social institutions; role and impact of political institutions; policymaking at local level; studies in policy problems; the emerging metropolis.

POL 8325. State Politics and Intergovernmental Relations. (3 cr; Prereq—Grad pol sci major or #) Theoretical approaches to comparative study of state politics; study of political culture and behavior, governmental institutions, and public policy at state level; federalism.

POL 8331. Constitutional Law. (3 cr; Prereq—Grad pol sci major or #) Overview of substantive and theoretical debates in American constitutional law; role of law and constitutional interpretation in shaping American political institutions and American politics.

POL 8333. FTE: Master’s. (1 cr; No grade. Prereq—Master’s student, adviser and DGS consent)

POL 8335. Public Policy. (3 cr; Prereq—Grad pol sci major or #) Theoretical approaches: incrementalism, innovation and policy learning, comparative policy outputs, policy process models, interest groups, and selected areas of public policy.

POL 8337. Welfare State Theories and American Social Policy. (3 cr; Prereq—Grad pol sci major or #) Rival theoretical explanations for cause and nature of welfare state development in context of four American social policies: social security, welfare, education, and healthcare.

POL 8360. Topics in American Politics. (1-3 cr [max 3 cr]; Prereq—Grad pol sci major or #) Readings/research in special topics or problems.

POL 8401. International Relations. (3 cr [max 4 cr]; Prereq—Grad pol sci major or #) Basic theories/approaches to study of international politics. Surveys representative work/central issues of scholarship.

POL 8402. International Security. (3 cr; Prereq—Grad pol sci major or #) Introduction to contending theories of international conflict/security.

POL 8403. International Norms and Institutions. (3 cr; Prereq—Grad pol sci major or #) Origins, roles, and effectiveness of international norms and institutions; theoretical explanations and debates. Institution of sovereignty; rational choice versus constructivist perspectives; role of international law, international organizations, and non-governmental organizations in international society and transnational cultural norms.

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

POL 8405. International Political Economy. (3 cr; A-F or Aud. Prereq—Grad pol sci major or #) Theoretical and policy issues in international economic relations. Different approaches for understanding outcomes in international economy. Trade, finance, labor markets, creation and maintenance of international regimes, and “globalization” of economic liberalism.

POL 8406. Politics of International Finance. (3 cr; Prereq—Grad pol sci major or #) Relationship between workings of the international political system and that of international markets for currency and capital.

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

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

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

POL 8412. American Foreign Policy. (3 cr; Prereq—8410 or #) U.S. policy toward foreign states and peoples: heritage, motivations, policy processes, what the public generally knows and wants, specific policies. Rise of interstate issues and decline of enemy-focused internationalism: implications for process and content of U.S. foreign policy.

POL 8444. FTE: Doctoral. (1 cr; No grade. Prereq—Doctoral student, adviser and DGS consent)

POL 8460. Topics in International Relations. (3 cr [max 6 cr]; Prereq—Grad pol sci major or #) Readings and research in advanced topics or problems. Recent topics: global environmental issues, morality in world politics, and norms and institutions in world politics.

POL 8601. Introduction to Comparative Politics. (3 cr; Prereq—Grad pol sci major or #) Main theoretical approaches and issues: comparative method, the state and class; political culture; development, democratization, rational choice, social movements.

POL 8602. Families, Children, and the State. (3 cr; A-F or Aud. Prereq—Grad pol sci major or #) Politics of family, sex, and children. Comparative perspective. Family autonomy vs. state authority. Political struggles over the definition of family, sex, and marriage. Crisis in fatherhood. Children’s rights. Globalization of Western ideology of childhood. Political realities of third-world childhood. Theories of political efficacy in family/child advocacy.

POL 8603. European Government and Politics. (3 cr; A-F or Aud. Prereq—Grad pol sci major or #) Main theories and approaches used to interpret European politics. Many of these theories have broad relevance for comparative politics, for example, theories about the state, cleavages and coalitional bases, parties and social movements, and constitutional structures and institutions have broad relevance for the field of comparative politics.

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

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

POL 8611. Chinese Politics. (3 cr; Prereq—Grad pol sci major or #) Major issues since 1949: democratization, dissent, violence, gender, capitalist and socialist development strategies, inequality, effect of culture on politics, status of Taiwan. Current scholarly debates on Chinese politics. Professional methods for research on contemporary China.

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

POL 8619. Latin American Politics. (3 cr; Prereq—Grad pol sci major or #) Major bodies of theory on development, democracy and re-democratization, social movements, civil society, the state, and transnational linkages.

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

POL 8637. Comparative Political Economy. (3 cr; Prereq—Grad pol sci major or #) Connections between democracy and markets, emphasizing experiences of countries in North America and Europe.

POL 8641. Comparative Mass Political Behavior. (3 cr; A-F or Aud. Prereq—Grad pol sci major or #) Examined from a cross-national perspective. Development of political participation, mobilization and its effects, development of political cleavages and political parties as vehicles of conflict, modes of political behavior under varied systems of representation and varied party systems.
PORT 5602. Seminar: Lusophone Literatures and Cultures. (3 cr; max 3 cr; Prereq–Pol Sci grad student or 4) Problems pertaining to Portuguese, Brazilian, and/or Lusophone African literatures and cultures. Topics specified in [Class Schedule].

Psychology (PSY)

Department of Psychology

College of Liberal Arts

PSY 5012. Learning and Cognition in Animals. (4 cr; Prereq–3011 or 4011 or honors or grad student) Review/evaluation of key questions, methods, theories, and data about forms of learning and elementary cognitive processes. Emphasizes animal models. Implications for human learning/behavior.

PSY 5014. Psychology of Human Learning and Memory. (3 cr; Prereq–3011 or 4011 or honors or grad student) Survey of basic methods and findings of research on human learning, memory, and cognition. Emphasis on major factors influencing human encoding or acquisition of information and skill, retention, and retrieval. Theoretical perspectives on underlying processes of encoding, retention, and retrieval.

PSY 5015. Cognition, Computation, and Brain. (3 cr; Prereq–3011 or 4011 or honors or grad student) Human cognitive/motor systems (perception, attention) from different perspectives (e.g., cognitive psychological approach, cognitive neuroscience approach).

PSY 5018H. Mathematical Models of Human Behavior. (3 cr; Prereq–Math 1271 or 1272) Mathematical models of complex human behavior, including individual/group decision making, information processing, learning, perception, and overt action. Specific computational techniques drawn from decision theory, information theory, probability theory, machine learning, and elements of data analysis.

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

PSY 5036W. Computational Vision. (3 cr; Prereq–[[3031 or 3051], Math 1272 or equiv]) Applications of psychology, neuroscience, computer science to design/leverage visual perception, visual cognition, action. Compares biological/physical processing of images with respect to image formation, perceptual organization, object perception, cognition, navigation, motor control.

PSY 5037. Psychology of Hearing. (3 cr; §NSC 5031W, 3031 [except for honors/grad student]) Biological and physical aspects of hearing, auditory psychophysics, theories and models of hearing, perception of complex sounds (melodies, speech, and noise). Application to sensory processing, perception, learning, memory.

PSY 5038W. Introduction to Neuromagnetism. (3 cr; Prereq–[[3061 or NSC 3102, Math 2243] or equiv]) Parallel distributed processing models in neural/ cognitive science. Linear models, Hebbian rules, self-organization, non-linear networks, optimization, representation of information. Applications to sensory processing, perception, learning, memory.


PSY 5054. Psychology of Language. (3 cr; Prereq–[[3001W or equiv], honors or grad student) Theories/experimental evidence in past/present conceptions of psychology of language.

PSY 5051. Neurobiology of Behavior. (3 cr; §PSY 5011, 3001 or 3011) Physiological/neuronal mechanisms underlying behavior of animals, including humans. Neural basis of learning/memory, sleep, wakefulness, and attention processes. Effects of drugs on behavior.


PSY 5064. Brain and Emotion. (3 cr; A-F or Aud. Prereq–3061 or 5061 or 3051) Introduction to affective neuroscience. How brain promotes emotional/motivated behavior in animals/humans. Biological theories of emotion in historical/current theoretical contexts. Fundamental brain motivational systems, including fear, pleasure, attachment, stress, and regulation of motivated behavior. Implications for emotional development, vulnerability to psychiatric disorders.

PSY 5065. Functional Imaging: Hands-On Training. (3 cr; Prereq–[[2801 or 4801 or equiv], 3061 or NSC 3101 or equiv]) Basic neuroimaging techniques. Emphasizes functional magnetic resonance imaging (fMRI). Theory/background. Students design/execute fMRI experiment on Siemens 3 Tesla scanner, incorporating techniques that compensate for distortion and other imaging artifacts.

PSY 5101. Personality Psychology. (3 cr; §PSY 5101, 3011) Surveys major theories and issues of personality functioning, personality structure, and personality assessment. Historically important and currently influential perspectives.

PSY 5135. Psychology of Individual Differences. (3 cr; §PSY 5135, 3001 or 3011 or equiv) Surveys major theories and issues of personality functioning, personality structure, and personality assessment. Differences in personality functioning, personality structure, and personality assessment. Differences in individual differences in ability, personality, interests, and social attitudes.

PSY 5136. Human Abilities. (3 cr; Prereq–3135 or 5135 or 5862) Theories and major issues/foundations on personality functioning, personality structure, and personality assessment. Differences in personality functioning, personality structure, and personality assessment. Differences in individual differences in ability, personality, interests, and social attitudes.

PSY 5137. Introduction to Behavioral Genetics. (3 cr; Prereq–3001 or equiv) Applications of psychology, neuroscience, computer science to design/leverage visual perception, visual cognition, action. Compares biological/physical processing of images with respect to image formation, perceptual organization, object perception, cognition, navigation, motor control.

PSY 5107. Theories and applications of research in human abilities. Includes intelligence, aptitude, achievement, specific abilities, information processing/ learning and intelligence, aptitude/treatment interactions, and quantitative measurement issues.


PSY 5138. Psychology of Aging. (3 cr; Prereq–3001 or equiv) Surveys theories/findings concerning age-related changes in mental health, personality, cognitive functioning, productivity are reviewed/interpreted within context of multiple biological, social, and psychological changes that accompany age.

PSY 5202. Attitudes and Social Behavior. (3 cr; Prereq–3201 or equiv) Theories/research in social psychology, other fields in psychology of attitudes, beliefs, values. These fields' relationship to social behavior. Principles/theories of persuasion.

PSY 5204. Psychology of Interpersonal Relationships. (3 cr; A-F or Aud. Prereq–[honors or grad student] or Plan B or Plan C) Theory/research in social psychology, other fields in psychology of attitudes, beliefs, values. These fields' relationship to social behavior. Principles/theories of persuasion.
Courses

PSY 5205. Applied Social Psychology. (3 cr; Prereq–3201 or grad student)
Applications of social psychology research/theory to domains such as physical/mental health, education, the media, desegregation, the legal system, energy conservation, public policy.

PSY 5206. Social Psychology and Health Behavior. (3 cr; A-F or Aud; Prereq–3201 or grad student)
Survey of social psychological theory/research pertaining to processes by which people develop beliefs about health/illness. Relationship between these beliefs, adoption of health-relevant behavior. Effect of psychological factors on physical health.

PSY 5207. Personality and Social Behavior. (3 cr; A-F or Aud; Prereq–3101 or 3201 or honors or grad student or #)
Conceptual/methodological strategies for scientific study of individuals and their social world. Applications of theory/research to issues of self, identity, and social interaction.

PSY 5501. Vocational and Occupational Health Psychology. (3 cr; Prereq–3001W or equiv or #)
Survey of history, concepts, theories, methods, and findings of vocational/occupational health psychology. Burnout, personality, violence, stressors/stress-relations, counter productive behaviors, coping in workplace. Vocational development/assessment, career decision-making/counseling, person-environment fit.

PSY 5604H. Abnormal Psychology. (3 cr; §PSY 3604. Prereq–honors or grad student or #)
Comprehensive review of psychopathological disorders. Etiology, diagnostic criteria, clinical research findings.

PSY 5606. Clinical Psychopharmacology. (3 cr; Prereq–[[3001W or equiv], [3011 or equiv], [5603 or equiv] or #)
How psychopharmacological methods such as autonomic/central nervous system recording are used in studying major psychopathological disorders.

PSY 5707. Personnel Psychology. (4 cr; Prereq–[[3001W or equiv], [3711] or #)
Application of psychological research/theory to organizational staffing, evaluation, and training. Principles of individual differences and psychological measurement applied to job making, staffing, and instruction in organizations. Job analysis, recruitment, screening, selection, performance appraisals, criterion measurement, organizational training, learning, aptitude test interactions.

PSY 5708. Organizational Psychology. (4 cr; §PSY 5702, PSY 5703, Prereq–[[3001W or equiv], [3711] or #)
Psychological causes of behavior in work organizations. Consequences for individual fulfillment and organizational effectiveness. Individual differences, social perception, motivation, stress, job design, leadership, job satisfaction, teamwork, organizational culture.

PSY 5862. Psychological Measurement: Theory and Methods. (3 cr; Prereq–4801 or equiv)
Types of measurements (tests, scales, inventories) and their construction. Theory/measurement of reliability/validity.

PSY 5865. Advanced Psychological and Educational Measurement. (4 cr; §PSY 6822. Prereq–5862 or #)

PSY 5960. Topics in Psychology. (1-4 cr [max 8 cr]; Prereq–1001. [1 cr or 2 cr or grad student])
Special course or seminar. Topics listed in psychology office.

PSY 5993. Research Laboratory in Psychology. (3 cr [max 18 cr]; Prereq–4, A)
Laboratory in instruction and seminars in faculty research areas.

PSY 8004. Philosophical Psychology. (3 cr; S-N or Aud; Prereq–[[Logic or phil course], [psych or ICD or phil] PhD student] or #)
Selected philosophical/methodological problems.

PSY 8010. Advanced Topics in Learning. (3 cr [max 12 cr]; S-N or Aud. Prereq–5012 or #)
Contemporary topics in learning and behavior theory.

PSY 8020. Seminar in Conditioning and Learning. (3 cr [max 12 cr]; S-N or Aud. Prereq–5012 or grad psych major or #)
Review and discussion of ongoing research and perspectives on future research.

PSY 8026. Neuro-Immune Interactions. (3 cr; §SCMB 8381, NSC 8026. Prereq–Psych or equiv, NSc 5111 or equiv)
Regulatory systems (neuroendocrine, cytokine, and autonomic nervous systems) linking brain and immune systems in brain-immune axis. Functional effects of bidirectional brain-immune regulation.

PSY 8031. Seminar: Visual Perception. (2 cr [max 3 cr]; Prereq–5031 or #)
Cognitive, psychological, neurophysiological determinants of visual perception. Current research.

PSY 8036. Topics in Computational Vision. (3 cr [max 12 cr]; Prereq–5031 or 5036 or equiv or #)
Recent research in visual psychophysics, visual neuroscience, and computer vision.

PSY 8037. Psychophysics and Audition. (3 cr; Prereq–#)

PSY 8055. Seminar: Cognitive Neuroscience. (3 cr; Prereq–5015 or #)
Recent advances in analysis of neural bases of cognitive functions.

PSY 8056. Seminar: Psychology of Language. (3 cr; A-F or Aud. Prereq–grad psych major or #)
Selected topics in psycholinguistics.

PSY 8060. Seminar: Neural Substrates of Mental Processes. (3 cr [max 12 cr]; Prereq–5012 or 5061 or 5062 or 5064 or NSci 5681 or 5101 or Psy 6301 or NSc 5401 or #)
Neurobiological substrates of psychological processes such as memory, attention, and emotion. Neurobiological substrates of mental dysfunction.

PSY 8070. Seminar: Psychopharmacology. (1-3 cr [max 12 cr]; §NSC 8207, PHCL 8207. Prereq–#)
Basic issues, contemporary research. Lectures, student presentations.

PSY 8111. Psychopathology I. (4 cr; A-F or Aud. Prereq–Clinical psych grad student, #)

PSY 8112. Psychopathology II. (3 cr; A-F or Aud. Prereq–[8111, psych grad student] or #)

PSY 8201. Social Cognition. (3 cr; A-F or Aud. Prereq–Psych PhD candidate)
Theory and research in stereotyping, social inference, and person memory.

PSY 8202. Close Relationships. (3 cr; A-F or Aud. Prereq–Grad psych major; 8202 recommended; #)
Recent theory and research.

PSY 8203. Impression Management. (3 cr; Prereq–Grad psych major; 8202 recommended, #)
Classic and contemporary theory and research concerning interpersonal strategies of impression management and interplay between private and public self.

PSY 8204. Social Psychology of Prejudice and Intergroup Relations. (3 cr)
Approaches, findings, and controversies in research on social psychology of prejudice, racial attitudes, and intergroup relations. Focuses on approaches based in social psychology and in related work from political science and sociology.

PSY 8206. Proseminar: Research in Social Psychology. (2 cr [max 8 cr]; S-N or Aud. Prereq–Psych PhD student)
Contemporary theoretical positions and related research.

PSY 8208. Social Psychology: The Self. (3 cr; A-F or Aud. Prereq–Psych background especially in personality and soc psych)
Social psychological theory and research concerning the self and social behavior.

PSY 8209. Research Methods in Social Psychology. (3 cr; A-F or Aud. Prereq–Grad psych major)
Experimental and quasi-experimental methods suitable for research in social psychology. Statistical, interpretive, operational, and ethical issues.

PSY 8210. Law, Race, and Social Psychology. (3 cr; A-F only. Prereq–2nd or 3rd yr law student or PhD student in social science doctoral program)
Interdisciplinary seminar. Scientific foundations for and legal implications of implicit (vs explicit) racial or gender bias in four socio-legal domains: criminal law, affirmative action, employment discrimination, and legislative redistricting.

PSY 8211. Proseminar in Political Psychology I. (1 cr; S-N or Aud. SPL 8307. Prereq–Political Psychology grad minor)
Readings, discussion, and guest speakers. Topics vary each semester.

PSY 8212. Proseminar in Political Psychology II. (1 cr; S-N or Aud. §POL 8308. Prereq–Political Psychology grad minor)
Readings, discussion, and guest speakers. Topics vary each semester.

PSY 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

PSY 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

PSY 8501. Counseling Psychology: History and Theories. (3 cr; Prereq–Counseling psych grad student or #)
Introduction to history of counseling psychology and to primary theoretical orientations used by counseling psychologists. For each theory: basic principles, application to counseling practice, and research support.

PSY 8502. Assessment in Counseling Psychology. (3 cr; Prereq–Counseling psych grad student or #)

PSY 8503. Interviewing and Intervention. (3 cr; Prereq–8501, 8502 or #)
Skills-based course: conceptualization of counseling process, stages of counseling, development of counseling skills, and strategies for behavior change.

PSY 8510. Counseling Psychology Beginning Practicum: General. (1-6 cr [max 6 cr]; S-N or Aud. Prereq–Counseling psych grad student, 8501, 8502, 8503 or equiv, #)
Beginning applied experiences in counseling psychology settings.

PSY 8511. Counseling Psychology Beginning Practicum: General. (1-6 cr [max 18 cr]; S-N or Aud. Prereq–[[8501, 8502, 8503 or equiv] or equiv], counseling psych grad student, or #)
Beginning applied experiences in counseling psychology settings.

PSY 8512. Counseling Psychology Beginning Practicum: General. (1-6 cr [max 18 cr]; S-N or Aud. Prereq–[[8501, 8502, 8503 or equiv] or equiv], counseling psych grad student, or #)
Beginning applied experiences in counseling psychology settings.
PSY 8514. University Counseling Practicum I. (4-6 cr [max 6 cr]; S-N or Aud. [EPSY 8513. Prereg—Counseling psych grad student, 8501, 8502, 8503 or equiv, #]) Integrates science with supervised practice in University Counseling and Consulting Services (UCCS) involving career, academic, and personal counseling clientele.

PSY 8515. University Counseling Practicum II. (4-6 cr [max 6 cr]; S-N or Aud. [EPSY 8514. Prereg—Counseling psych grad student, 8501, 8502, 8503 or equiv, 8514, #]) Integrates science with supervised practice in University Counseling and Consulting Services (UCCS) involving career, academic, and personal counseling clientele.

PSY 8541. Multicultural Psychology. (3 cr; Prereq—Counseling psych grad student or #) Theory, research, and practice of multiculturally competent counseling in diverse settings/communities. Emphasizes self-awareness, knowledge, and skills. Discussion, lecture, readings, lab, guest lectures.

PSY 8542. Ethics in Psychology. (3 cr; S-N or Aud. Prereq—Counseling psych grad student or #) Ethical principles and codes of conduct for psychologists. Ethical dilemmas faced by researchers, practitioners, and teachers.

PSY 8544. Vocational and Occupational Health Psychology Research. (3 cr; Prereq—[8501, 8502, 8503] or equiv, counseling psych grad student or #) Research problems specific to special populations, vocational research, assessment/testing, findings in these areas useful to counseling psychology practice.

PSY 8545. Counseling Psychology Process and Outcome Research. (3 cr; Prereq—[8501, 8502, 8503] or equiv, counseling psych grad student or #) Introduction to methods/content domains. Research design, methodological issues, analogue research, process/outcome research.

PSY 8550. Assessment: WAIS-III. (3 cr; Prereq—Counseling psych grad student or #) Skills acquisition for administering, scoring, summarizing results of Wechsler Adult Intelligence Scale-III (WAIS-III).

PSY 8554. Career and Occupational Health Psychology Assessment. (3 cr; Prereq—Counseling psych grad student, or #) History of vocational interest/inventories/measures related to career development, and of assessments used in occupational health psychology. Scale construction methodology. Research applications. Interpretation/use of instruments.

PSY 8560. Counseling Psychology Advanced Practicum I: General. (1-6 cr [max 6 cr]; S-N or Aud. Prereq—[8501, 8502, 8503] or equiv, [8510, 8511] or [8514, 8515] or equiv], counseling psych grad student or #) Applied practice experience in counseling psychology settings and seminars. May include guest speakers, readings, and student presentations.

PSY 8561. Counseling Psychology Advanced Practicum II: General. (1-6 cr [max 6 cr]; S-N or Aud. Prereq—Counseling psych grad student, 8501-8502-8503 or equiv, 8510-8511 or 8514-8515 or equiv, or #) Applied practice experience in counseling psychology settings and seminar that may include guest speakers, readings, and student presentations on topics relevant to clients and settings of practice experiences.

PSY 8562. Counseling Psychology Advanced Practicum III: General. (1-6 cr [max 6 cr]; S-N or Aud. Prereq—Counseling psych grad student, 8501-8502-8503 or equiv, 8510-8511 or 8514-8515 or equiv, or #) Applied practice experience in counseling psychology settings and seminar that may include guest speakers, readings, and student presentations on topics relevant to clients and settings of practice experiences.

PSY 8565. Counseling Psychology Advanced Practicum I: Vocational: Career Counseling Clinic. (1-6 cr [max 6 cr]; S-N or Aud. Prereq—[8501, 8502, 8503 or equiv, [8510, 8511 or equiv], counseling psych grad student or #) Applied practice experience in vocational assessment clinic of Department of Psychology. Career/vocational testing, assessment, decision making.

PSY 8566. Counseling Psychology Advanced Practicum II: Vocational Assessment Clinic. (1-6 cr [max 6 cr]; S-N or Aud. Prereq—8501, 8502, [8503 or equiv], 8510 or 8511 or equiv], counseling psych grad student, or #) Applied practice experience in Vocational Assessment Clinic of Department of Psychology. Career/vocational testing, assessment, decision making.

PSY 8567. Counseling Psychology Advanced Practicum III: Vocational Assessment Clinic. (1-6 cr [max 6 cr]; S-N or Aud. Prereq—Counseling psych grad student, 8501, 8502, 8503 or equiv, 8510 or 8511 or equiv, or #) Applied practice experience in Vocational Assessment Clinic of Department of Psychology. Career/vocational testing, assessment, and decision making.

PSY 8570. Counseling Psychology Internship I. (1-12 cr [max 12 cr]; S-N or Aud. Prereq—Counseling psych PhD candidate, or #) First part of counseling psychology internship.

PSY 8571. Counseling Psychology Internship II. (1-12 cr [max 36 cr]; S-N or Aud. Prereq—Counseling psych PhD candidate, or #) Second part of counseling psychology internship.

PSY 8572. Counseling Psychology Internship III. (1-12 cr [max 36 cr]; S-N or Aud. Prereq—Counseling psych PhD candidate, or #) Third part of counseling psychology internship.


PSY 8612. Assessment II. (5 cr; A-F or Aud. Prereq—8611, clinical psych grad student) Theory and practice in clinical application of assessment techniques and interviewing. Lab: observations, administration, scoring, interpretation.

PSY 8620. Clinical Psychology Practicum. (1-6 cr [max 36 cr]; S-N or Aud. Prereq—#) Field experience in professional work in clinical settings.


PSY 8622. Treatment I. (3 cr; A-F or Aud. Prereq—8611, CSPR grad student) Methodological issues in treatment research, theories of change/motivation. Empically supported therapies for anxiety, mood, and personality disorders, psychosis, and addiction. Simulating therapeutic interactions to prepare students to provide therapy.

PSY 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq—Doctoral student who has not passed prelim exams) Each week participants read and discuss one or two primary research articles.

PSY 8701. Seminar in Industrial and Organizational Psychology I. (3 cr; A-F or Aud) Application of research and theory in psychological measurement and individual differences to problems in job analysis, personnel selection and classification, and individual training.

PSY 8702. Seminar in Industrial and Organizational Psychology II. (3 cr; A-F or Aud) Determinants of behavior, performance, job satisfaction that can be influenced after an individual enters an organization. Application of research/theory in motivation, social psychology, human factors to enhancement of job performance/satisfaction.

PSY 8703. Seminar in Industrial and Organizational Psychology III. (3 cr; A-F or Aud) Developing issues and trends in current research, research methodological advances, and implementation practices. Recent important and controversial developments.

PSY 8777. Thesis Credits: Masters. (1-18 cr [max 50 cr]; No grade. Prereq—Max 18 cr per semester or summer; 10 cr total required [Plan A only])


PSY 8881. Seminar in Quantitative and Psychological Measurement. (3 cr [max 15 cr]) Reviews, individual research on current topics in psychological measurement.

PSY 8882. Seminar in Quantitative and Psychological Measurement. (3 cr [max 15 cr]) Reviews, individual research on current topics in psychological measurement.

PSY 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

PSY 8935. Readings in Behavioral Genetics and Individual Differences Psychology. (1 cr [max 10 cr]; S-N or Aud. Prereq—5135, 5137 or #) Each week participants read and discuss one or two primary research articles.

PSY 8937. Seminar in Human Behavioral Genetics. (3 cr [max 6 cr]; Prereq—5137 or #) Advanced topics vary with each offering. Sample topics: gene identification in complex human traits, behavioral genetics of alcoholism, twin-family methodology.

PSY 8960. Graduate Seminar in Psychology. (1-4 cr [max 36 cr]; Prereq—Psychology grad student or #) Graduate seminar in subject of current interest in psychology.


PSY 8966. Directed Studies: Special Areas of Psychology and Related Sciences. (1-6 cr [max 36 cr]; Prereq—#) Special area of psychology or a related science.

PSY 8995. Research Problems. (1-6 cr [max 36 cr]) Research problems.
Public Affairs (PA)

**Hubert H. Humphrey Institute of Public Affairs**

**PA 5001. Intellectual Foundations of Public Action.** (1.5 cr; A-F or Aud) Prereq–Major in publ aff or publ policy or sci, tech, and environ policy or urban and regional planning or publ hth or #) Evolution of intellectual approaches that underlie public planning, management, and policy analysis as strategies for public action. How public decision making is shaped by knowledge and values; role of rationality. Conceptual approaches to public action along descriptive/normative lines and structure/process lines.

**PA 5002. Introduction to Policy Analysis.** (1.5 cr; A-F or Aud, Prereq–Major in public policy or #) Process of public policy analysis from problem structuring to communication of findings. Commonly used analytical methods. Alternative modes of analytical problem resolution.

**PA 5003. Introduction to Financial Analysis and Management.** (1.5 cr; A-F or Aud, Prereq–Major in public policy or #) Basic finance/accounting concepts/tools used in public/private sector. Fund accounting, balance sheet and income statement analysis, cash flow analysis, and public/nonprofit sector budgeting processes. Lectures, discussions. Case/examples from nonprofit and public sector organizations.

**PA 5004. Introduction to Planning.** (3 cr; A-F or Aud, Prereq–Major in urban/regional planning or #) History, institutional development of urban planning as a profession. Intellectual foundations, planning theory. Roles urban planners in U.S./international settings. Scope, legitimacy, limitations of planning and of planning process. Issues in planning ethics and in planning in settings of diverse populations/stakeholders.

**PA 5011. Leadership and Management.** (3 cr; A-F or Aud, Prereq–Major in public policy or #) Challenges facing higher-level managers in public/nonprofit organizations in a mixed economy and democratic republic. Distinctive features of public/nonprofit management, skills necessary for effective management, manager’s role as creator of public value. Lectures, case discussions.

**PA 5012. The Politics of Public Affairs.** (3 cr; A-F or Aud, Prereq–Major in public policy or [sci, tech, and environ policy] or #) Stages of policy making from agenda setting to implementation. Role/behavior of political institutions (courts, legislatures, executives, bureaucracies) and citizens, social movements, and interest groups. Concepts of political philosophy. Theories of the state. Team taught, interdisciplinary course. Small discussion sections.

**PA 5013. Law and Urban Land Use.** (1.5 cr; A-F or Aud, Prereq–Major in urban/regional planning or #) Role of law in regulating/shaping urban development, land use, environmental quality, and local/regional governmental services. Interface between public/private sector.

**PA 5021. Economics For Policy Analysis and Planning I.** (3 cr; A-F or Aud, Prereq–Major in public policy or [sci, tech, and environ policy] or #) Introduction to tools useful for public policy: intermediate microeconomics, macroeconomics, concepts of international trade.

**PA 5022. Economics For Policy Analysis and Planning II.** (1.5-3 cr; max 4.5 cr; A-F or Aud, Prereq–Major in [5021 or equiv], public policy major or #) Application of economic reasoning to various public policy issues. Cost-benefit analysis, nonmarket valuation, and tax analysis.


**PA 5032. Intermediate Regression Analysis.** (2 cr; A-F or Aud, Prereq–Major in [5031 or equiv], major in [public policy or [sci, tech, and environ policy]] or #; [5032 or equiv] recommended) Public affairs topics using maximum-likelihood estimation approaches.

**PA 5033. Multivariate Techniques.** (2 cr; A-F or Aud, Prereq–Major in [5031 or equiv], major in [public policy or [sci, tech, and environ policy]] or #; [5032 or equiv] recommended) Introduction to survey research methods. Emphasizes applications to policy and applied research. Research design choices: descriptive, experimental (case studies), sampling, variable specification, measurement. Conducting interviews, mailed questionnaires. Qualitative techniques.

**PA 5036. Regional Economic Analysis.** (1.5-5 cr; A-F or Aud, Prereq–Major in science, tech, env policy; or urban/regional planning or #) Economic data analysis techniques for practitioners in planning and economic development working at local/regional levels. Shift-share analysis, economic base model, base multipliers, location quotient analysis, minimum requirements method, economic impact analysis. Individual/group projects.

**PA 5037. Regional Demographic Analysis.** (1.5-5 cr; A-F or Aud, Prereq–Major in public policy or [science, tech, env policy] or urban/regional planning or #) Demographic data analysis, population projection techniques for practitioners in planning, social service delivery, and community development at local/regional levels. Population extrapolation using curve fitting methods, demographic indicators, cohort-component method of population projection, estimation of fertility/migration rates, life tables. Individual/group projects.

**PA 5010. Management and Governance of Nonprofit Organizations.** (3 cr; Prereq–5001 or 5941 or #) Draws on theories, concepts, and real world examples to explore critical managerial challenges. Governance systems, managerial/leadership practices, effect of different funding environments, management of multiple constituencies. Different types of nonprofits using economic/behavioral approaches.

**PA 5102. Organization Performance and Change.** (3 cr; Prereq–5001 or 5941 or #) Models of change/leadership. How leaders can promote personal, organizational, and societal change. Emphasizes case studies and action research. Framework for leadership/change in an innovation society. At end of each class session, two or three students summarize evening’s discussion.

**PA 5104. Strategic Human Resource Management.** (3 cr; A-F or Aud, Prereq–5001 or 5941 or #) Theory/practice of developing, utilizing, and aligning human resources to improve culture/outcomes of nonprofit/public organizations. HR strategy, individual diversity, leadership, selection, training, compensation, classification, performance appraisal, future HR practices.


**PA 5113. State and Local Public Finance.** (3 cr; Prereq–Grad or #) Theory/practice of financing. Providing public services at state/local level of government. Emphasizes integrating theory/practice, applying materials to specific policy areas, and documenting wide range of institutional arrangements across/within the 50 states.

**PA 5122. Law and Public Affairs.** (3 cr; Prereq–Grad or #) Overview of development of American legal system. Role of courts, legislatures, and political actors in changing law. How law is used to change public policy.

**PA 5123. Introduction to Philanthropy: Theory and Practice.** (3 cr; Prereq–5001 or 5941 or #) Brief history of philanthropy in the United States. Foundation/other sources of funding for nonprofit activity. Philosophes of fundraising/grantmaking. Types of foundations/agencies that fund. Practical approaches to getting/managing money.

**PA 5131. Conflict Management: Readings in Theory and Practice.** (3 cr; Prereq–5001 or 5941 or #) Current theory. Review of conflict resolution strategies. Aspects of interpersonal, group, organizational, and systemic conflict.

**PA 5132. Mediation Training.** (3 cr; Prereq–Grad or #) Creating an arena for mediation. Skills/expectations needed to mediate disputes between individuals, among groups: balanced (peer or colleague), imbalanced (power differentials). Role playing, group debriefing, critique. Cases.

**PA 5133. Conflict Management Proseminar.** (1 cr; Prereq–5001 or 5941 or #) Topics in conflict management research/practice. Theoretical implications, practical applications from the perspectives of participants. National/international issues.

**PA 5134. Conflict Management Proseminar.** (1 cr; Prereq–5001 or 5941 or #) Topics in conflict management. Theoretical implications, practical applications from the perspectives of participants. National/international issues.

**PA 5142. Public Issues Facilitation Strategies.** (1 cr; Prereq–5001 or 5941 or #) Processes that encourage civic participation and effective, timely decision-making. Students identify/examine facilitation components and link them to public issues, examine one approach/theory of facilitation and apply it to a case study, and share experiences/cases with other learners.

**PA 5143. Teaching Leadership for the Common Good.** (1 cr; Prereq–5001 or 5941 or #) Main concepts in “leadership for the common good” framework. Tools/exercises for applying these concepts. How to teach others about leadership for the common good.
PA 5190. Topics in Public and Nonprofit Leadership and Management (1-4 cr; max 9 cr; Prereq–5011 or 5941 or #) Selected topics.


PA 5203W. Geographical Perspectives on Planning, (3 cr; §GEOG 3605W, GEOG 3606W, GEOG 5605W, GEOG 5606W. Prereq–Grad student or #) Includes additional weekly seminar-style meeting and bibliography project on topic selected in consultation with instructor.

PA 5211. Land Use Planning. (3 cr; Prereg–Grad student or #) Physical/spatial basis for land use planning at community/regional level. Role of public sector in guiding private development. Land use regulations, comprehensive planning, growth management, innovative land use planning/policies.

PA 5212. Managing Urban Growth and Change, (3 cr; Prereq–Grad student or #) Theory/practice of planning, promoting, and controlling economic growth/change in urban areas. Economic development tools available to state/local policymakers, historic context of their use in the United States. Legal, social, and economic implementation constraints. Interactions among economic, social, and demographic trends.

PA 5221. Private Sector Development, (3 cr; Prereq–Grad or #) Roles of various participants in land development. Investment objectives, effects of regulation. Overview of development process from private/public perspective.


PA 5232. Transportation Policy, Planning, and Deployment. (4 cr; Prereq–Sr or grad student or #) Development of transportation policy, making of transportation plans, deployment of transportation technologies. Lectures, interactive case studies, role playing.

PA 5251. Strategic Planning and Management, (3 cr; A-F or Aud. Prereq–Grad student or #) Theory/practice of strategic planning/management for public/nonprofit organizations/networks. Strategic planning process, management systems; stakeholder analyses. Tools/techniques such as purpose expansions, SWOT analyses, oval mapping, portfolio analyses, and logic models.

PA 5252. Strategy and Tactics in Project Planning and Management, (1.5 cr; Prereg–Grad or #) Planning, analysis, evaluation, and implementation of short-term plans/projects. Technical analyses, interactive elements of completing projects within budget/time constraints. Strategic/tactical choices in planning. Case examples.


PA 5254. Strategic Planning Tools and Techniques, (1.5 cr; A-F or Aud. Prereg–Grad student or #) Techniques may include purpose expansions, competitive analysis, core/distinctive competency identification, portfolio methods, logic and business process models, scenario construction, balanced scorecards, and related strategy mapping tools.

PA 5255. Stakeholder Identification, Analysis, and Influence Techniques, (1.5 cr; A-F or Aud. Prereg–Grad student or #) Techniques include basic identification, power vs. interest grids, stakeholder influence diagrams, discerning the common good, soft vs. opposition matrices, participation planning matrices, and ethical analysis.


PA 5290. Topics in Planning, (1-3 cr; max 9 cr; Prereq–Grad student or #) Selected topics.


PA 5311. Program Evaluation. (3 cr; Prereq–Grad student or #) Principal methods, primary applications of evaluation research as applied to programs/policies in health/human services, education, or the environment. Conducting evaluations. Becoming a critical consumer of studies.

PA 5390. Topics in Advanced Policy Analysis Methods, (1-4 cr; max 9 cr; Prereg–Grad student or #) Topics in advanced policy analysis methods.

PA 5401. Poverty, Inequality, and Public Policy, (3 cr; Prereq–Grad or #) Nature/extent of poverty/inequality in the United States, causes/effects of government programs/policies. Extent/causes of poverty/inequality in other developed/developing countries.

PA 5411. Child Labor, (3 cr; Prereq–Grad student or #) International child labor issues. Options for improving child well-being, including policies/programs that have potential to affect the lives of millions of children.

PA 5421. Racial Inequality and Public Policy, (3 cr; Prereq–Grad or #) Historical roots of racial inequality in American society. Contemporary economic consequences. Public policy responses to racial inequality. Emphasizes understanding/analysis that is critical of strategies offered for reducing racism and racial economic inequality.

PA 5431. Public Policies on Work and Pay, (3 cr; Prereq–[PA 5031 or equal; grad student]) or #) Public policies affecting employment, hours of work, and institutions in labor markets. Public programs affecting wages, unemployment, training, collective bargaining, job security, and workplace governance. Policy implications of the changing nature of work.

PA 5441. Education Policy and the State Legislature, (3 cr; Prereq–Grad or #) How Minnesota legislature decides K–12 issues. Implications for higher education. How to increase your influence in process. Discussions with persons who influence statewide educational policy. Presentations. Field trip to state legislature.

PA 5442. Policy Design for Education and Human Development, (3 cr; Prereq–Grad or #) Designing effective educational policies. Using interdisciplinary approaches to identify/understand core variables (economic, political, etc.). Work on policy design.

PA 5451. Immigration Health Issues, (3-4 cr; max 4 cr; §PUBH 6281. Prereg–Grad student or #) How to access demographic, health, background information on U.S. immigrants. Characteristics and health needs of immigrants. Designing culturally competent health programs. How to advocate for change to promote immigrant health. Community visits required. Online course.

PA 5452. Immigration and Public Policy, (3 cr; Prereq–Grad student or #) How to employ an analytical framework to analyze a current immigration policy proposal. Topics vary (e.g., president’s guest worker proposal, demographic alternative proposals).

PA 5480. Topics in Race, Ethnicity, and Public Policy, (1-3 cr; max 9 cr; Prereq–Grad or Sr or grad student or #) Link between race/ethnicity and public policy. How to identify/measure racial/ethnic disparities and their historical/cultural origins and policy impacts and to craft politically feasible remedies. Topics may include criminal justice, housing, child welfare, and education.

PA 5490. Topics in Social Policy, (1-4 cr; max 9 cr; Prereq–Grad student or #) Selected topics.

PA 5501. Economic Development I, (1.2 cr; Prereq–Grad or #) Economic development theories/strategies at national/regional levels in developing countries and the United States. Redistributive and basic needs strategies, institutional approaches, dependency/Neo-Marxist approaches, gender and development, sustainable development, effects of globalization on workers/community, public policy responses.


Courses

PA 5521. Development Planning and Policy Analysis. (4 cr; Prereq--Grad student or #) Techniques/assumptions of development planning and policy analysis at national, regional, and project levels. Direct/indirect effects of external shocks and government interventions on national/regional economies. Macroeconomic modeling, input-output analysis, social accounting matrices/multipliers, project appraisal/evaluation techniques.

PA 5522. Economic Development Policies in Latin America. (3 cr; Prereq--Grad student or #) Evolution of economic development policies from import-substituting industrialization policies of 1950s/1960s through beginning of reform in 1970s, economic crisis of 1980s, and reform into 1990s. Emphasizes privatization, economic integration, exchange rate/trade, and domestic/adjustment policies.

PA 5531. Strategies for Sustainable Development: Theory and Practice. (2 cr; Prereq--Microecon course, grad student or #) Economic, environmental, and social aspects of sustainable development. Strategies, methods of implementation, and applications of sustainable development in different economic systems of industrialized/developing countries. Special attention to countries in transition.

PA 5590. Topics in Economic and Community Development. (1-3 cr [max 9 cr]; Prereq--Grad student or #) Selected topics.


PA 5611. Feminist Economics. (2 cr; Prereq--[5021, grad student or #]) Feminist philosophy/materials, methodology, and economic practice. Feminist perspectives on development and the global economy, work/family. Heterodox traditions in economics.

PA 5621. Board Service in Women and Public Policy. (1 cr; S-N only. Prereq--#) Students serve as full members of a board of directors for a women’s movement organization. Organizational leadership. How to be an effective board member. Twin Cities feminist nonprofit organizations.

PA 5690. Topics in Women and Public Policy. (1-3 cr [max 9 cr]; Prereq--Grad student or #) Selected topics.


PA 5711. Science and Technology Policy. (3 cr; Prereq--Grad student or #) Effect of science/technology on relations among nations in such matters as autonomy, national security, economic strength, environmental, cultural identity, and international cooperation. Negotiating international agreements with S&T implications.

PA 5721. Energy and Environmental Policy. (3 cr; Prereq--Grad or #) Impact of energy production/consumption choices on environmental quality, sustainable development, and other economic/social goals. Emphasizes public policy choices for energy/environment, linkages between them.

PA 5722. Environmental and Resource Economics Policy. (3 cr; Prereq--Intermediate microeconomics, intermediate policy analysis, grad student or #) Public policy associated with natural resource use and environmental protection. Develops/appplies economic concepts/methodologies/policy mechanisms.

Principles of environmental/resource economics. Issues related to renewable resources and environmental pollution. Focuses on scientific/political aspects of policy.

PA 5790. Topics in Science, Technology, and Environmental Policy. (1-3 cr [max 9 cr]; Prereq--Grad or #) Selected topics.

PA 5801. Global Public Policy. (3 cr; Prereq--Grad student or #) Creation of rules, norms, and institutions to regulate global activities. Policy making, from exclusive domain of state to including various nonstate actors. How global policy making regulates interstate, national, and transnational activities. Creation/enforcement of global rules. Applications to international security, political economy, and other topics.

PA 5812. Open Economy Models: An Assessment. (3 cr; Prereq--Intermediate macroeconomics, trade theory, grad student or #) Open economics, implications for policy making/implementation. Issues at level of international/domestic economies.

PA 5890. Topics in Foreign Policy and International Affairs. (1-5 cr [max 9 cr]; Prereq--Grad student or #) Selected topics.

PA 5900. Computer Applications in Public Affairs (Summer). (5 cr [max 1 cr]; S-N or Aud, Prereq--#) Introduction to basic computer systems/applications in public affairs practice (e.g., MS Windows, MS Word). Offered summer.

PA 5901. Computer Applications in Public Affairs. (5-3 cr [max 6 cr]; S-N or Aud, Prereq--#) Introduction to computer systems/applications in public affairs practice.

PA 5902. Computer Applications in Public Affairs. (5-3 cr [max 6 cr]; S-N or Aud) Introduction to computer systems/applications in public affairs practice.

PA 5903. Introduction to Computers and Applications at the Humphrey Institute. (2 cr; S-N or Aud. Prereq--International HHF fellow) Computers/applications. Basic skills. Software such as MS Word, Excel, PowerPoint, Access. Using Internet, e-mail, search engines (for research), HTML (through Web page creation software).

PA 5910. Developing Your Public Service Career. (1 cr; S-N or Aud, Prereq--Major in [public affairs or public policy or urban/regional planning or science, technology/environmental policy] or #) Students investigate/analyze interests, skills, and abilities and combine them in a career plan. Students develop tools to illustrate their abilities, develop their experiences/knowledge, and explore public service career options.

PA 5912. Politics of Public Affairs and Civic Engagement. (3 cr; A-F only. Prereq--Grad student or #) Potential for public affairs professionals to be agents/architects of democracy in a radically changing, diverse, global landscape of governance.

PA 5920. Skills Workshop. (5-3 cr [max 6 cr]; Prereq--Grad student or #) Topics on public policy or planning skills. Topics specified in Class Schedule.

PA 5931. Role of the Media in Public Affairs. (3 cr; Prereq--Grad or #) Historical/contemporary role of news media in defining/shaping public opinion/policy, primarily in the United States. Emphasizes critical research, professional skills in three forms of journalism: how news coverage, investigative reporting, documentaries, Field experience, practice in governmental public relations.

PA 5941. Leadership for the Common Good. (4 cr; Prereq--Major in public affairs or #) Personal, team, organizational, visionary, political, and ethical aspects of leadership. Emphasizes building/experiencing a learning community.

PA 5951. Global Commons Seminar. (3 cr [max 8 cr]; S-N or Aud. Prereq--International Humphrey fellow) Meets specific needs of International Humphrey Fellows. Topics vary each year depending on the interests and needs of the fellows.

PA 5952. Global Commons Seminar II. (2 cr; S-N only. Prereq--HHF international fellow) Research/presentations related to professional development projects. Each week selected students assign readings, deliver a presentation on their professional development project, and distribute a summary of the talk. Presentations are developed in collaboration with at least one faculty specialist in the subject area.

PA 5990. Topics: Public Affairs—General Topics. (1-3 cr [max 9 cr]; Prereq--Grad student or #) General topics in public policy.

PA 8001. Transforming Public Policy. (4 cr; A-F or Aud. Prereq--Grad PA major or #) Development of interdisciplinary understanding of one or more policy areas through explorations of theory, readings, cases, and model-building exercises. This understanding is then used to articulate possible policy or system improvements, along with leadership implications for formulating and implementing them.

PA 8002. Synthesis Workshop. (4 cr; A-F or Aud. Prereq--[5001, grad PA major or #] Development of public policy to advance public interest, common good. Recommendations flow from interdisciplinary understanding of problem, stakeholder analyses, modeling/analysis. Political feasibility, marketing, entrepreneurship, advocacy.

PA 8081. Capstone Workshop. (3 cr; A-F or Aud. Prereq--Grad major in [public policy or urban and regional planning] or [science, technology, and environment policy], completion of core courses or #) Project external client on issue agreed upon by student, client, and instructor. Students apply interdisciplinary methods, approaches, and perspectives studied in core courses to the issue. Written report includes analysis of issue and policy recommendations. Oral presentation of major findings. Concentration/topic vary term-to-term.

PA 8082. Working Group. (3 cr; A-F or Aud. Prereq--Grad major in [public policy or urban and regional planning] or [science, technology, and environment policy], completion of core courses or #) Facilitates completion of research paper on current issue in public policy and management. Students apply interdisciplinary methods, approaches, and perspectives studied in core courses. Written report includes analysis of issue, policy recommendations. Concentration/topic vary term-to-term.

PA 8105. Human Resources and Organizational Performance. (2 cr; S-NHR 8063. Prereq--5032, 5022 or equiv) Impact of human resource policies and practices on organizational productivity and effectiveness. Role of government, unions, and private sector institutions on organizational effectiveness.

PA 8183. Managing Collaborations. (3 cr; A-F or Aud) Management challenges of operating within multiparty (combination of nonprofit, for-profit, and public enterprises) collaborations formed to deal with a social problem. Combines in-class discussions of conceptual materials with application in community. Student teams work for half a semester with local collaborations on management problems.

PA 8186. Public Services Redesign. (1.5 cr; A-F or Aud) Theory, strategy, politics, and practical mechanics required to adapt public service systems given constraints on resources and continuing pressure for effectiveness/equity. In-class interviews with persons involved in redesign. Student presentations on current redesign issues.

PA 8190. Advanced Topics in Public and Nonprofit Leadership and Management. (1-3 cr [max 6 cr]) Selected topics.
PA 6201. Environment and Infrastructure Planning. (4 cr; A-F or Aud. Prereq: Urban and regional planning) Grad student or #)
Relationship between infrastructure, human settlement design. Natural resource systems as foundation of infrastructure provision. Environmental basis of, and political/legal/institutional frameworks for, land-use planning. Parallel computer lab, practicum assignment.

PA 8202. Networks and Places: Transportation, Land Use, and Design. (4 cr; A-F or Aud. Prereq: 8212; Urban and regional planning) Grad student or #)
Relationship between land use and transportation. Developing synthetic design skills for linking land use transportation in urban/regional settlements. Economic, political, legal, institutional frameworks for planning. Parallel computer lab, practicum assignment.

PA 8203. Neighborhood Revitalization Strategies and Theories. (4 cr; A-F or Aud. Prereq: Urban and regional planning) Grad student or #)
Policymaking/politics of planning in housing, community development, social policy. Connecting policy to local/regional politics. Role of institutional decision-making structures on policy outcomes. Importance of citizens, social movements, interest groups in policymaking process.

PA 8204. Creating Good Work: Economic and Workforce Development. (4 cr; A-F or Aud)
Job-oriented economic development. Theories on how/why jobs are created. Tools used by communities and economic developers (e.g., tax abatement, infrastructure, job training, entrepreneurship). Strategy, politics, effectiveness.

PA 8212. Networks and Places: Transportation, Land Use, and Design. (3 cr; A-F or Aud. Prereq: 8202; Transportation Certificate student or #)
Relationship between land use and transportation. Developing synthetic design skills for linking land use transportation in urban/regional settlements. Economic, political, legal, institutional frameworks for planning.

PA 8286. International Development and Urban Planning. (3 cr; A-F or Aud)
Urbanization process and planning responses in cities of developing world. Urban sustainability, migration, housing, transportation, employment, and urban service delivery. Phenomena such as squatter settlements and informal economy that normally proceed unplanned and without formal government control.

PA 8290. Advanced Topics in Planning. (1-3 cr [max 6 cr])
Selected topics.

PA 8302. Applied Policy Analysis. (4 cr; A-F only) Prereq: Intermediate microeconomics, introduction to econometrics)

PA 8311. Case Studies in Policy Analysis. (3 cr)
Topics in microeconomics applied to systems problems of government. Market and nonmarket resource allocation; cost-effectiveness and cost-benefit analysis. Case method employed.

PA 8312. Analysis of Discrimination. (3 cr)
Introduces students to policy analysis and other applied social sciences to tools for measuring and detecting discrimination in market and nonmarket contexts. Application of modern tools of labor economics and race relations research to specific problems of market and nonmarket discrimination.

PA 8333. FTE: Master’s. (1 cr; No grade. Prereq: Master’s student, adviser and DGS consent)

PA 8336. Research Methods in Social and Labor Policy. (3 cr; A-F or Aud. §PUBH 5603; PUBH 5503; PUBH 5022 or equiv)
Use of social science research methods in analyzing and developing public policies.

PA 8390. Advanced Topics in Advanced Policy Analysis. Methods. (1 cr; 2 cr; 3 cr)
Selected topics.

PA 8406. Work and Family in the United States and the Third World. (3 cr; A-F or Aud)
Topics based on students’ interests. Topics must relate to formal and informal labor force work, household work, child care, child labor, youth employment, education, training, or their interrelationships. Data collection and measurement issues; economic and demographic theories of work and education decisions in context of the family.

PA 8490. Advanced Topics in Social Policy. (1-3 cr [max 6 cr])
Selected topics.

PA 8583. Capstone Workshop on Economic and Community Development. (3 cr; A-F or Aud)
Comprehensive overview of state, local, community-based economic development strategies. Processes involved in producing broadly conceived economic development strategy. Institutional structures/processes to deal with economic change, new political realities.

PA 8590. Advanced Topics in Economic and Community Development. (1-3 cr [max 6 cr])
Selected topics.

PA 8686. Feminist Organizations. (3 cr; A-F or Aud)
Uses social movement literature and histories of U.S. second-wave feminism to study feminist organizations. Recurring issues and conflicts within organizations and movements examined through comparative studies of feminism in Latin America, Eastern Europe, Britain, and Italy. Methods and sources for studying feminism.

PA 8687. Women and Electoral Politics. (3 cr; A-F or Aud)
Political science and women’s studies literature on American women and electoral politics.

PA 8690. Advanced Topics in Women and Public Policy. (1-3 cr [max 6 cr])
Selected topics.

PA 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Grade-Max 18 cr per semester or summer, 10 cr total required [Plan A only])

PA 8790. Advanced Topics in Science, Technology, and Environmental Policy. (1-3 cr [max 6 cr])
Selected topics.

PA 8811. Strategic Issues in International Economic Policy. (3 cr)
Comparative/contrast experiences of industrial/developing countries in trade, investment, exchange rates, and immigration.

PA 8821. National Security Policy. (3 cr)
Politics and economics of national security policy. Defense policy, military strategy, and weapons procurement. While emphasis is on the United States, other countries also discussed.

PA 8890. Advanced Topics in Foreign Policy and International Affairs. (1-3 cr [max 6 cr])
Selected topics.

PA 8991. Independent Study. (1-3 cr [max 6 cr]; Prereq–#)

PA 8991. Independent Study. (1 cr [max 3 cr]; Prereq–#)

Public Health (PUBH)
School of Public Health

PUBH 5060. Smoking Intervention. (2 cr; Prereq: CHE or MPH or grad student or #)

PUBH 5810. Topics: Environmental Health. (1-4 cr [max 20 cr])
New course offerings or topics of interest in environmental health.

PUBH 8120. Occupational Injury Prevention Research Training Program Research Seminar. (1 cr [max 12 cr]; Prereq: 8120; 8330 or 6341; 8450; environmental health major, [HRIR specialty or equiv] or #)
Facilitates student research training in occupational injury prevention. Roundtable discussions, interdisciplinary involvement.

PUBH 8140. Validity Concepts in Epidemiologic Research. (2 cr; S-N only)
Conceptual basis for validity in observational epidemiologic research. Recognizing, evaluating, preventing, and correcting for confounding, specification error, measurement-error bias, and selection/follow-up bias.

PUBH 8141. Doctoral Seminar in Observational Inference. (2 cr; S-N or Aud. Prereq: 8140; doctoral student in public health, §8330, 6343 or §6341, 6342 recommended) Fundamentals of epidemiologic inference. Methods for designing, analyzing, and interpreting epidemiologic studies.

PUBH 8142. Epidemiologic Uncertainty Analysis. (2 cr; S-N only. Prereq: 8140)
Scientific interpretation of statistical analysis as dependent on both data and assumptions. Techniques that enable an investigator to incorporate uncertainty about assumptions into a quantitative analysis.

PUBH 8160. Advanced Toxicology. (2 cr; Prereq: 6160, one course in biochem, one course in molecular biology or # Cellular/molecular mechanisms by which xenobiotics cause toxicity. Investigative approaches to current research problems in toxicology/carcinogenesis. Apoptosis, cell cycle regulation, genetic toxicology, molecular mechanisms of chemical carcinogenesis, genetic basis for susceptibility to environmental toxins.

PUBH 8161. Current Literature in Toxicology. (1 cr [max 3 cr]; S-N or Aud. Prereq: 6104)
Modern methods in toxicology, critical thinking skills. Topics vary each semester. Students read/discuss toxicological literature.

PUBH 8162. Chemical Carcinogenesis and Chemoprevention. (3 cr; A-F or Aud. §NUR 8617. Prereq: [BIOC 3001, BIOC 3021, BIOC 4331] or equiv, [Chem 2302 or equiv])
Fundamental background in chemical carcinogenesis, carcinogen activation/detoxification, carcinogen-DNA adduct formation, cellular oncogenesis, cancer chemoprevention, nutrition/cancer. Topics integrated/interrelated.

PUBH 8170. Advanced Industrial Hygiene Applications. (2 cr; A-F or Aud. Prereq: 5170, eh grad major)
Recognition, evaluation, and control of occupational health/safety hazards. Application of concepts to specific industrial hygiene problems related to gases/vapors, aerosols, and physical agents.

PUBH 8194. Directed Research: Environmental Health. (1-6 cr [max 6 cr]; Prereq–#)
Research, with direction from faculty member, in environmental/occupational stresses on human health.

PUBH 8300. Topics: Epidemiology. (1-4 cr [max 20 cr])
New course offerings or topics of interest in epidemiology.

PUBH 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

For definitions of course numbers, abbreviations, and symbols, see page 169.
Courses


PUBH 8355. Teaching Practicum in Epidemiology. (2 cr; S-N or Aud. Prereq–Epi grad major or #) Instruction/hands-on experience in teaching methods.

PUBH 8377. Seminar: Chronic Disease and Behavioral Epidemiology. (1 cr [max 2 cr]; S-N or Aud. Prereq–Epi grad major or #) Readings, presentations, classroom discussions, and exercises in epidemiologic research methods in chronic/behaviorally-based diseases other than infectious/cardiovascular diseases and cancer.

PUBH 8378. Seminar in Epidemiology. (2 cr; S-N or Aud. Prereq–Epi grad or MPH major or #) Selected current problems.

PUBH 8392. Readings in Clinical Research. (1-4 cr [max 4 cr]; Prereq–Clinical research major, #) Current readings in clinical research.

PUBH 8393. Directed Study: Clinical Research. (1-4 cr [max 20 cr]; Prereq–Clinical research major, #) Directed research or field practice in clinical research.

PUBH 8400. Topics: Biostatistics. (5-4 cr [max 20 cr]; Prereq–Biostats PhD major or #) Topics of interest.


PUBH 8432. Probability Models for Biostatistics. (3 cr; Prereq–[7450, 7407, STAT 5102, advanced biostatistics or statistics] major or #) Three basic models used for stochastic processes in the biomedical sciences: point processes (emphasizes Poisson processes), Markov processes (emphasizes Markov chains), and Brownian motion. Probability structure and statistical inference studied for each process.

PUBH 8435. Latent Variable Measurement Models and Path Analysis. (3 cr; Prereq–[7435, PUBH 7435]. Prereq–Biostats PhD student or #) Introduction to use of statistical techniques known collectively as latent variable models. Exploratory/confirmatory factor analysis, path analysis, structural equation modeling, latent trait models, latent class models. SAS/SAS/MOS software are used.

PUBH 8442. Bayesian Decision Theory and Data Analysis. (3 cr; Prereq–[7460 or experience with FORTAN or with [C, S+]], Stat 5101, Stat 5102, Stat 8311, grad student in [biostatistics or statistics] or #) Theory/application of Bayesian methods. Bayesian methods compared with traditional, frequentist methods.

PUBH 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent) 

PUBH 8445. Statistics for Human Genetics and Molecular Biology. (3 cr; Prereq–[[Stat 8101, Stat 8102] or equiv], PhD student or #; some background with molecular biology desirable) Introduction to statistical problems arising in molecular biology. Problems in physical mapping (radiation hybrid mapping, DDP), genetic mapping (pedigree analysis, lod scores, TDT), biopolymer sequence analysis (alignment, motif recognition), and micro array analysis.

PUBH 8452. Advanced Longitudinal Data Analysis. (3 cr; Prereq–[Stat 5102, Stat 8311, experience with [SAS or S+], advanced biostats or grad student] or #) Methods of inference for outcome variables measured repeatedly in time or space. Linear/nonlinear models with either normal or non-normal error structures. Random effects. Transitional/marginal models with biomedical applications.


PUBH 8472. Spatial Biostatistics. (3 cr; Prereq–[(Stat 5101, STAT 5102) or STAT 8101, STAT 8102], some experience with S-plus; STAT 8311 recommended) Spatial data, spatial statistical models, and spatial inference on unknown parameters or unobserved spatial data. Nature of spatial data. Special analysis tools that help to analyze such data. Theory/applications.

PUBH 8482. Sequential Analysis. (3 cr; Prereq–[7450, 8432, Stat 5102, advanced biostatistics or statistics] major or #) Statistical methods for design/analysis of sequential experiments. Wald theorems, stopping times, martingales, Brownian motion, dynamic programming. Compares Bayesian/frequentist approaches. Applications to interim monitoring of clinical trials, medical surveillance.

PUBH 8494. Directed Research: Biostatistics. (1-4 cr [max 4 cr]; S-N only. Prereq–#) Research, with direction from a faculty member, in biostatistics.

PUBH 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; 4 cr for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

PUBH 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

PUBH 8800. Topics in Health Services Research and Policy. (1-4 cr [max 20 cr]; Prereq–#) Topics and credit vary by instructor.

PUBH 8801. Health Services Policy Analysis: Theory. (3 cr; Prereq–[Grad or professional school] student or #) Integrated overview of U.S. health services policy. Related theoretical/empirical literature. Analysis of alternative policy-making models, political/philosophical underpinnings of those models.

PUBH 8802. Health Services Policy Analysis: Applications. (2 cr; A-F or Aud. Prereq–HSRPA grad major or #) Emphasizes relationships between health services research policy and the public policy in practice. Use studies to examine how research influences policy and vice versa.

PUBH 8803. Long-Term Care: Principles, Programs, and Policies. (2 cr; Prereq–Grad-level health-care policy course or #) Long-term care policy for functionally impaired persons, particularly the elderly. Team taught from experience in healthcare and public health services, including epidemiological research on evidence of program effectiveness. Innovative programs addressing current fragmentation of services.

PUBH 8805. Sociological Theory in Health Services Research. (3 cr; Prereq–#) Overview of sociological theories in medical sociology, occupations/professions. Emphasizes teaching students how to apply theories to health/social phenomena of their own interest or choice.

PUBH 8806. Sociology of Health Occupations and Organizations. (3 cr; Prereq–HSRPA grad major or #) Sociological theories of occupations/orGANizations as applied to health care. Functional, conflict, evolutionary theories applied to health care organization such as managed care, technology on organization of work/occupations. Emphasizes application of theories to develop hypotheses.

PUBH 8810. Research Studies in Health Care. (3 cr) Prereq–Grad or professional school student or #) Introduction to philosophy of science, conceptual modeling, experimental design, survey/sampling, issues relevant to health services research.

PUBH 8811. Research Methods in Health Care. (3 cr; Prereq–[8810, grad or professional school] student or #) Research methods commonly used in analysis of health services research and health policy problems.

PUBH 8813. Measurement of Health-Related Social Factors. (3 cr; A-F or Aud. Prereq–Intro stat course, understanding of simple correlations or #) How social factors such as innovativeness, compliance, religiosity, and stress are measured and tested for reliability and validity. Relationships between theory, concepts, variables, data.

PUBH 8820. Health Economics I. (3 cr; A-F or Aud. Prereq–One course each in intermediate microeconomics, calculus, intro to linear algebra) Application of microeconomic theory to healthcare decisions of consumers and producers under different assumptions about market structure and behavior.

PUBH 8821. Health Economics II. (3 cr; A-F or Aud. Prereq–#) Examines application of microeconomic theory to health services research through selected reading from published and unpublished health economics literature.

PUBH 8830. Writing for Research. (2 cr Prereq–HSRPA PhD student or #) Two-course sequence. Writing research grants/papers. Writing skills appropriate to research proposals and scholarly papers. How to review, synthesize, and critique research proposals and published articles.

PUBH 8831. Research Project in Health Care. (1 cr; A-F or Aud. Prereq–#) Development and articulation of a research proposal.

PUBH 8836. Integration of Public Health Research Methods in Health Services Research and Policy. (2 cr; Prereq–Professional school or grad student or #) Integration of concepts/designs of public health research methods, how they can be integrated into health services research and policy analysis. Experiential learning opportunities in clinical settings that illustrate need for integration.

PUBH 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

PUBH 8893. Directed Study: Health Services Research, Policy, and Administration. (1-3 cr [max 3 cr]; Prereq–HSRPA grad student, #)

PUBH 8894. Directed Research: Health Services Research, Policy, and Administration. (1-8 cr [max 8 cr]; Prereq–HSRPA grad student, #)

Radiology (RAD)

Department of Radiology

Medical School

RAD 8200. Nuclear Medicine. (1-15 cr [max 15 cr])

RAD 8210. Fundamentals of Nuclear Medicine. (1 cr; Prereq–1st-yr resident)

RAD 8250. Research: Nuclear Medicine. (1-15 cr [max 15 cr])

RAD 8450. Research: Radiation Biology. (1-15 cr [max 15 cr])

RAD 8550. Research: Radiological Physics. (1-15 cr [max 15 cr])
Recreation Resource Management (RRM)

Department of Forest Resources

College of Food, Agricultural, and Natural Resource Sciences

RRM 5101. Nature and Heritage Based Tourism. (3 cr; A-F or Aud. §RRM 3101. Prereq—Grad student or #) Interaction of resource based tourism with cultural/natural environments. Impacts of tourism on environment.

RRM 5201. Introduction to Travel and Tourism. (3 cr; A-F only. §RRM 5201. Prereq—Grad student or #) Nature, structure and complexity of tourism industry. Overview of travel/tourism: definition, evolution, magnitude globally. Types/functions of various sectors, tourism distribution system, role of various stakeholders in creation/delivery of tourism. Motivations for travel as means of understanding demand for tourism.

RRM 5322. Managing Recreational Lands. (4 cr; A-F; Aud. §RRM 5322. Prereq—Grad student or #) Recreation management tools from a public agency perspective. Social carrying capacity, recreation opportunity spectrum, limits of acceptable change, benefits to/impact of recreation/ resource protection. Various projects. Group project to develop a management plan.

RRM 5259. Visitor Behavior Analysis. (3 cr; A-F or Aud. Prereq—RRM major or ENR major or grad student or #) Application of social science theory/methods to recreation-based tourism visitor behavior. Culture and cultural identity. Influences on behavior. Mitigating environmental impacts. Theory/analysis of surveys, observation, and content. Implications for sustainable resource management.

Recreation, Park, and Leisure Studies (REC)

School of Kinesiology

College of Education and Human Development

REC 5101. Foundations of Recreation. (3 cr; A-F or Aud. Prereq—MED or grad student or #) Investigation of the rational, sociological, psychological, and philosophical foundations of the recreational use of leisure in contemporary society. Includes a survey of leisure services.

REC 5111. Sports Facilities. (3 cr; A-F or Aud. §ION 5111. Prereq—Kin or rec major or #) Steps in planning and building facilities for athletics, physical education, and sport for college, professional, and public use.

REC 5115. Event Management in Sport. (3 cr; A-F or Aud. Prereq—§Kin 5115; Grad student, #) Techniques/principles of planning, funding, and managing sport events. Collegiate championships, non-profit events/benefits, professional events.

REC 5161. Recreation Land Policy. (3 cr; A-F or Aud. Prereq—5101 or 5101 or #) History and development of recreational land policy in the United States and related contemporary issues in policy, management, interpretation, and research.

REC 5191. Commercial Recreation and Tourism. (3 cr; A-F or Aud. Prereq—5351 or #) Scope and development of profit-oriented recreation agencies, including an emphasis on the tourism industry.

REC 5211. Introduction to Therapeutic Recreation. (3 cr; A-F or Aud. Prereq—5101 or §5101, rec major or #) Purposeful intervention; roles of specialist/recreation therapists in meeting cognitive, physical, emotional, social needs of people with disabling conditions through recreation services; roles of specialist/recreation therapists changing societal attitudes toward illness and disability and the self-concepts of individuals with impairments.

REC 5215. Assess and Monitor Patient/Client Functioning in Recreation Therapy. (3 cr; Prereq—TR major or academic health professional or #; majors A-F only) Selecting appropriate techniques/techniques to assess and monitor progress in RT and in collaborative services: standard notes; team meetings; on-line reporting for quality assurance, referral, augmentation/termination of services.

REC 5218. Comprehensive Therapeutic Recreation Services Development and Management. (4 cr; Prereq—5211 or #, rec major) Guided development of written plans including development of protocols and critical pathways, intervention programs/activities, individual treatment plans and standards for appropriate placement of individuals in group intervention, and management of patient/client service delivery, record keeping, and administrative responsibilities.

REC 5231. Therapeutic Recreation and Diagnostic Groups. (3 cr; A-F or Aud. Prereq—5211 or #) Definitions, philosophies, methodologies regarding therapeutic recreation services for persons in diagnostic groups of cognitive, physical, sensory, psychological, and psychiatric impairments/disabilities. Lectures, group discussion. Presentations by parents, professionals, and self-advocates. Clinical or community practicum assignment.

REC 5241. Functional Intervention: Recreation Therapy in Geriatric Care. (3 cr; A-F or Aud. Prereq—5341 or 5111 or #) Role of leisure in maintenance of mental, physical, social-emotional health/functioning. Issues relative to prevention of impairment/disability. Rehabilitation support of vital life involvement, effect on design/ delivery of recreation services.

REC 5271. Community Leisure Services for Persons with Disabilities. (3 cr; A-F or Aud. Prereq—1501, Rec major or #) Exploration and application of concepts and techniques of normalization and least restrictive environment strategies to leisure service delivery in inclusive community settings for a range of individuals with disabilities.

REC 5288. Grant Writing in Human Services. (3 cr; A-F or Aud.) Identify, develop, and procure financial assistance for programs in human services, including education, recreation, and social programs. Skills and strategies for preparing and evaluation of competitive proposals for grant support through federal agencies and private foundations or corporations.

REC 5301. Wilderness and Adventure Education. (4 cr; A-F or Aud.) Rationale for, methods in applying wilderness/adventure education programs in recreation, corporate, human service settings. Emphasizes adventure/wilderness program management.

REC 5311. Programming and Outdoor Environmental Education. (3 cr; A-F or Aud.) Methods, materials, and settings for developing and conducting environmental and outdoor education programs.

REC 5371. Sport and Society. (3 cr; A-F or Aud. §ION 5371. Prereq—[5126, grad student] or #) Sport, sport processes, social influences, systems, and structures that have effected and exist within/among societies, nations, and cultures. Issues concerning social destabilization. Social concerns such as violence and honesty.

REC 5421. Sport Finance. (3 cr; A-F or Aud. §ION 5421. Prereq—Grad student #) Introduction to financial analysis in sport. Cash flow statements, budgeting issues, traditional/innovative revenue producing strategies available to sport organizations. Discussion, practical analysis of current market.

REC 5461. Foundations of Sport Management. (3 cr; A-F or Aud. Prereq—Kin or rec or postgrad or rec grad student or #) Theories/techniques in administering/managing sport enterprises. Organizational theory/policy. Practical examples of sport management skills/strategies.

REC 5511. Women in Sport and Leisure. (3 cr; A-F or Aud. §ION 5511) Critical examination of women’s involvement in/contributions to sport, physical activity, and leisure.

REC 5601. Sport Management Ethics and Policy. (3 cr; A-F or Aud. §ION 5601. Prereq—Grad student or #) Ethical concepts that underpin or inform sport policies. Evaluating sport policies from a normative point of view. Selected sport policy issues are used to illustrate relevance of ethical considerations in policy development, ethical implications of sport policy.

REC 5631. Programming and Promotion in Sport. (3 cr; A-F or Aud. §ION 5631. Prereq—Kin or Rec grad student or #) Introduction to marketing concepts as they apply to sport industry. Consumer behavior, market research, marketing mix, corporate sponsorship, licensing concepts. Discussion, practical application.


REC 5801. Legal Aspects of Sport and Recreation. (4 cr; A-F or Aud. Prereq—5351 or 5461 or #) Legal issues related to recreation, park, and sport programs/facilities with public/private sectors.

REC 5900. Special Topics: Contemporary Issues in Leisure Services. (1-12 cr; max 12 cr) Contemporary issues emphasizing administrative and supervisory functions for recreation and allied professionals; individual offerings, to be determined by faculty, focus on special issues and professional groups.

REC 5981. Research Methodology in Kinesiology, Recreation, and Sport. (3 cr; A-F or Aud. §ION 5981. Prereq—MED or grad student or #) Research methodology. Introduction to collection of quantitative and qualitative data. Statistics and data analysis. Introduction to research literature and study design.

REC 5992. Readings: Recreation. (1-3 cr; max 9 cr) Prereq—REC major, #) Independent study under tutorial guidance by faculty member on particular topic(s) not covered in regular coursework.

REC 5995. Problems in Recreation, Park, and Leisure Studies. (1-12 cr [max 30 cr]; Prereq—[MED or grad student], #) Independent study of leisure service programs, systems, facilities, or policies. Focuses on conduct of recreation programs. Scholarly projects (e.g., library or field research) or demonstration projects.

REC 8128. Doctoral Sport Management Seminar. (3 cr; A-F only §ION 8128. Prereq—PhD student, #) Analysis of current literature, theoretical constructs, research methodology, and design relative to sport management. Focuses on student-selected topics, research problems.

REC 8310. Seminar: Leisure Services. (3 cr; A-F or Aud. Prereq—[MED or grad student], #) Critical study and special problems in recreation, park, and leisure services and in therapeutic recreation.

REC 8320. Seminar: Theoretical Perspectives in Leisure Behavior. (3 cr; A-F or Aud. Prereq—5101 or #) Major theoretical paradigms and empirical findings, where appropriate, from leisure studies in particular and social sciences in general.

REC 8333. FTE: Master’s. (1 cr; No grade. Prereq—Master’s student, adviser and DOS consent)
Courses

RESC 8390. Seminar: Administrative Problems in Leisure Services and Therapeutic Recreation. (3 cr; A-F or Aud. Prereq–Rec MED or grad student or #) Administrative and management issues and problems in leisure services and therapeutic recreation.

RESC 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

RESC 8980. Graduate Research Seminar in Recreation, Park, and Leisure Studies. (1-3 cr [max 3 cr]; S-N or Aud. Prereq–#) Individual scholarly research.

Rehabilitation Science (RSC)

Department of Physical Medicine and Rehabilitation

Medical School

RSC 5135. Advanced Biomechanics I: Kinematics. (3 cr; A-F or Aud. Prereq–#) How to describe/masure movement. Basic/applied biomechanics, pathokinesiology, and rehabilitation literature. Lecture, lab, seminar discussion. Meets with RSC 5135.

RSC 5294. Independent Study in Rehabilitation Science. (1-3 cr [max 3 cr]; Prereq–Rehabilitation science student or program approval) Independent exploration into topics related to rehabilitation science.

RSC 5814. Age, Exercise, and Rehabilitation. (2 cr; Prereq–Rehabilitation science student or program permission) Overview of normal physiological responses to exercise in the elderly. Comparison of exercise-induced responses of physiological systems throughout aging process. Focuses on importance of exercise from rehabilitation perspective. Offered Fall semesters of even-numbered years.

RSC 5841. Rehabilitation Science Instrumentation and Methodology. (4 cr; A-F or Aud. Prereq–[PHYS 1031, PHYS 1032] or equiv, #) [rehabilitation science student or program permission] Theory/application of kinesiological EMG and other common instruments used to measure human motion.

RSC 8100. Rehabilitation Science Seminar. (1 jr [max 6 cr]; A-F or Aud. Prereq–Rehabilitation science student or program permission) Critically reading/discussing rehabilitation science literature. Identifying important, researchable questions, methods to answer them. Speaking/writing persuasively on scientific topics.

RSC 8130. Current Literature Seminar. (1 cr; A-F or Aud. Prereq–Grad student in PT or rehabilitation science major or #) Critical review of literature to evaluate efficacy of selected physical therapy interventions.

RSC 8135. Advanced Kinesiology. (3 cr; A-F or Aud. Prereq–[Rehabilitation science student or program permission], #) How to describe/masure movement. Basic/applied biomechanics, pathokinesiology, and rehabilitation literature. Lecture, lab, seminar discussion.

RSC 8170. Special Topics in Rehabilitation Science. (1 cr [max 3 cr]; A-F or Aud. Prereq–[Rehabilitation science student or program permission], #) Topics vary by semester. Papers required.

RSC 8185. Problems in Rehabilitation Science. (1-3 cr [max 3 cr]; Prereq–[Rehabilitation science student or program permission], #) Research practicum on selected topic. Use of systematic literature search. Critical analysis of scientific literature. Specific measurement systems. Data collection/reduction methods of on-going or new research projects. Preparing/defending research reports.

RSC 8188. Teaching Practicum. (1-5 cr [max 5 cr]; A-F or Aud. Prereq–[Rehabilitation science student or program permission], #) Supervised experience in teaching/evaluation. Effective use of instructional materials in lecture/lab courses. Students create learning objectives for teaching unit(s), conduct a review of current literature on topic, prepare/deliver presentations, compose test questions. Offered by individual arrangement with faculty.

RSC 8189. Research Design in Physical Therapy. (3 cr; A-F or Aud. Prereq–Grad student in PT or rehabilitation science student or program permission, #) Critical appraisal of current medical literature. Fundamentals of research design, data analysis, and medical writing.

RSC 8282. Problems in Human Movement. (4 cr; A-F or Aud. Prereq–[Rehabilitation science student or program permission], #) Fundamental principles of neuropsychology, neurology, motor control, and motor learning as a basis for therapeutic intervention in motor dysfunction.

RSC 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

RSC 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

RSC 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim or; no required conditions for title registration, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

RSC 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

RSC 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

Religions in Antiquity (RELA)

Department of Classical and Near Eastern Studies

College of Liberal Arts


RELA 5251. Archaeology of Herodian Israel. (3 cr; A-F or Aud. Prereq–[SHPE 5251, RELA 5251]) Archaeological one course in [archaeology or ancient history] or grad student) Archaeological sites in Israel dating to era of Herod the Great (37–4 BC). Palaces, religious edifices, and remains from Jewish/gentile settlements throughout the kingdom. Course readings consist of contemporary literary sources and excavation reports.

RELA 5503. History and Development of Israelite Religion I. (3 cr; SHPE 5503, ANE 5503, SHPE 5503, RELA 5503) Survey of the evolution of Israelite religion. Cultic practices, law and religion, prophecy, religion and historiography. Relationship to surrounding religious systems.

RELA 5504. Development of Israelite Religion II. (3 cr; SHPE 5504, ANE 5504, RELA 5504) Ancient Judaism from the Persian restoration (520 B.C.E. to Roman times (2nd century C.E.). Religious, cultural, and historical developments are examined to understand Jewish life, work, and worship under a succession of foreign empires: Persian, Greek, Roman.

RELA 5513. Scripture and Interpretation. (3 cr; A-F or Aud. Prereq–[SHPE 5513] or equiv) Idea of divine revelation, its impact upon religion/ literature. How history of Bible’s creation, transmission, and interpretation helps us think critically about role of idea of revelation in history of religious traditions. What is revelation? How does belief that a text is revelatory affect the way it is read within the community for which it constitutes revelation?

RELA 5521. Theory and Method in the Study of Religion. (3 cr; Prereq–Sr or grad student or #) Fundamental theoretical/methodological issues pertaining to academic study of religion. Influential modern theories of origin, character, and function of religion as a human phenomenon, including psychological, sociological, anthropological, and phenomenological perspectives.

RELA 5535. Death and the Afterlife in the Ancient World. (3 cr; A-F or Aud. Prereq–[SHPE 5535, SHPE 5535, RELA 5535]) Beliefs, attitudes, and behaviors related to death and afterlife found in cultures of ancient Mediterranean and Near East. Literature funerary art/epitaphs. Archaeological evidence for burial practices and care of dead.
REL 5993. Directed Studies. (1-4 cr [max 10 cr]; Prereq—#) Guided individual reading or study.

REL 5910. Comparative Seminar in Religions in Antiquity. (3 cr [max 6 cr]; A-F or Aud. Prereq—Grad student in relevant field)

Religious Studies (RELS)

Department of Classical and Near Eastern Studies

College of Liberal Arts

RELS 5111. Problems in Historiography and Representation of the Holocaust. (3 cr; Prereq—3521 or 3541 or JWST 3521 or #)


RELS 5251. Archaeology of Herodian Israel. (3 cr; A-F or Aud. §CNES 5251, RELA 5251. Prereq—one course in [archaeology or ancient history] or grad student)

Archaeological sites in Israel dating to era of Herod the Great (37–4 B.C.). Palaces, religious edifices, and remains from Jewish/gentile settlements throughout the kingdom. Course readings consist of contemporary literary sources and excavation reports.

RELS 5411. Introduction to Indian Philosophy. (3 cr; §RELS 3411)

Major concepts. Principal schools of Indian philosophy. Traditional/contemporary views.

RELS 5412. Hinduism. (3 cr; §RELS 3412)


RELS 5413. Buddhism. (3 cr; §RELS 3413, SALC 5413, SALC 5413)

Historical account of Buddhist religion in terms of its rise, development, various schools, and common philosophical concepts. Indian Buddhism compared with Hinduism. Buddhism’s demise/revival on Indian subcontinent.

RELS 5414. Comparative Religions of South Asia. (3 cr; §RELS 3414, SALC 3414, SALC 5414)

Compares/contrasts basic philosophical concepts, literatures, ideologies, and ritualistic practices of Hinduism, Buddhism, and Jainism with those of Islam and Sikhism.

RELS 5903. Directed Studies. (1-4 cr [max 24 cr]; Prereq—#)

Russian (RUSS)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

RUSS 5021. Russia Study Tour. [8-18 cr [max 18 cr]; Prereq—3002 or equiv)

Study of Russian language & culture in an accredited institution in Russia.

RUSS 5104. Introduction to Literary Analysis. (3 cr; Prereq—3002 or equiv)

Reading and analysis of poetry and prose selections to understand rudiments of studying Russian literature. Readings are in Russian.

RUSS 5105. Russian Poetry and Prose. (3 cr; Prereq—3002 or equiv)

Appreciation of literary values through stylistic analysis and literary interpretation; analysis of humanistic elements. Readings in Russian.

RUSS 5211. Modern Russian Literature in Translation. (3 cr; §RUSS 3211)

Literary, cultural, and political significance of modern Russian literary works.

RUSS 5404. Tolstoy in Translation. (3 cr; §RUSS 3404)

Novels, stories, and philosophical writings of Leo Tolstoy.

RUSS 5407. Stories and Plays of Anton Chekhov in Translation. (3 cr; §RUSS 3407)

Study of literary devices and themes in selected stories and major plays using the intrinsic approach.

RUSS 5409. 19th-Century Russian Novel. (3 cr; §RUSS 3409)

The Russian realistic novel from origin to decline; social, political, and intellectual circumstances that led to its emergence as the dominant genre of the “age of realism” in Russia.

RUSS 5411. Dostoevsky in Translation. (3 cr; §RUSS 3411)

Novels, stories, and other writings by Fyodor Dostoevsky.

RUSS 5421. Literature: Middle Ages to Dostoevsky in Translation. (3 cr; §RUSS 3421)

Russian literature from about 1000 A.D. to mid-19th century; emphasizing writers of the first half of the 19th century.

RUSS 5422. Literature: Tolstoy to the Present in Translation. (3 cr; §RUSS 3422)

Survey of Russian literature from mid-19th century to the present: realism, modernism, feminism and other trends.

RUSS 5601. Methods of Translating Fiction from Russian to English. (3 cr; Prereq—§3601; 3102 or equiv)

Learning to appreciate a variety of literary styles through the experience of translation.

RUSS 5900. Topics in Russian Language, Literature, and Culture. (3 cr [max 3 cr]; Prereq—1102 for language topics)

Variable topics in Russian language, literature, and culture.

RUSS 5993. Directed Studies. (1-4 cr [max 16 cr]; Prereq—#, Δ, ∂)

Guided individual study.

Sanskrit (SKT)

Department of Classical and Near Eastern Studies

College of Liberal Arts

SKT 5001. Beginning Sanskrit. (3 cr)

Introduction to the classical language of ancient India.

SKT 5002. Beginning Sanskrit. (3 cr; Prereq—5001 or equiv)

Introduction to the classical language of ancient India.

SKT 5001. Intermediate Sanskrit. (3 cr; Prereq—5002 or equiv)

Readings in Sanskrit literature.

SKT 5002. Intermediate Sanskrit. (3 cr)

Readings in Sanskrit literature.

SKT 5710. Topics: Language and Literature. (3 cr)

Selected reading and/or study of linguistic problems in Sanskrit.

SKT 5992. Directed Readings. (1-4 cr [max 12 cr]; Prereq—#, Δ, ∂)

Guided individual study or research.

SKT 8993. Directed Studies. (1-12 cr [max 30 cr]; Prereq—#, Δ)

Guided individual study or research.

Scandinavian (SCAN)

Department of German, Scandinavian, and Dutch

College of Liberal Arts

SCAN 5501. Scandinavian Mythology. (3 cr)

Study of Scandinavian mythology based on primary sources represented by Saxo Grammaticus, Snorri Sturluson’s Edda and Vvingla Saga, and the Poetic Edda. Myths are analyzed using contemporary critical approaches. All readings in translation.

SCAN 5502. The Icelandic Saga. (3 cr)

Study of the sagas written in 13th-century Iceland. Discussion includes cultural and historical information about medieval Iceland and analysis of a selection of saga texts using contemporary critical approaches. All readings in translation.

SCAN 5613. Contemporary Scandinavian Literature. (3 cr)

An investigation of issues which emerged as extremely important after 1945 in Scandinavia, as articulated by writers and analyzed by researchers in social sciences. All readings in translation.

SCAN 5615. Ibsen and the Beginnings of Modern Drama. (3 cr)

Close reading of Ibsen’s modern tragedies from A Doll’s House (1879) to When We Dead Awaken (1899). Focus is on the dialectics between Ibsen and his society, and dramatic structure and staging conventions in the context of modern theater. Readings in English for nonmajors.

SCAN 5616. Strindberg and the Drama in Revolt and Change. (3 cr)

Strindberg as the master of naturalistic drama and the precursor of modernity in European and American theater. Close reading of plays with emphasis on dramatic structure and staging conventions in the context of modern theater. All readings in English for nonmajors.

SCAN 5670. Topics in Scandinavian Studies. (3 cr [max 9 cr])

Topic may focus on a specific author, group of authors, genre, period, or subject matter. Topics specified in Class Schedule. Readings in English for nonmajors. May meet with 3670.

SCAN 5701. Old Norse Language and Literature. (3 cr)

Acquisition of a reading knowledge of Old Norse; linguistic, philological and literary study of Old Norse language and literature.

SCAN 5704. History of the Scandinavian Languages. (3 cr)

Investigation of the development of the Scandinavian languages from the earliest periods to the present.

SCAN 5710. Topics in Old Norse Literature. (3 cr [max 9 cr]; Prereq—5701 or equiv)

Topic may focus on Old Norse prose or poetry. Primary texts read in Old Norse. Critical literature about texts, medieval Icelandic culture in English. Topics specified in Class Schedule.

SCAN 5993. Directed Studies. (1-4 cr [max 12 cr]; Prereq—#, Δ, ∂)

Guided individual reading and study.

SCAN 6002. Introduction to Scandinavian Studies. (3 cr)

Introduction to history of Scandinavian studies, to field of Scandinavian studies as an integral area with particular disciplines, and to study of Scandinavian languages, literatures, and cultures. Integrated sections on Scandinavian bibliography.

SCAN 8500. Seminar in Medieval Scandinavian Languages and Literature. (3 cr [max 9 cr])

Sample topics: Volsunga Saga, studies in Snorri Sturluson’s Edda, dialogue analysis in the Icelandic sagas.

SCAN 8630. Seminar in Scandinavian Criticism. (3 cr [max 9 cr])

Sample topics: feminist theory in Scandinavia, writing literary history in Scandinavia.

SCAN 8994. Directed Research. (1-3 cr [max 12 cr]; Prereq—may be taken as tutorial with #, Δ)
Courses

Scientific Computation (SCIC)

Institute of Technology

SCIC 8001. Parallel High-Performance Computing. (3 cr; Prereq—Undergraduate degree in field using sci comp or #) Interdisciplinary overview of computer science aspects of scientific computation, both hardware and techniques. Parallel computing, architectures, programming, and algorithms; restructuring compilers and data structures.

SCIC 8011. Scientific Visualization. (3 cr; Prereq—Undergraduate degree in field using sci comp or #) Basic issues in scientific visualization, visualization software, graphics, representation of scientific data, modeling, hardware for visualization, user interface techniques, output, commonly used algorithms and techniques for visualization, animation, information visualization, higher dimensional data, case studies, and examples of successful visualizations.

SCIC 8021. Advanced Numerical Methods. (3 cr; Prereq—Undergraduate degree in field using sci comp or #) Interdisciplinary overview of advanced numerical methods of scientific computation, emphasizing computational aspects. Approximation methods for partial differential equations, numerical linear algebra, sparse matrix techniques, iterative methods, solution of eigenvalue problems, and case studies.

SCIC 8031. Modeling, Optimization, and Statistics. (3 cr; Prereq—Undergraduate degree in field using sci comp or #) Interdisciplinary overview of mathematical modeling, optimization, and statistics techniques for scientific computation. Nonlinear equations and nonlinear optimization, statistics, control theory, modeling, and simulation.

SCIC 8041. Computational Aspects of Finite Element Methods. (3 cr; Prereq—Undergraduate degree in field using sci comp or IT grad student or #) Fundamental concepts and techniques of finite element analysis. Variational equations and Galerkin’s method; weak formulations for problems with nonsymmetric differential operators; Petrov-Galerkin methods; examples from solid and fluid mechanics; properties of standard finite element families, implementation.

SCIC 8095. Problems in Scientific Computation. (1-3 cr [max 9 cr]; Prereq—Undergraduate degree in field using sci comp or #) Selected topics in interdisciplinary aspects of scientific computing.

SCIC 8190. Supercomputer Research Seminar. (1 cr [max 3 cr; Prereq—Undergraduate degree in field using sci comp or #] Series of seminars by distinguished lecturer.

SCIC 8333. FTE: Master’s. (1 cr; No grade. Prereq—Master’s student, adviser and DGS consent)

SCIC 8444. FTE: Doctoral. (1 cr; No grade. Prereq—Doctoral student, adviser and DGS consent)

SCIC 8594. Scientific Computation Directed Research. (1-4 cr [max 9 cr]; Prereq—Undergraduate degree in field using sci comp or #)

SCIC 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

SCIC 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq—Max 18 cr per semester or semester; 10 cr total required [Plan A only])

SCIC 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or semester; 24 cr required)

Slavic (SLAV)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

SLAV 9900. Topics in Slavic Languages and Literatures. (3 cr) Topics specified in Class Schedule.

Social and Administrative Pharmacy (SAPH)

Department of Pharmacy Practice

College of Pharmacy


SAPH 8100. Seminar. (1 cr [max 8 cr]; Prereq—Grad SAPH major or #) Contemporary issues and research problems in sociobehavioral pharmacy, pharmaco economics and policy, and clinical research.

SAPH 8173. Principles and Methods of Implementing Research. (3 cr; §SAPH 8173, Prereq—Two grad stat courses) Integrates scientific, statistical, and practical aspects of research. Interrelationships among design, sample selections, subject access, human subjects requirements, instrument selection and evaluation, data management, analyses plans, grant writing, and research career issues. Field experiences.

SAPH 8200. Research Problems. (1-8 cr [max 16 cr]; Prereq—Grad SAPH major or #) Individually designed research experience directed at contemporary problems related to drug use process.

SAPH 8235. Pharmaceutical Economics and Policy. (3 cr; A-F or Aud, Prereq—Grad SAPH major or #) Economic analysis of pharmaceutical sector of health care systems. Problems of pricing production and distribution of pharmaceuticals. Domestic or international policy issues relevant to price and access of pharmaceuticals.

SAPH 8255. Pharmaceutical Marketing. (3 cr; A-F or Aud, Prereq—Grad SAPH major or #) Historical development of distributive systems, marketing channels, institutions, policies, and practices as they relate to pharmaceutical industry. Contemporary issues/theory related to pharmaceutical marketing. Pharmaceutical proportion, especially directed to consumer advertising.

SAPH 8270. Clinical Conferences. (2 cr; Prereq—Grad SAPH major or #)

SAPH 8420. Social and Behavioral Aspects of Pharmacy Practice. (3 cr; A-F or Aud, Prereq—Grad SAPH major or #) Historical development of the profession, its growth and development, emphasizing forces of education, professionalization, attitude modification, and changes occurring as a product of legal and organizational forces in society.

SAPH 8500. Pharmacy and Its Environment. (3 cr; A-F or Aud, Prereq—Grad SAPH major or #) Cultural foundations of pharmacy. Development of present state of pharmacy practice. Role of pharmacist as health practitioner in relation to other health practitioners. Identification of factors (health policy, regulation, economics, research, development, promotion) that affect individual responses to drug therapy.

SAPH 8700. Hospital Pharmacy Administration. (3 cr; A-F or Aud, Prereq—Grad SAPH major or #) History, classification, organization, and functions of hospital departments in relation to the pharmacy service.

SAPH 8702. Hospital Pharmacy Survey. (1 cr [max 3 cr]; Prereq—Grad SAPH major or #) Readings for self-directed students to explore contemporary issues in hospital pharmacy practices.

SAPH 8810. Social Psychology of Health Care. (2 cr; Prereq—Grad SAPH major or #) Behavioral and social aspects of recovery responses to drugs and other therapies, patients’ compliance with prescribed therapies, relationships between healthcare professional and patient.

SAPH 8840. Social Measurement. (3 cr; A-F or Aud, Prereq—Intro stat course, understanding of simple correlations or #) How social factors such as innovativeness, compliance, religiosity, and stress are measured and tested for reliability and validity. Relationships between theory, concepts, variables, data.

Social Work (SW)

School of Social Work

College of Education & Human Development

SW 5051. Human Behavior and the Social Environment. (2-3 cr [max 3 cr]; A-F or Aud, Prereq—Grad student or #) Social, psychological, biological, and cultural factors of individual and group development as applied to social work practice. Behavior and life-cycle development focusing on diversity and each stage of life. Discuss development in terms of the individual, and in terms of overlapping social systems such as the multigenerational family, culture, community, and society.

SW 5052. Ecologies of Child Development Within Communities of Color. (3 cr; Prereq—Grad or #) Examine social, affective, and cognitive development of children of color via a life course, ecological systems framework. Family, school, peers, and community are studied as ecological contexts which influence developmental trajectories for these children and youth. Attention is given to poverty, racism, and oppression.

SW 5101. Historical Origins and Contemporary Policies and Programs in Social Welfare. (3-4 cr [max 4 cr]; A-F or Aud) Contemporary policies and programs in social welfare are examined in light of their historical origins and evolution. A framework is then developed for analysis of concepts and principles in contemporary social policy for social welfare programs and services. The emergence of the profession of social work also examined.

SW 5105. Women and Public Policy. (3 cr) Study of feminist organizations; issues and conflicts within organizations and movements; methods and sources for studying feminism.

SW 5107. Child Welfare Policy. (3 cr; SPA 5411, Prereq—Grad or #) Examine the intersection of conceptual orientations of developmental psychology with policies that affect children and families. Demographic, historic, and social trends underlying the assumptions that drive policies directed at women and children; projections of future policies.

SW 5309. Case Management with Special Populations. (3 cr; Prereq—Grad or non-degree seeking student or #) Examine concepts and principles of case management practices with special populations such as older adults, persons with developmental disabilities, and persons with serious and persistent mental illness. The core functions of case management practice in a range of settings are addressed in relationship to issues of diversity, vulnerability, and empowerment.
SW 5313. Social Work with Older Adults. (2 cr; Prereq—Grad or non-degree seeking student or #)

The practice components of social work with older adults including assessment, intervention, and case management. Taught from the perspective of bio-psycho-social strengths and challenges and within the context of current social policy and delivery systems.

SW 5314. Social Work in the Schools. (2 cr; Prereq—Grad or non-degree seeking student or #)

Application of social work methods in a school setting. Emphasizes assessment, consultation, advocacy, interdisciplinary team building, and crisis intervention.

SW 5315. Social Work Practice in Hospitals and Health Care Settings. (2 cr; Prereq—Grad or non-degree seeking student or #)

Prepares students for social work practice in a hospital or health care setting. Focus on integration of conceptual and practice subject matter that covers differential assessment, clinical intervention models, impact of acute and chronic illness, special populations, managed care, legal and ethical issues, interdisciplinary team work, and transition planning in health care.

SW 5316. Brief Treatment and the Task-Centered Approach. (2 cr; SW 5303. Prereq—5303; grad or non-degree seeking student or #)

The advent and current prominence of brief treatment models in work with individuals, families, and groups including their theoretical and empirical bases. Practice with diverse populations in a context of managed care. Emphasis on the task-centered approach including skill training and supervised practice.

SW 5317. Social Work With Involuntary Clients. (2 cr; Prereq—Grad or non-degree seeking student or #)

Includes theory, ethics, effectiveness, and intervention methods for work with client systems that experience involuntary contact with a social worker. Interventions at micro, mezzo, and macro levels are included. Practice in various settings such as child welfare, mental health, corrections, and public schools as well as practice related to organizational responses to change.

SW 5318. Family Centered Home Based Services. (2 cr; SW 5303. Prereq—5303, grad or non-degree seeking student or #)

Ecological, multisystems approach focusing on the family system. Triadic theory, meta-neutrality, strengths-focus, case management and team treatment. Family-based services evaluated for high-risk, multi-problem families and as an alternative to foster placement.

SW 5319. Adolescents: Norms, Culture, and Health. (2 cr)

Relationships among familial, social, societal, political, economic, environmental, psychosocial, and cultural determinants of adolescent behavior that affect health; major public health issues and problems of adolescents.

SW 5481. Child Abuse Prevention I: Research and Theory. (3 cr; Prereq—Bachelor’s degree or #)

Foundation of research/theory for level I child abuse prevention studies certificate.

SW 5482. Child Abuse Prevention II: Program Development, Evaluation, and Advocacy. (3 cr; Prereq—5481)

Design and evaluation of policies and programs of interventions to prevent child abuse. This is the second course in the Level I Child Abuse Certificate program.

SW 5483. Child Abuse Prevention III: Skill Building I—Cultural and Legal Issues. (3 cr; Prereq—Bachelor’s degree or #)

Risk factors, protective factors, resilience in cultural settings. Identifying/designing strategies appropriate to cultural characteristics. First course for level II child abuse prevention certification.

SW 5484. Child Abuse Prevention IV: Skill Building II—Risk Assessment and Interviewing. (3 cr; Prereq—Bachelor’s degree or #)


SW 5519. Medi}ation and Conflict Resolution. (3 cr; Prereq—58519)

Develop mediator skills for making informed decisions regarding the appropriateness of mediation for conflicts that frequently confront social worker practitioners such as divorce, neighborhood disputes, conflicts between parents and adolescents, conflicts between spouses, and conflicts between crime victims and offenders.

SW 5525. Global Perspectives on Social Welfare, Peace, and Justice. (3 cr; Prereq—2001 or #)

Role of international social welfare in meeting basic human needs and promoting human rights, social justice, and peace. Theories, models, and social policies in different economic and political systems with emphasis on Third World nations.

SW 5705. Violence in Families. (3 cr; Prereq—5707; grad student or adult special or #)

Prevention/intervention with perpetrators, survivors, and social institutions. Perpetration, effects on victims, social responses to family violence. Child abuse/neglect. Adolescent and women/vulnerable adults. Roles of gender, race, culture, age, physical ability, and sexual orientation.

SW 5706. Issues and Interventions in Child Sexual Abuse. (2 cr; Prereq—Grad student or adult special or #)


SW 5707. Interventions with Battered Women and Their Families. (2 cr; Prereq—5703, grad or non-degree seeking student or #)

Current theories, research, and evaluation of interventions with battered women and their families. Focus on practice, e.g., direct work with social institutions, victim-survivors, and assailants and their families.

SW 5708. Substance Abuse and Social Work. (3 cr; Prereq—Grad or non-degree seeking student or #)

Assessment and intervention in situations involving substance abuse with special emphasis on cross-cultural practice. Relationships of substance abuse to areas such as child welfare, mental illness, and violence within families are examined.

SW 5709. Applied Psychopharmacology for Human Service Professionals. (2 cr; A-F or Aud)

Categories of psychoactive drugs. Medications to treat mental disorders. Legal drugs such as alcohol, nicotine, cocaine, and marijuana. What is occurring physiologically when someone takes a psychoactive drug.

SW 5711. Co-Ocurring Addictive and Mental Health Disorders. (2 cr; A-F or Aud. Prereq—Cannot be taken for cr by MSW students) Mentally ill, chemically abusive, or dependent clients. Intervention, advocacy, education, and support for client and those who are part of his or her environment. Social, environmental, and multicultural factors. Meets partial state requirements for becoming licensed as an alcohol/drug counselor.

SW 5810. Seminar: Special Topics. (1-4 cr [max 10 cr])

Topics specified by instructor. SW 5811. Social Work Ethics. (2 cr; Prereq—5801, grad student or non-degree seeking student or #)

Acquire knowledge base and develop skills required to identify ethical issues, resolve ethical dilemmas, and make ethical decisions within the context of the professional practice of social work. Values base and ethical standards of the profession and ethical decision-making models examined in-depth.

SW 5813. Child Welfare and the Law. (2 cr; Prereq—2nd yr MSW or advanced standing or #)

Social work practice in juvenile court. Child abuse/neglect reporting laws, risk assessment, reasonable efforts, case plan, custody proceedings, permanency planning, termination of parental rights, child testimony, social worker testimony, adoption laws.

SW 5991. Independent Study in Social Work. (1-4 cr [max 4 cr])

Independent study in areas of special interest to students and faculty.

SW 8010. Seminar: Field Practice I. (1-8 cr [max 8 cr]; S-N or Aud. Prereq—00201) Integrates classroom learning with direct experience of a social work field internship. Professional support/learning groups focus on student-and facilitator-identified issues. Students discuss professional/personal biases, ethical dilemmas, and supervisory issues. Cross-cultural understanding, implications of cross-cultural practice.

SW 8020. Field Practice II. (1-6 cr [max 6 cr]; S-N or Aud. Prereq—5910) Integrates classroom learning within a concentration with the direct experience of an internship. Students expand competency in cross-cultural practice.

SW 8030. Advanced Standing Social Work Practicum. (1-8 cr [max 8 cr]; S-N or Aud. Prereq—Adv standing) Integrates classroom learning with direct experience of a social work field internship. Professional support/learning groups discuss issues raised in field placement. Groups focus on professional/personal biases, ethical dilemmas, supervisory issues, cross-cultural sharing, and implications of students’ privilege/power in relation to client systems.

SW 8041. Specialized Field Placement. (3-4 cr; S-N or Aud. Prereq—8030, MSW adv-standing) Internship within an agency or a specific population. Applied practical experience in specialized concentration area of practice.

SW 8051. Psychopathology and Social Work Practice. (3 cr; Prereq—All foundation courses for full program or advanced standing or #) Psychopathology from ecosystemic perspective. Biopsychosocial influences on incidence, course, treatment of common mental disorders diagnosed from infancy through adulthood. Differential effects on populations at risk. Diagnostic skills, alternative intervention strategies, social work roles.

SW 8011. Social Policy and Delivery Systems for Child Welfare and Family Services. (3 cr; Prereq—[8211, advanced standing] or #) Federal, state, and local policies related to contemporary child welfare system and system of social services to families. Current debates about policies, financing, and structure and organization of service delivery; process of influencing policy changes in children and family services.

SW 8013. Health and Mental Health Policy. (3 cr; Prereq—[8211, advanced standing] or #) Factors affecting health and mental health status of variety of populations. Policies on organizational, local, state, and federal level affecting health status; financing; and delivery of health and mental health services. Ethical issues embedded in policies, issues in need of policy development.

SW 8015. Economic Security of Disadvantaged Populations. (3 cr; Prereq—[8211, advanced standing] or #) Impact of social policy and macro economic trends on economic security of disadvantaged populations. Focuses on anti-poverty/work programs in the United States, although international perspective is used as well.

SW 8016. Special Topics in Social Policy. (1-9 cr [max 9 cr]) For definitions of course numbers, abbreviations, and symbols, see page 169. 313
Courses

SW 8201. Social Work Methods: Practice With Individuals and Groups. (3 cr; F-A or Aud. Prereq–SW 5201 or #) Introductions to theories, knowledge, values, skills in initial phases of social work practice. Practice phases: assessment, goal setting, contracting, intervention, treatment. Develops relationships, interviewing skills in practice with diverse populations. Ecological problem-solving framework from empowerment orientation.


SW 8301. Advanced Child Welfare Practice. (3 cr; Prereq–All foundation courses for full program or advanced standing or #) Child welfare policies. Use of multistystem interventions. Impact of poverty, race, ethnicity, and gender on policy/practice. Developments in family preservation, relative placement, foster care, adoptions, and Indian child welfare. Role of social work in child protection services.

SW 8303. Advanced Mental Health Practice with Adults. (3 cr; SW 5316. Prereq–8501 or #) SW 8501 or all foundation courses for full program or advanced standing or #) Theory/practice of cognitive, cognitively-behavioral, and psychodynamic social work treatment in community/clinical settings. Criteria for differential applications, including brief treatment and crisis-oriented approaches. Cultural/social aspects of mental health, issues important to populations at risk.

SW 8304. Advanced Practice With Children and Adolescents. (3 cr; Prereq–All foundation courses for full program or advanced standing or #) Practice with children, adolescents, and their families. Ecosystemic model that undergirds assessment/ intervention. Mastery of developmental tasks and enhanced social functioning as protective mechanisms. Biopsychosocial focus. Integrates familial/community contributions, especially in face of loss or disruption.

SW 8312. Advanced Social Work Practice With Groups. (3 cr; Prereq–8201, 8202, adv standing or #) Advanced clinical social work practice with groups. How to differentiate among available models of group work and select an appropriate model based on needs of client population and on context in which they are served.

SW 8313. Professional Practice in Interdisciplinary Teams and Collaboratives. (3 cr; Prereq–Foundation curriculum, [advanced standing or grad student in health and human service or in educational professional program] or #) Principles of interdisciplinary/interorganizational collaboration in human services, health, and educational settings. Team building, decision-making models, engaging value differences, managing conflict on team, role/status disparities, relational communications. Emerging approaches to interdisciplinary collaboration.

SW 8314. Social Work Interventions With Families. (3 cr; SW 5318. Prereq–5318; adv standing or #) Interventions based on systems perspective of family as center of focus, in environmental context. Policy/practice principles of working with families in their home, community environment.

SW 8333. FTE: Master's. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

SW 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

SW 8501. Planning, Marketing, and Program Development. (3 cr; Prereq–[Foundation curriculum, advanced standing] or #) Principles, applied practice of management concepts in human service settings. Management theories, organizational planning, program development, marketing, and management practices that are client/community-focused, results-oriented, and seeks to achieve positive social change.

SW 8502. Resource Development and Management. (3 cr; Prereq–[Foundation curriculum, advanced standing] or #) Procuring/managing financial resources in social work settings. Principles of fund raising, grant writing, preparing/monitoring budgets, interpreting basic financial reports. Management information systems, accountability requirements.


SW 8505. Advanced Community Organization and Advocacy. (3 cr; Prereq–[Foundation curriculum, advanced standing] or #) Methods for stimulating/supporting joint action for constructive change to fulfill community needs. Principles of working with local organizations. Social action to accomplish specific changes.

SW 8507. Community Practice Seminar. (1 cr; Prereq–[Foundation curriculum, advanced standing] or #) Links content from human services management and from community organization and advocacy. Integrating framework that draws upon knowledge/ skills used in human services management and in community organization/change.

SW 8519. Mediation and Conflict Resolution for Social Workers. (3 cr; Prereq–5159; MSW student or grad conflict mgmt minor or #) Advanced mediator skills for social workers; appropriateness of mediation for conflicts that frequently confront social work practitioners, such as divorce, neighborhood disputes, and conflicts between parents and adolescents, between spouses, and between crime victims and offenders.

SW 8525. Global Perspectives on Social Welfare, Peace, and Justice. (3 cr; Prereq–5211, advanced standing or #) Role of international social welfare in meeting basic human needs and promoting human rights, social justice, and peace. Theories, models, and strategies of social welfare in different economic/political systems. Emphasizes Third World nations. Skills for social workers and other professionals in the helping professions.

SW 8601. Social Work Research Methods. (3 cr; A-F or Aud. Prereq–MSW student or #) Introduction to quantitative and qualitative social work research designs. Research methods and contemporary social work practice models. Practice models studied will include direct intervention in variety of systems from individual to community. Theoretical, value, empirical foundations of contemporary practice models examined through lens of intervention research.

SW 8666. Doctoral Pre-Thesis Credits. (1-6 cr; max 12 cr) (Theoretical student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; A, for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr.)

SW 8683. Directed Study. (1-6 cr; max 6 cr; Prereq–#) Individual or small group research inquiry translating introductory course content into research design and study. Projects may be conducted in conjunction with field learning experiences or other coursework.

SW 8702. Advanced Social Work Practice With Diverse Populations. (2 cr; Prereq–All foundation courses for full program or advanced standing or #) Models of ethnic-sensitive social work practice applied in human service management or direct practice settings. Critical examination of human needs and organizational responses to racially and culturally competent practice with populations at risk.

SW 8801. Social Work Ethics and Legal Issues. (3 cr; Prereq–5811; foundation courses or adv standing or #) Develops knowledge base and skills required to identify and understand legal and ethical issues, solve ethical dilemmas, and make ethical decisions within social work. Values base, ethical standards, ethical decision-making models, and laws and legal procedures related to social work. Legal aspects of child welfare practice.

SW 8803. Social Work Supervision, Consultation, and Leadership. (3 cr; Prereq–Foundation courses or advanced standing or #) Principles, practices, and models of supervision in human service systems: administrative, educational, and supportive functions. Organizational leadership and mediation skills. Contextual factors that influence supervisory role and function. Principles and methods of teamwork, staff development, and consultation.

SW 8851. History of Social Work and Historical Research Methods. (3 cr; Prereq–Required research courses for soc work PhD student; equiv research methods courses for other grad students) Methods of historical research in, and survey of, history and evolution of social welfare and social work, using primary and secondary source materials.

SW 8855. Social Policy Formulation and Analysis. (3 cr; Prereq–Soc wk PhD student or #) Application of theoretical perspectives, conceptual frameworks, and research methodologies to analysis of social issues and formulation of social welfare policy.

SW 8861. Theory and Model Development in Social Work. (3 cr; Prereq–Soc wk PhD student or #) Intervention research methods and contemporary social work practice models. Practice models studied include direct intervention in variety of systems from individual to community. Theoretical, value, empirical foundations of contemporary practice models examined through lens of intervention research.

SW 8863. Social Work Teaching Methods and Educational Issues. (3 cr; Prereq–Soc wk PhD student or 2nd-yr MSW student or #) Teaching methods, skills, strategies, and issues related to teaching, scholarship, and service roles in context of social work education. Familiarizes students with current issues, including curriculum development. Includes concurrent teaching experience in a social work class.

SW 8871. Social Work Research Seminar. (3 cr; Prereq–Soc wk PhD student or #) First of two required Ph.D. seminars. Students review and expand their knowledge of basic concepts and methods of social research; current issues and controversies in social science and social work research and knowledge development. Development of research questions, sampling, measurement, data collection strategies, qualitative and quantitative research.
SW 8872. Social Work Research Seminar II. (3 cr; Prereq: SW 8871 or #) Additional topics: methodologies and design of quasi-experiments, surveys, descriptive research, grounded theory, and analysis of quantitative and qualitative data.

SW 8875. Research Practicum. (2 cr; [max 6 cr]; S-N or Aud. Prereq-Soc, Ph.D student for #) Experience in conduct of research, following completion of 8871 and 8872. Students work under faculty direction.

SW 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

Social, Administrative, and Clinical Pharmacy (SACP)

College of Pharmacy

SACP 8333. FTE: Master's. (1 cr; No grade. Prereq-Master's student, [adviser, DGS] consent)

SACP 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, [adviser, DGS] consent)

SACP 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combinations; A for 3rd/4th registrations, up to 24 combined; doctoral student admitted before summer 2007 may register up to 4 times, up to 60 combined cr)

SACP 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade. Prereq-Plan A)

SACP 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; No grade)

Society (SOC)

Department of Sociology

College of Liberal Arts

SOC 5090. Topics in Sociology. (1-3 cr [max 9 cr]; Prereq-1001 or #) Topics specified in Class Schedule.

SOC 5455. Sociology of Education. (3 cr; SEDP 5041. Prereq-1001 or equiv or #) Structures and processes within educational institutions. Links between educational organizations and their social contexts, particularly as these relate to educational change.

SOC 5811. Intermediate Social Statistics. (4 cr; Prereq-3811 or equiv) Measurement, theory of probability, and bivariate statistics. Focus on multiple regression analyses of sociological data. Primarily for first-year sociology graduate students who need preparation for advanced social statistics. Undergraduates preparing for graduate programs may register upon availability.

SOC 8001. Sociology as a Profession. (1 cr [max 2 cr]; S-N or Aud. Prereq-Grad soc major) Sample topics: role of sociology in society, professional organizations, employment opportunities, professional ethics, and writing for publication or grant proposals.

SOC 8011. Sociology of Higher Education: Theory and Practice. (3 cr; Prereq-Grad soc major or #) Social/political context of teaching. Ethical issues, multiculturalism, academic freedom. Teaching skills (e.g., lecturing, leading discussions). Active learning. Evaluating effectiveness of teaching. Opportunity to develop a syllabus or teaching plan.

SOC 8090. Topics in Sociology. (1-4 cr [max 12 cr]; Prereq-#) Topics specified in [Class Schedule].

SOC 8091. Independent Study. (1-5 cr [max 20 cr]; Independent study of an established 8xxx course.

SOC 8093. Directed Study. (1-4 cr [max 20 cr]; Prereq-Grad soc major or #) Directed study in sociology.

SOC 8094. Directed Research. (1-4 cr [max 20 cr]; May be used to fulfill sociology graduate requirement for advanced methodological training.

SOC 8101. Sociology of Law. (3 cr) Sociological analysis of law and society. In-depth review of research on why people obey the law, of social forces involved in creation of law (both civil and criminal), procedures of enforcement, and impact of law on social change.

SOC 8111. Criminology. (3 cr) Overview of theoretical developments and empirical research. Underlying assumptions, empirical generalizations, and current controversies in criminological research.

SOC 8148. Law, Sociology, and the Mental Health System. (3 cr; A-F or Aud. Prereq-Grad student in sociology) Intensive survey of psychopathology. Reference to criminal behavior, criminal justice system.

SOC 8190. Topics in Law, Crime, and Deviance. (3 cr [max 12 cr]; Prereq-Grad student in sociology) Advanced topics in law, crime, and deviance. Social underpinnings of legal/illegal behavior and of legal systems.

SOC 8201. Social Stratification and Mobility. (3 cr; Prereq-3811 or equiv #) Form and content of hierarchical arrangements. Relationship of hierarchy to social order and individual behavior. Structures of social stratification. Status attainment. Mobility. Inequality and economic development, social development, and technological change. Economic status in relation to social status, including race, gender.

SOC 8211. Race Relations Theory. (3 cr) Major theoretical debates. Classic and contemporary theoretical approaches to studying U.S. race relations; contemporary and historical experiences of specific racial and ethnic groups.

SOC 8221. Sociology of Gender. (3 cr; #) Organization, culture, and dynamics of gender relations and gendered social structures. Sample topics: gender, race, and class inequalities in the workplace; women’s movement; social welfare and politics of gender inequality; theoretical and methodological debates in gender studies; sexuality; science; sociology of emotions. Communicating and interpreting gender and social relationships.

SOC 8250. Social Stratification. (3 cr) Comparative perspectives on social inequality, race, class, and gender; quantitative research on gender stratification; stratification in post-communist societies; institutional change and stratification systems; and change in stratification. Topics specified in [Class Schedule].

SOC 8311. Political Sociology. (3 cr) Social dimensions of political behavior and social origins of different forms of the state. How various theoretical traditions—Marxist, Weberian, and feminist—address key issues in political sociology, including citizenship, revolution, state formation, origins of democracy, welfare state, and fascism.

SOC 8333. FTE: Master's. (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

SOC 8390. Topics in Political Sociology. (3 cr [max 12 cr]; Prereq-Soc grad student or #) Topics with common focus on social underpinnings of political behavior/change. Sample topics: democracy and development, international legal and political systems, power and authority in advanced capitalist states, xenophobia and international migration, and civil society and democracy. Topics specified in [Class Schedule].


SOC 8421. Work and Occupations. (3 cr) Sociological analysis of work, occupations, and labor markets, including contemporary theory and research. Course emphasis varies with instructor.

SOC 8444. FTE: Doctoral. (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

SOC 8490. Advanced Topics in Social Organization. (3 cr [max 12 cr]; Prereq-#) Content varies with instructor. Sample topics: gender and organizations, interorganizational relations, comparative study of organizations, nonprofit organizations, consumer behavior, industry and technology, social networks, conflict, coercion, and social exchange. Topics specified in [Class Schedule].

SOC 8501. Sociology of the Family. (3 cr) Theoretical and empirical works from contemporary family sociology. Content varies with instructor. Sample topics: definitions of the family, family roles, family interactions, marriage and divorce, childrearing, parenthood, and cultural variations in families.

SOC 8540. Topics in Family Sociology. (3 cr [max 12 cr]) Families and mental health; families, work, and the labor market; historical/comparative research on the family. Topics specified in [Class Schedule].

SOC 8551. Social Structure and the Life Course. (3 cr; Prereq-Soc grad major or #) Central concepts/purposes of life course analysis as applied to inter societal (comparative); intra societal (socioeconomic status, race, gender); and historical variability. Institutional patterning of life course (family, education, work, polity), deviation and criminal careers. Changes in the self. Methodological strategies.

SOC 8590. Topics in Life Course Sociology. (3 cr [max 12 cr]) Sociology of aging; sociology of youth, and mental health and adjustment in early life course. Topics specified in [Class Schedule].

SOC 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq-Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to 4 times, up to 60 combined cr)

SOC 8671. Sociological Theory. (4 cr; A-F or Aud. Prereq-Grad soc major or #) Traditions of social theory basic to sociological knowledge, their reflection and expansion in contemporary theory, their applications in selected areas of empirical research. Sample topics: social inequality, social mobilization, and politics, family organization and social reproduction, social order and change, sociology of knowledge and religion.

SOC 8711. Theories of Social Organization. (3 cr) Key frameworks and theories, structure and process, macro and micro levels of analysis. Empirical literature on major substantive issues related to work, gender, and race; political and family relations; and post-industrialization and technological change. World systems theory.

SOC 8721. Theories of Social Psychology. (3 cr) Prominent contemporary theories of sociological social psychology, including structural (social structure and personality) perspectives, social relationships and small group processes (exchange, equity, expectation states theories), and symbolic interactionism. Classical writings, theoretical statements, and empirical studies.
Courses

SOC 8725. Sociological Theory Construction. (3 cr; Prereq–A) Structure of social scientific theories, basic tools for developing/ critiquing them. Types of theoretical statements, concept formation, operationalization, testability. Contrasts goals/methods of different theoretical perspectives.

SOC 8731. Sociology of Knowledge. (3 cr; Prereq–Soc grad student or #) Knowledge and related terms (ideology, stereotype, prejudice, belief, truth). Variation of knowledge across social groups/categories (e.g., gender, race, class, generation, nationality); institutions (e.g., politics, law, science); and societies across time and space. Power, rituals, institution, networks, and knowledge. Genealogy of theories.


SOC 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

SOC 8790. Advanced Topics in Sociological Theory. (3 cr [max 12 cr]) Sample topics: theories of conflict, theories of purposive action, Marxist theory, and structure- agency debate.

SOC 8801. Sociological Research Methods. (4 cr; A-F or Aud. Prereq–Grad soc major or #) Multiple objectives of social research and how they inform research design. Conceptualization and measurement of concepts and constructs. Bryman’s issues in research design and quantitative and qualitative approaches to data collection and management.

SOC 8811. Advanced Social Statistics. (4 cr; A-F or Aud. Prereq–5811 or equiv. grad soc major or #) Statistical methods for analyzing social data. Sample topics: advanced multiple regression, logistic regression, limited dependent variable analysis, analysis of variance and covariance, log-linear models, structural equations, and event history analysis. Applications to datasets using computers.

SOC 8821. Research Practicum. (3 cr; Prereq–Sociology grad student or #) Writing a scholarly paper. Framing the question within the literature(s). Selecting appropriate data/methods. Conducting initial analysis. Writing a preliminary draft. 

SOC 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

SOC 8890. Advanced Topics in Research Methods. (1-4 cr [max 32 cr]; Prereq–Grad soc major, 8801, 8811 or #) Advanced quantitative methods (e.g., multilevel models) and historical/comparative, field, and survey research. Topics specified in [Class Schedule].

Software Engineering (SENG)

Department of Computer Science
Institute of Technology

SENG 5115. Graphical User Interface Design, Evaluation, and Implementation. (3 cr; A-F or Aud. Prereq–Grad SEng major) Design and evaluation of interactive application interfaces, user- and task-centered approaches to design, guidelines for graphical design, interface evaluation techniques, current interface trends, including web interfaces and information visualization. Group projects that include designing, prototyping, and implementing an application interface.

SENG 5116. Graphical User Interface Toolkits. (2-3 cr [max 3 cr]; A-F or Aud. Prereq–Grad SEng major) Toolkit-centered introduction to GUI implementation technology. Students learn to use a GUI toolkit to implement a graphical application. Introduction to advanced techniques. Concluding constraint-based data management, 3D visualization tools, and toolkit structure and design.

SENG 5131. Network Programming: Distributed Objects. (3 cr [max 23 cr]; A-F or Aud. Prereq–Grad SEng major) Java programming, concurrent programming, workflow, distributed database, security, collaborative computing, object-oriented architecture/design, network publishing, messaging architecture, distributed object computing, and intranet.

SENG 5199. Topics in Software Engineering. (2-3 cr [max 6 cr]; A-F or Aud. Prereq–Grad SEng major) Topics specified in [Class Schedule].


SENG 5551. Introduction to Intelligent Robotic Systems. (3 cr; A-F or Aud. Prereq–Grad SEng major) Transformations and inverse kinematics, dynamics, and control. Sensing (robot vision, force control, tactile sensing), applications of sensor-based robot control, robot programming, mobile robotics, and micro-robots.

SENG 5707. The Principles of Database Systems. (3 cr; A-F or Aud. Prereq–Grad SEng major) Fundamental concepts; conceptual data organization; data models; data manipulation languages; database design; security and integrity; performance evaluation; query optimization; distributed database systems.


SENG 5801. Software Engineering I: Software Life Cycle, Requirements Specification, and Design. (3 cr; A-F or Aud. Prereq–Grad SEng major) Fundamental concepts; conceptual data organization; data models; data manipulation languages; database design; security and integrity; performance evaluation; query optimization; distributed database systems.

SENG 5802. Software Engineering II: Advanced Software Engineering. (3 cr; A-F or Aud. Prereq–Grad SEng major) Topics in software engineering and in object-oriented software development. Software design/implementation using UML, object-oriented techniques, object-oriented languages such as Java. Lectures, project.


SENG 5851. Software Project Management. (3 cr; A-F or Aud. Prereq–Grad SEng major) Concepts used to manage software projects. Project management cycle: initiation, planning/controlling, status reporting, review, post-project analysis. Leadership and team development; communication, individual/team presentations/projects.

SENG 5852. Quality Assurance and Process Improvement. (3 cr; A-F or Aud. Prereq–Grad SEng major) Theory and application of capability maturity model: process assessment, modeling, and improvement techniques. Life cycle issues related to development and maintenance; quality, safety, and security assurance; project management; and automated support environments. Group projects and case studies.

SENG 5861. Introduction to Software Architecture. (3 cr; A-F or Aud. Prereq–Grad SEng major) Software/systems architecture. Representation/design, how they fit into software engineering process. Description of architectures, including representation and quality attributes.


SENG 5900. Directed Study. (1-3 cr [max 3 cr]) Directed study/research in software engineering. Topics/scope decided in collaboration with instructor.

SENG 8333. FTE: Master’s. (1 cr, No grade. Prereq–Master’s student, advisor and DSG consent)

SENG 8494. Capstone Project (Plan B Project). (3 cr; S-N or Aud. Prereq–SEng major) Students work in teams on software project using tools, techniques, and skills acquired during previous coursework. Each team works with a client to establish requirements, agree upon design, and achieve a successful acceptance test of resulting software system.

SENG 8891. Independent Project. (2-6 cr [max 12 cr]) Independent project arranged with faculty.

Soil, Water, and Climate (SOIL)

Department of Soil, Water, Climate
College of Food, Agricultural and Natural Resource Sciences

SOIL 5005. Lab and Field Techniques in Soil Science. (2 cr; A-F only §SOIL 4005. Prereq–2125) Field/lab exercises for analysis of soils/landscapes. Students describe soils along a hillslope sequence, take soil samples, and perform a suite of chemical, biological, and physical soil analyses. Lab analytical techniques, soil quality control issues.

SOIL 5111. Practicum Internship in Precision Agriculture. (2-5 cr [max 5 cr]; S-N or Aud) Practical experience in precision agriculture in agri-industry/business. Content and extent of work at the internship site is jointly decided by the instructor, host business representative, and student’s principal adviser.

SOIL 5125. Soil Science for Teachers. (3 cr; §SOIL 1125, SOIL 2125) Basic physical, chemical, and biological properties of soil. Soil genesis classification and principles of soil fertility. WWW used for lab. Soil survey information used to make a land-use plan. Similar to 2125 with less emphasis on chemistry.

SOIL 5232. Vadose Zone Hydrology. (3 cr; Prereq–Math 1271 or equiv., PHYS 1042 or equiv.) Basic soil physical properties/processes governing transport of mass/energy into soils. Emphasizes water/solute transport through unsaturated root/vadose zones, their impact on subsurface hydrology and on water quality. Lectures, hands-on laboratory exercises, discussion of real world problems, problem solving.
SOIL 5311. Soil Chemistry and Mineralogy. (3 cr; Prereq—CHEM 1021 [max 1022], [max 1102], grad or #) Structural chemistry, origin/identification of crystalline clay mineral layers. Structure of soil organic matter. Chemical processes in soil: solubility, adsorption/desorption, ion exchange, oxidation/reduction, acidity, alkalinity. Solution of problems related to environmental degradation, plant nutrition, and soil genesis.

SOIL 5515. Soil Genesis and Landscape Relations. (3 cr; A-F or Aud, Prereq—2125 or #) Basic soil morphology and soil profile descriptions; pedogenetic processes and models of soil development; soil geomorphology, hydrology, and hillslope processes; digital spatial analysis; soil classification; soil surveys and land use; soil geography.

SOIL 5555. Wetland Soils. (3 cr; A-F or Aud, [majors] 5555, Prereq—1125 or 2125 or equiv or #, *4511 recommended) Morphology, chemistry, hydrology, formation of mineral/organic soils in wet environments. Soil morphological indicators of wet conditions, field techniques of identifying hydric soils for wetland delineations. Peatlands. Wetland benefits, preservation, regulation, mitigation. Field trips, lab, field hydric soil delineation project.

SOIL 5611. Soil Biology and Fertility. (3 cr; Prereq—2125, BIOL 1009 or equiv, CHEM 1021 or equiv, or grad, BIOE 300x, BioS 3xxx recommended) Soil microbial populations and biodiversity. Soil microorganisms. Biogeochemical cycles. Macro and microelement fertilization, and element function in plants and microbes. Composts, sludge and manures in fertilization. Plant microbe associations: nitrogen fixation, mycorrhizal fungi, and biological control of root pathogens. Pollution and bioaccumulation.

SOIL 5711. Forest Soils. (2 cr; Prereq—1125 or 2125) Factors affecting tree growth; estimation, modification, and management effects on site productivity; regeneration.

SOIL 8005. Supervised Classroom or Extension Teaching Experience. (2 cr; S-N or Aud) AGRO 8005, BBE 8005, HORT 8005, PLPA 8005, Prereq—#) Teaching experience in one of five departments: Biosystems and Agricultural Engineering; Agronomy and Plant Genetics; Horticultural Science; Soil, Water, and Climate; or Plant Pathology. Participation in discussions about effective teaching to strengthen skills and develop a personal teaching philosophy.

SOIL 8110. Colloquium in Soil Science. (1-3 cr [max 6 cr]; S-N or Aud) Research or intellectual areas in soil science or climatology not covered in regular courses. Topics vary; contact department for current offerings.


SOIL 8128. Seminar in Soils. (1 cr [max 2 cr]; S-N or Aud) Students present an open seminar on an advanced topic and attend seminars presented by other graduate students.

SOIL 8195. Research Projects in Soils. (1-5 cr [max 10 cr]; Prereq—Grad major in soil sci or related field, #) Directed research on special topics of interest in soil science or climatology supervised by individual or small groups of faculty.


SOIL 8333. FTE: Master’s. (1 cr; No grade. Prereq—Master’s student, adviser and DGS consent) SOIL 8444. FTE: Doctoral. (1 cr; No grade. Prereq—Doctoral student, adviser and DGS consent) SOIL 9510. Advanced Topics in Pedology. (2-4 cr [max 12 cr]; A-F or Aud, Prereq—5515) Sample topics: soil-landscape relations, soil genesis, landscape evolution, land use and management, precision agriculture, digital terrain modeling, forest soils.

SOIL 8541. Aquatic and Soil Chemistry. (3 cr; A-F or Aud, Prereq—§; CE 8541; 5311 or CE 4541) Physical chemical principles, geochemical processes controlling chemical composition of natural waters, soil-/sediment-water interactions. Emphasizes behavior of inorganic contaminants in natural waters, engineered systems, dissolved natural organic matter.

SOIL 8550. Teaching Experience. (1 cr [max 6 cr]; S-N or Aud) Prereq—Grad major in soil sci or related field, #) Provides students with practical experiences in instructional techniques in universities setting.

SOIL 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; a, for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

SOIL 8777. Thesis Credits: Masters’. (1-18 cr [max 50 cr]; No grade. Prereq—Max 18 cr per semester or summer; 10 cr total required [Plan A only])

SOIL 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

South Asian Languages and Cultures (SALC)

Department of Asian Languages and Literatures

College of Liberal Arts


SALC 5090. Instruction in South Asian Languages. (3-5 cr [max 5 cr]) Individualized instruction in one of the South Asian languages.

SALC 5201. Ancient Indian Literature in Translation. (3 cr) Literary achievements of Indian civilization from the ancient period.

SALC 5202. Modern Indian Literature in Translation. (3 cr) Literary achievements of Indian civilization from the modern period.

SALC 5204. Folklore of India. (3 cr) A study of the main genres of Indian folklore—folk tales, folk songs, folk epic, folk dramas, proverbs, and riddles—their relationship to Indian society and inter-relationship with literary traditions, both great and small.

SALC 5411. Introduction to Indian Philosophy. (3 cr) Major concepts, principal schools of Indian philosophy; traditional and contemporary views.

SALC 5412. Hinduism. (3 cr) Development of Hinduism focusing on sectarian trends, modern religious practices, myths and rituals, pilgrimage patterns and religious festivals, and the interrelationship between Indian social structure and Hinduism.

SALC 5413. Buddhism. (3 cr; ∑SRLS 3413, RELS 5413, SALC 3413) Historical account of Buddhist religion in terms of its rise, development, various schools, and common philosophical concept. Indian Buddhism compared with Hinduism; Buddhism’s demise and revival on the Indian subcontinent.

SALC 5414. Comparative Religions of South Asia. (3 cr; ∑SRLS 3414, RELS 5414, SALC 3414) Compares and contrasts basic philosophical concepts, literatures, ideologies, and ritualistic practices of Hinduism, Buddhism, and Jainism with those of Islam and Sikhism.

SALC 5456. The Cinema of India. (3 cr; ∑SALC 3456) Survey of cinema of South Asia; aesthetic, social, economic, and political perspectives.

SALC 5550. Problems in Indian Philosophy. (3 cr; Prereq—§ or Aud 5412 or 5413 or 5411 or 5412 or 5413) An introduction to Indian philosophy emphasizing analyses of mind and knowledge.

SALC 5521. Gandhi and Non-Violent Revolution. (3 cr; ∑SALC 3521) Character of Gandhi, his influence over contemporaries, and his hold on the world today.

SALC 5556. Women in India: Role and Repression. (3 cr; ∑SALC 3556) Representation of Indian women studied through literature of contemporary Indian women and against background of traditional Indian values and roles.

SALC 5710. Seminar in South Asian Languages. (4-5 cr [max 5 cr]) Selected topics on South Asian languages; no knowledge of South Asian languages required.

SALC 5720. Seminar in South Asian Literature. (3-4 cr [max 4 cr]) Selected topics on South Asian literature.

SALC 5730. Seminar in South Asian Culture. (4-5 cr [max 5 cr]) Selected topics on South Asian cultures.

SALC 5833. India’s Gods and Goddesses. (3 cr) Indian history examined by following development of the deities Krishna, Shiva, and Kali.

SALC 5993. Directed Studies. (1-5 cr [max 5 cr]; Prereq—#, Δ) Guided individual reading and study of topics not covered in regular courses. Open to qualified students for one or more semesters.

SALC 5994. Directed Research. (1-5 cr [max 5 cr]; Prereq—#, Δ) Directed research on topics of language, literature, or civilization selected by qualified students with consent of instructor and studied on tutorial basis.

SALC 8333. FTE: Master’s. (1 cr; No grade. Prereq—Master’s student, adviser and DGS consent) SOIL 8444. FTE: Doctoral. (1 cr; No grade. Prereq—Doctoral student, adviser and DGS consent)

SALC 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; a, for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

SALC 8710. Seminar: South Asian Languages, Literatures, and Cultures. (1-5 cr [max 5 cr]) Topic specified in [Class Schedule].

SALC 8720. Seminar: Interdisciplinary Study of South Asian Topics. (1-5 cr [max 3 cr]) Selected Indian topics: language problems, social structure, social and cultural change, law, and religion, as seen from a variety of social science and humanities disciplinary perspectives.
Spanish (SPAN)

Department of Spanish and Portuguese Studies

College of Liberal Arts

SPAN 5106. The Literature of the Reconquest and Feudal Spain. (3 cr; Prereq–three 3xxx or 5xxx literature courses in Spanish or Portuguese)

The major literary genres developed in Spain from the Reconquest to 1502, with reference to the crucial transformations of the Middle Ages, including primitive lyric, epica, clerical narrative, storytelling, debates, collections, chronicles, “exempla,” and the Celestina (1499–1502).

SPAN 5107. The Literature of the Spanish Empire and Its Decline. (3 cr; Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese)

Major Renaissance and Baroque works of the Spanish Golden Age (16th- and 17th-century poetry, nonfiction prose, novel, drama) examined against the historical background of internal economic decline, national crisis, and ideological apparatus developed by the modern state.

SPAN 5108. Don Quixote. (3 cr; Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese)

Analysis of Cervantes’ Don Quixote in its sociohistorical context; focus on the novel’s reception from the romantic period to postmodern times.

SPAN 5109. The Crisis of the Old Regime: Spanish Literature of the Enlightenment and Romanticism. (3 cr; Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese)

Major literary works and intellectual movements and conflicts of the 18th and early 19th centuries (1803–1845), examined as expressions of the long crisis of Spain’s Old Regime and the rise of bourgeois liberalism.

SPAN 5110. Discursive Formations at the Threshold of 20th-Century Spain. (3 cr; Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese)

Theory and representative examples of the realist/naturalist novel (Galdós, Pardo Bazán) in the context of its antecedents (“costumbreismo”), opposites (the idealist/sentimental novel), and turn-of-the-century innovations of modernism and the “generation of 1898.”

SPAN 5111. Contemporary Spanish Literature. (3 cr; Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese)


SPAN 5221. Spanish Drama of the 17th-Century. (3 cr; Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese)

Polemics surrounding public theater in 1600s. Analyses of texts in light of current approaches to comedy and related theatrical genres (e.g., autosacramentales).

SPAN 5316. Spanish Picaresque Narratives. (3 cr; Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese)


SPAN 5526. Early Modernity and Colonialism in Spanish America. 1492–1800. (3 cr; Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese)

Imperial writing. Forms of inner dissension, indigenous resistance. Baroque, consequences of cultural hybridity.

SPAN 5527. Nineteenth Century Latin America: Enlightened Thought, Nationalism, Language, Cultural Discourse. (3 cr; Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese)


SPAN 5528. Latin American Cultural Integration in the Neocolonial Order. (3 cr; Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese or A)

Modernismo, historical vanguard, impact of populist politics in patterns of culture/literature. 1900-50.

SPAN 5529. The Impact of Globalization in Latin American Discourses. (3 cr; Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese)

Interdisciplinary approach providing a framework for deconstructing issues of national identity, marginalization, and modernity. U.S. Hispanic theatre/literature and its ethnic diversity, regional variations, cultural links, and scope of its genres.

SPAN 5531. Hispanic Literature of the United States. (3 cr; Prereq–Three 3xxx or 5xxx Spanish or Portuguese literature courses or A)

Formulating and evaluating a phonological description of Spanish. Approaches to problems in Spanish phonology within metrical, autosegmental, and lexical phonological theories.

SPAN 5713. The Structure of Modern Spanish: Syntax. (3 cr; Prereq–Three 3xxx or 5xxx Spanish linguistics courses or A)

Study and analysis of the principal constructions found in the syntax of Spanish.

SPAN 5714. Theoretical Foundations of Spanish Syntax. (3 cr; Prereq–5713 or 3)

Categorization processes that appear across languages. Grammatical relations, word order, transitivity, subordination, information structure, grammaticalization. How these are present in syntax of Spanish.

SPAN 5715. The Structure of Modern Spanish: Semantics. (3 cr)

Applying semantic theory to Spanish: conceptual organization and the structuring of experience; meaning and cultural values; semantic fields; categorization and prototypes; cognitive model theory; metaphor, metonymy, and mental imagery as source and change of meaning.

SPAN 5716. The Structure of Modern Spanish: Pragmatics. (3 cr; Prereq–A)

Concepts used in current literature in Spanish pragmatics, such as deixis, presupposition, conversational implicature, speech act theory, and conversational structure.

SPAN 5717. Spanish Sociolinguistics. (3 cr; Prereq–Two 3xxx or 5xxx linguistics courses in Spanish or Portuguese)

Sociolinguistic variation, cross-linguistic diversity in different varieties of Spanish in Latin America and Spain. Impact of recent cultural, political, and socioeconomic transformations on language.

SPAN 5718. Spanish Language Contact. (3 cr; Prereq–Two 3xxx or 5xxx linguistics courses in Spanish or Portuguese)

Analysis of different types/results of Spanish language contact globally, taking into account varying social conditions under which contact occurs.

SPAN 5721. Spanish Laboratory Phonology. (3 cr; A-F or Aud. Prereq–5711, honor or grad student or A)

Spanish-American laboratory phonology. Phonology from a laboratory perspective. Students evaluate laboratory research methodologies, perform basic acoustic analyses, and design laboratory phonology studies.

SPAN 5910. Topics in Spanish Peninsular Studies. (3 cr; Max 9 cr; Prereq–Three 3xxx or 5xxx literature courses in Spanish or Portuguese)

Crucial moment or characters, works, or events marking beginning of new phase in literary/cultural landscape.

SPAN 5920. Topics in Spanish-American Studies. (3 cr; Prereq–5910 or A)

Spanish-American literature analyzed according to important groups, movements, trends, methods, and genres. Specific approaches depend on topic and instructor. Topics specified in Class Schedule.

SPAN 5930. Topics in Ibero-Romance Linguistics. (3 cr; Max 9 cr)

Problems in Hispanic linguistics; a variety of approaches and methods.

SPAN 5970. Directed Readings. (1-4 cr; Prereq–MA or PhD candidate, A, A)

Students must submit reading plans for particular topics, figures, periods, or issues. Readings in Spanish and/or Spanish-American subjects.

SPAN 5985. Sociolinguistic Perspectives on Spanish in the United States. (3 cr; Prereq–Three 3xxx or 5xxx linguistics courses in Spanish or Portugal)

Sociolinguistic analysis of issues such as language maintenance/shift in U.S. Latino communities, code switching, attitudes of Spanish speakers towards varieties of Spanish and English, language change in bilingual communities, and language policy issues.

SPAN 5990. Directed Research. (1-4 cr; Prereq–9 cr; Prereq–4, A, A)

SPAN 5991. The Acquisition of Spanish as a First and Second Language. (3 cr; Prereq–Three 3xxx or 5xxx Spanish or Portuguese courses in Spanish or Portuguese)

Analysis of issues such as the acquisition of Spanish and English by bilingual children; Spanish in immersion settings; developmental sequences in Spanish; classroom language learners’ attitudes, beliefs, and motivation; development of pragmatic competence.

SPAN 8100. Research in Sociolinguistical Approaches to Spanish Literature. (3 cr; Max 9 cr; Prereq–5xxx courses in Spanish literature and culture)

Sociolinguistical functions of Spanish literary works and major theories concerning literary production of texts. Testing modern theories in terms of representative fictional discourses from specific historical periods.

SPAN 8200. Spanish Literary Texts: Theories of Formal Structures. (3 cr; Max 8 cr; Prereq–5xxx courses in Spanish literature and culture)

Advanced research in methods of literary analysis of discourse. Emphasizes theoretical and practical frameworks within which representative texts are analyzed and interpreted from differing perspectives.

SPAN 8212. Spanish Theater of the 16th Century: Drama up to Lope. (3 cr; Prereq–5xxx courses in Spanish literature and culture)

Medieval origins of drama to La Celestina (1499–1502), pastoral dialogues, crossover plays of Spanish and Portuguese dramatists, popular theater up to emerging public and private theaters under Italian influence. Rojas, Encina, Vicente, Naharro, Cervantes, and new tragedians.

SPAN 8223. The Poetry of the Spanish Golden Age. (3 cr; Prereq–5xxx courses in Spanish literature and culture)

New Spanish poetic forms, from Garcilaso de León, mystics, and San Juan to Baroque trends by
Spanish and Portuguese (SPPT)

Department of Spanish and Portuguese Studies

College of Liberal Arts

SPPT 5930. Selected Topics in Hispanic and Lusophone Cultural Discourse. (3 cr [max 9 cr]; A-F or Aud. Prereq—Reading knowledge of Spanish and Portuguese) Cultural discourses in Spanish- and Portuguese-speaking areas. Historical intersections/divergences. Taught in Spanish or Portuguese, and in English when cross-listed. Topics specified in Class Schedule.

SPPT 5999. The Teaching of College-Level Spanish: Theory and Practice. (3 cr; Prereq—Grad or #) Theoretical grounding in the general principles of second language acquisition and guidance with their practical applications to the teaching of first- and second-year Spanish at the college-level.

SPPT 6400. Topics in Modern Hispanic and Lusophone Culture. (3 cr [max 9 cr]; Prereq—Three 5000 SPPT or PORT courses) Advanced research in methods of analysis of cultural products, including but not limited to literature. Emphasizes historical, ideological, and theoretical frameworks within which representative texts/events may be interpreted.

SPPT 6920. Cross-Cultural Issues in Hispanic and Lusobo-Lusophone Cultural Discourses. (3 cr [max 9 cr]) Comparative study of literary and cultural production in historical periods when economic, social, political, and ideological bonds among Hispanic and Lusophone countries were intensified. Topics specified in [Class Schedule].

Speech-Language-Hearing Sciences (SLHS)

College of Liberal Arts


SLHS 4801. Counseling and Professional Issues. (3 cr; Prereq—[¶ 8720 or ¶8820], grad student] recommended) Basic counseling principles and current professional issues in communication disorders. Application of counseling theory to clinical practice. Analysis of regulation, practice, and future direction of communication disorders.

SLHS 5402. Assessment and Treatment in Speech-Language Pathology. (3 cr; A-F or Aud. Prereq—Grad student or #) Introduction to clinical methods/issuses in communication disorders. Professional/legal mandates, collection/analysis of clinical data, principles/models of intervention with adults/children, clinical reporting.

SLHS 5501. Fluency and Phonological Disorders. (3 cr; Prereq—Grad student or #) Description, nature, and treatment of fluency disorders in children/adolescents. Involvement in therapeutic/research activities.


SLHS 5603. Language and Cognitive Disorders in Children. (3 cr; Prereq—3305 or CDIS 3305 or equiv or grad student or #) Language assessment, teaching procedures used with children/adolescents. Procedures apply to children who face language disabilities such as developmental delays, autism, learning disabilities.

SLHS 5605. Language and Cognitive Disorders in Adults. (3 cr; Prereq—3302, 4301) or [CDIS 3302, CDIS 4301] or §) Neurogenic communicative and cognitive disorders in adults, including aphasia, right-hemisphere syndrome, traumatic brain injury, and dementia. Consideration of Neurologic substrates, assessment and diagnosis, and clinical intervention.

SLHS 5606. Introduction to Augmentative and Alternative Communication. (3 cr) Description of the range of augmentative and alternative communication applications for persons with developmental and acquired disabilities.

SLHS 5607. Electronic Communication Aids. (3 cr; Prereq—5606 or #)

SLHS 5608. Clinical Issues in Bilingualism and Cultural Diversity. (3 cr; A-F only. Prereq—3303 or equiv or #) Topics in cultural diversity, bilingualism, and second language learning needed for clinical competency in speech-language pathology. Basic/applied issues across a broad range of culturally/linguistically diverse populations.

SLHS 5801. Audiolologic Assessment I. (3 cr; Prereq—4801 or CDIS 4801 only) Basic audiometric battery, including pure tones, speech, masking, and inimmittance in adults. Industrial audiometry, otacoustic emissions.

SLHS 5802. Hearing Aids I. (3 cr; Prereq—3303, 4801) or [CDIS 3305, CDIS 4801] or #) Survey of modern hearing aids including history of development, electroacoustic functions, clinic and laboratory measurement techniques, sound field acoustics, techniques for selection.

SLHS 5803. Hearing Loss in Children: Diagnosis. (3 cr; Prereq—4801 or CDIS 4801 or #) Behavioral, physiological approaches to assessment and identification, development of the auditory mechanism, etiologies of hearing losses in infants, children, selection of sensory aids, principles of case management with children and families.

SLHS 5804. Cochlear Implants. (3 cr; A-F or Aud. Prereq—4802, 5801, 5802) or [CDIS 4802, CDIS 5801, CDIS 5802 or #) Implantable auditory prostheses. History of device development, including cochlear implants and auditory brainstem implants. Signal processing. Techniques for selection, fitting, and rehabilitation. Behavioral/physiological changes across lifespan.


SLHS 5806. Auditory Processing Disorders. (2 cr; A-F or Aud. Prereq—4802 or CDIS 4802) Normal/disordered auditory processing abilities. Anatom/physiology of central auditory pathway, assessments to evaluate auditory processing skills, techniques to address auditory processing weaknesses. Current/historical theories/controversies surrounding auditory processing assessment.


For definitions of course numbers, abbreviations, and symbols, see page 169.
Courses

SLHS 5808. Hearing Disorders. (3 cr; A-F or Aud. Prereq–4801 or [CDIS 8801, CDIS 8802]) Disorders of auditory system, including anatomical, physiological, perceptual, and audiological manifestations of pathologies affecting hearing.

SLHS 5810. Laboratory Module in Audiology. (1-2 cr; [max 5 cr]; Prereq–4801 or CDIS 4801 or 4810) Intensive study of clinical methods in audiology. Supplements didactic courses in audiology curriculum. Laboratory study, individually or in small groups.

SLHS 5820. Clinical Research and Practice: Grand Rounds. (1-6 cr; [max 6 cr]; S-N or Aud. Prereq–4801 or CDIS 4801 or equiv or #) Students participate in group discussions of current professional issues in audiology. Case presentations, guest presentations on current technology, clinical/ research ethics. Group meets for an hour weekly with faculty coordinator who leads discussion. Integrates academic/clinical education.

SLHS 5900. Topics: Communication Disorders. (1-3 cr; [max 6 cr]) Topics listed in Speech-Language-Hearing Sciences office.

SLHS 5993. Directed Study. (1-12 cr; [max 18 cr]; Prereq–#) Directed readings and preparation of reports on selected topics.

SLHS 6333. FTE: Masters. (1 cr. No grade. Prereq–Masters's student, adviser and DGS consent)

SLHS 8410. Seminar: Research. (3 cr) Advanced study exploring application of experimental and quasi-experimental research designs used in single-subject and group research.

SLHS 8420. Seminar: Teaching. (3 cr; max 9 cr; Prereq–Grad com dis major) Advanced study to prepare doctoral students for careers in undergraduate and graduate teaching.

SLHS 8430. Proseminar in Speech-Language-Hearing Sciences. (1 cr [max 10 cr]; S-N only. Prereq–Intended for students in Department of Speech-Language-Hearing Sciences) Presentations/discussions led by faculty and PhD students in the department, based on research or issues in the discipline.

SLHS 8444. FTE: Doctoral. (1 cr. No grade. Prereq–Doctoral student, adviser and DGS consent)

SLHS 8501. Interdisciplinary Management in Cleft Palate and Craniofacial Disorders. (3 cr; Prereq–3305 or CDIS 3305 or #) Communication problems associated with cleft palate and craniofacial disorders within interdisciplinary context; structural bases for speech problems, and physical and behavioral approaches to speech treatment; interdisciplinary medical and dental concerns and management.

SLHS 8530. Seminar: Speech. (3 cr [max 12 cr]) Advanced study and analysis of research in speech science and speech pathology.

SLHS 8602. Traumatic Brain Injury. (3 cr; Prereq–[3302, 4301] or [CDIS 3302, CDIS 4301] or #) Survey of communicative/cognitive disorders in adults who have traumatic brain injuries. Demographics, neuropathologic substrates, assessment/ diagnosis, clinical applications.

SLHS 8630. Seminar: Language. (3 cr [max 12 cr]) Advanced study and analysis of research in language acquisition, language science, and language disorders.

SLHS 8666. Pre-Thesis Credits. (1-6 cr [max 12 cr]) No grade. Prereq–Doctoral student who has not passed prelim oral; not required consent for 1st/2nd registrations, up to 12 combined cr. A for 3rd/4th registrations, up to 24 combined cr: doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr


SLHS 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

SLHS 8801. Audiologic Assessment I. (3 cr; Prereq–5801 or CDIS 5801 or #) Auditory brainstem response and balance function in adults. Case studies and development of clinical protocols allowing for integration of topics from both courses in this sequence.

SLHS 8802. Hearing Aids II. (3 cr; Prereq–5802 or CDIS 5802 or #) Instrumentation and methods for fitting and evaluating personal hearing aids; ear impression techniques and materials; repair and modification of hearing aids.

SLHS 8803. Signals and Systems in Audiology. (3 cr; Prereq–[3305, 3306, 4801] or [CDIS 3305, CDIS 3306, CDIS 4801] or #) Introduction to electronics, digital signal processing, and calibration of instruments used to assess hearing. Lab sessions on such topics as sound-field calibration, earphone calibration, filters, spectra of transient signals, and use of an artificial mastoid.


SLHS 8806. Audiology Capstone. (1-6 cr [max 6 cr]; S-N or Aud. Prereq–8802, 8807) Students research a case history of patient with an auditory disorder, write paper that summarizes the literature on the disorder, and recommend assessment tools and treatment plans.


SLHS 8820. Clinical Education in Audiology. (1-8 cr [max 24 cr]; S-N or Aud. Prereq–Grad CDIS major) Clinical experience.

SLHS 8830. Seminar: Hearing. (3 cr [max 12 cr]) Advanced study/analytics of research in hearing science and audiology.

SLHS 8840. Audiology Externship. (1-7 cr [max 7 cr]; S-N or Aud. Prereq–[8802, 8807] or [CDIS 8802, CDIS 8807]) Students intern at external clinical setting under supervision of certified audiologist. Entry-level knowledge/skills required for professional practice as clinical audiologist. External internship settings may include hospitals, schools, private otolaryngology practices, hearing aid dispensing practices, industrial settings, and community clinics.

SLHS 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

SLHS 8994. Directed Research. (1-12 cr; [max 18 cr]; Prereq–#) Directed research.

Statistics (STAT)

School of Statistics

College of Liberal Arts

STAT 5021. Statistical Analysis. (4 cr; S&SNC 2211, ESPM 3012, STAT 3011. Prereq–5 or 3011; College algebra or #; Stat course recommended) Intensive introduction to statistical methods for graduate students needing statistics as a research technique.

STAT 5031. Statistical Methods for Quality Improvement. (4 cr; Prereq–3021 or 3022 or 4102 or 5021 or 5102 or 5101 or Math 1272) Random variability/sampling. Controlling statistical process. Shewhart/accumulative charting. Analyzing plant data, trend surface, and variance/design of experiments.

STAT 5041. Bayesian Decision Making. (3 cr; Prereq–4101 or 5021 or 5101 or #) Axioms for subjective probability/utility. Optimal statistical decision making. Sequential decisions/discount tree. Backward induction. Bayesian data analysis.


STAT 5201. Sampling Methodology in Finite Populations. (3 cr; Prereq–3011 or 3021 or 5021 or #) Simple random, systematic, stratified, unequal probability sampling. Ratio, model based estimation. Single stage, multistage, adaptive cluster sampling. Spatial sampling.

STAT 5302. Applied Regression Analysis. (4 cr; Prereq–3022 or 4102 or 5021 or 5102 or #) Simple, multiple, and polynomial regression. Estimation, testing, prediction. Use of graphics in regression. Stepwise and other numerical methods. Weighted least squares, nonlinear models, response surfaces. Experimental research/applications.


STAT 5501. Nonparametric Methods. (3 cr; Prereq–3022 or 4102 or 5021 or 5102 or #) Order statistics. Classical rank-based procedures (e.g., Wilcoxon, Kruskal-Wallis). Goodness of fit. Topics may include smoothing, bootstrap, and generalized linear models.

STAT 5931. Topics in Statistics. (3 cr) Topics vary according to student needs and available staff.

STAT 5932. Topics in Statistics. (3 cr) Topics vary according to students’ needs and available staff.

STAT 5993. Tutorial. (1-6 cr [max 12 cr]; Prereq–#) Directed study in areas not covered by regular offerings.

STAT 8052. Applied Statistical Methods 2: Design of Experiments and Mixed-Effects Modeling. (4 cr; A-F or Aud. Prereq–8051 or #) Classical experimental designs, mixed effect models. How to recognize designs. How to design/analyze experiments. ANOVA for factorial designs, contrasts, multiple comparisons, complete/incomplete block designs, unbalanced data, confounding, fractional factors, response surfaces, nested designs, split-plots, random effects, mixed effects, repeated measures, longitudinal data.


STAT 8111. Mathematical Statistics I. (3 cr; Prereq–5102 or 8102 or #) (|Math 5615, Math 5616| or real analysis), matrix algebra Probability theory, basic inequalities, characteristic functions, and distributions. Multivariate normal distribution. Exponential family. Decision theory, admissibility, and Bayes rules.


STAT 8121. Theories of Inference. (3 cr; Prereq–8102, 8112, or #) Topics vary according to instructor and student interests. Sample topics: conditional distributions and sufficiency; estimation theory; comparison of statistical inference theories; Neyman-Pearson hypothesis-testing theory and its extensions; confidence regions; invariance; nonparametric, sequential, likelihood, and Bayesian inference.

STAT 8131. Predictive Inference. (3 cr; Prereq–8112 or equiv) Traditional frequentist and nontraditional predictive approaches. Bayesian predictive methods and the purpose for which data are used. Theoretical apparatus discussed using a variety of common statistical paradigms. Model selection, comparisons and allocation, perturbation analysis and control.

STAT 8141. Probability Assessment. (3 cr; Prereq–5102) Probability as a language of uncertainty for quantifying and communicating expert opinion and for use as Bayesian prior distributions. Methods for elicitation and construction of subjective probabilities. De Finetti’s coherence, subjective probability models, model-aided elicitation, use of experts.

STAT 8151. Statistical Decision Theory. (3 cr; S-N or Aud. Prereq–8112, Math 6666) Comparison of inferential methods in statistics (including risk comparison, minimaxity, and admissibility) using Wald’s formulation of decision. Formal and proper Bayes rules compared with frequentist inferences. Topics may vary depending on instructor.

STAT 8171. Sequential Analysis. (3 cr; Prereq–8112) Wald’s sequential probability ratio test and modifications. Sequential decision theory. Martingales. Sequential estimation, design, and hypothesis testing. Recent developments.

STAT 8201. Topics in Sampling. (3 cr; S-N or Aud. Prereq–8102 or #) Sampling theory; stratified sampling, ratio estimators, cluster sampling, double sampling, superpopulation theory, Bayesian methods, multiple imputation, nonresponse.

STAT 8311. Linear Models. (4 cr; Prereq–Linear algebra, 5102 or 8102 or #) General linear model theory from a coordinate-free geometric approach. Distribution theory, ANOVA tables, testing, confidence statements, mixed models, covariance structures, variance components estimation.

STAT 8312. Linear and Nonlinear Regression. (3 cr; Prereq–8311) Nonlinear regression: asymptotic theory, Bates-Watts curvatures, super leverage, parameter plots, projected residuals, transform-both-sides methodology, Wald versus likelihood inference. Topics in linear and generalized linear models as they relate to nonlinearity issues, including diagnostics, semi-parametric models, and model assessment.

STAT 8313. Topics in Experimental Design. (3 cr; Prereq–8311) Optimal, Bayes, and nonlinear designs; algorithms for computing designs; sample size; recent developments.


STAT 8333. FTG. Master’s. (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent) Graphical regression, inverse regression graphics, graphs and representation and use of functional data, plots and functions, graphical model assessment.


STAT 8411. Multivariate Analysis. (3 cr; Prereq–8152) Multivariate normal distribution. Inference on the mean, covariance, and correlation and regression coefficients; related sampling distributions such as Hotelling’s $T^2$-squared and Wishart distributions. Multivariate analysis of variance. Principal components and canonical correlation. Discriminant analysis.

STAT 8421. Theory of Categorical Data Analysis. (3 cr; Prereq–8062 or #) Categorical data, multidimensional cross-classified arrays, mixed categorical and continuous data. Loglinear, logit, and multinomial response models. Ordinal responses. Current research topics.


STAT 8450. Introduction to Stochastic Processes with Applications. (3 cr; Prereq–5101 or 8101) Markov chains in discrete and continuous time, renewal processes, Poisson process, Brownian motion, and other stochastic models encountered in applications.


STAT 8666. Doctoral Pre-Thesis Cr. (1-6 cr; Max 12 cr) No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr. A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

STAT 8701. Computational Statistical Methods. (3 cr; Prereq–8311, programming exper) Random variable generation, variance reduction techniques. Robust location estimation and regression, smoothing additive models, regression trees. Programming projects; basic programming ability and familiarity with standard high-level language (preferably FORTRAN or C) are essential.


STAT 8721. Programming Paradigms and Dynamic Graphics in Statistics. (3 cr; Prereq–8062, 8102) Alternative programming paradigms to traditional procedural programming, including object-oriented programming and functional programming. Applications to development of dynamic statistical graphs and representation and use of functional data, such as mean function in nonlinear regression log likelihoods and prior densities in Bayesian analysis.

STAT 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

STAT 8801. Statistical Consulting. (3 cr; S-N or Aud. Prereq–Grad stat major or #) Principles of effective consulting/problem-solving, meeting skills, and reporting. Aspects of professional practice/behavior, ethics, and continuing education.

STAT 8811. Statistical Consulting Practicum. (3 cr [Max 12 cr]; S-N or Aud. Prereq–Statistics grad student or #) Providing (under faculty supervision) statistical support to clients, primarily University researchers. Exercises in problem solving, ethics, listening/communication skills.

STAT 8821. Curricular Practical Training. (1 cr; S-N or Aud. Statistics grad student) A Industrial work assignment using advanced statistical techniques. Grade based on final report and presentation covering work assignment.

STAT 8888. Thesis Credit: Doctoral. (1-24 cr [Max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

STAT 8900. Student Seminar. (1 cr [Max 2 cr]; S-N or Aud. Prereq–Statistics graduate student) Preparation or presentation of seminar on statistical topics.

STAT 8913. Literature Seminar. (1 cr [Max 4 cr]; A-F or Aud. Prereq–Statistics grad major or #) Students will read, present, discuss, and critique current literature/research.

STAT 8931. Advanced Topics in Statistics. (3 cr [Max 12 cr]) Topics vary according to student needs and available staff.

STAT 8932. Advanced Topics in Statistics. (3 cr [Max 12 cr]) Topics vary according to student needs and available staff.

STAT 8933. Advanced Topics in Statistics. (3 cr [Max 12 cr]) Topics vary according to student needs and available staff.

STAT 8992. Directed Readings and Research. (1-18 cr [Max 50 cr]; No grade. Prereq–Max 12 cr per semester or summer; 24 cr combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

STAT 8811. Statistical Consulting. (3 cr; Prereq–8701 or #) Basic numerical analysis for statisticians. Numerical methods for linear algebra, eigen-analysis, integration, and optimization and their statistical applications.

Courses

For definitions of course numbers, abbreviations, and symbols, see page 169.
Courses

Studies in Cinema and Media Culture (SCMC)

Department of Cultural Studies and Comparative Literature

College of Liberal Arts

SCMC 5001. Critical Debates in the Study of Cinema and Media Culture. (4 cr)
Basic concepts in historical/international debates over production/reception of media culture. Emphasizes cinema. Advanced orientation toward intellectual traditions that inform contemporary scholarship.

SCMC 5993. Directed Study. (1-3 cr; max 6 cr)
Guided individual reading or study.

Studies of Science and Technology (SST)

Institute of Technology

SST 8000. Colloquium. (1.5 cr; max 3 cr; S-N or Aud. Prereq–Grad SST minor)
Series of weekly lectures by nationally and internationally known scholars with diverse disciplinary and methodological backgrounds speaking on a variety of issues.

SST 8100. Seminar: Models, Theories, and Reality. (3 cr; Prereq–HSci 8111 or [Phil 8601 or Phil 8602 or Phil 8605] or #)
Students participate in ongoing research on the role of models and theories in science, and prepare and present research papers.

SST 8200. Seminar: Philosophy of the Physical Sciences. (3 cr; max 6 cr; Prereq–#)
Students participate in ongoing research in history, philosophy, and social study of physical sciences and prepare and present research papers.

SST 8300. Seminar: The Biological and Biomedical Sciences. (3 cr; Prereq–HSci 8111 or [Phil 8601 or Phil 8602 or Phil 8605] or #)
Students participate in ongoing research in history, philosophy, and social study of biological and biomedical sciences, and prepare and present research papers.

SST 8400. Seminar: Science, Technology, and Society. (3 cr; Prereq–HSci 8111 or [Phil 8601 or Phil 8602 or Phil 8605] or #)
Students participate in ongoing research on interactions involving science, technology, and society from perspectives of history, philosophy, and social study of science, and prepare and present research papers.

SST 8420. Seminar: Social and Cultural Studies of Science. (3 cr; max 6 cr; §Phil 8600)
Recent work: theoretical and methodological differences among practitioners; selected responses from historians and philosophers of science.

Sumerian (SUM)

Department of Classical and Near Eastern Studies

College of Liberal Arts

SUM 5011. Elementary Sumerian I. (3 cr; Prereq–Adv undergrads with 2 yrs of another foreign lang, grad) Sumerian writing and grammar. Readings from classical Sumerian literary and historical texts.

SUM 5012. Elementary Sumerian II. (3 cr; Prereq–5011) Reading from classical literary and historical texts.

Surgery (SURG)

Department of Surgery

Medical School

SURG 8200. Clinical Surgical Problems in Management. (3 cr; A-F or Aud. Prereq–Grad surg major)
Diagnostic and management instruction in all phases of clinical surgery, inpatient and outpatient.

SURG 8201. Surgery Roentgenological Pathology Conference. (1 cr; A-F or Aud. Prereq–Grad surg major)
Weekly review of surgical patients presenting interesting roentgen and pathological findings. Staff from the Departments of Surgery, Radiology, and Laboratory Medicine and Pathology. Basic science and management principles of the surgical patient.

SURG 8202. Surgical Research. (3 cr; A-F or Aud. Prereq–Grad surg major)
Graduate students undertake original investigation of problems in either experimental or clinical surgery.

SURG 8203. Surgery Complications and Research Conference. (1 cr; A-F or Aud. Prereq–Grad surg major)
Evaluation of surgical patients, including postoperative course. Discussion and critical evaluation of current research problems.

SURG 8207. Transplantation Conference. (1 cr; A-F or Aud. Prereq–Grad surg major)
Interdepartmental discussion and evaluation of current clinical and research problems.

SURG 8235. Applied Statistics. (1 cr; S-N or Aud. Prereq–Grad student in [surgery or experimental surgery or health sciences] or Interactive computer course. Concepts of applied statistics. Examples, problem sets based on surgical research. How to independently set up appropriate experiments and perform basic descriptive/inferential analysis.

SURG 8333. FTE: Master’s. (1 cr; No grade. Prereq–Grad–Master’s student, adviser and DGS consent)

SURG 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

SURG 8666. Doctoral Pre-Thesis Credits. (1-6 cr; max 12 cr)
No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr

SURG 8777. Thesis Credits: Master’s. (1-18 cr; max 50 cr)
No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required (Plan A only)

SURG 8888. Thesis Credit: Doctoral. (1-24 cr; max 100 cr)
No grade. Prereq–Max 18 cr per semester or summer; 24 cr required

Sustainable Agricultural Systems (SAGR)

Department of Agronomy and Plant Genetics

College of Food, Agricultural and Natural Resource Sciences

SAGR 8010. Collegium in Sustainable Agriculture. (2 cr; A-F or Aud. Prereq–Coursework in biological or social sciences that provides intro to ag practices or issues) Forum for University faculty and students, and representatives of the farming community, including farmers, grassroot organizations and businesses, and representatives of state agencies, to engage in discussions on topics related to sustainability of food production.

SAGR 8020. Field Experience in Sustainable Agriculture. (1-4 cr; max 3 cr; S-N or Aud. Prereq–Coursework in biological or social sciences that provides intro to ag practices or issues) 3- to 14-week internship with growers or organizations working with sustainable agriculture issues. Students analyze issues in final written project, oral seminar.

Teaching English as a Second Language (TESL)

Institute of Linguistics, ESL, and Slavic Languages and Literatures

College of Liberal Arts

TESL 5011. Academic Writing in TESOL. (1 cr; S-N or Aud. Prereq–[SJT21], grad ESL student or #)
Research writing conventions in the profession.

TESL 5402. Language Analysis for Teachers of English as a Second Language. (4 cr; Prereq–Ling 3001 or Ling 5001 or #)
Overview of the structure of the English language geared to the needs of teachers of English to speakers of other languages. Study the structures of English from the point of view of second-language speakers as well as native speakers. Phonetics, phonology, morphology, and some aspects of the syntax of the English language. Part of a two-course sequence.

TESL 5404. Language Analysis for Teachers of English as a Second Language. (4 cr; Prereq–Ling 3001 or Ling 5001 or #)
Overview of the structure of the English language geared to the needs of teachers of English to speakers of other languages. Study the structures of English from the point of view of second-language speakers as well as native speakers. More complex structures of English syntax, as well as English semantics, pragmatics, and discourse structures. Second in a two-course sequence.

TESL 5610. Research Methods in Applied Language Study. (3 cr; max 12 cr; Prereq–Ling 5505 or #)
Key issues in second language acquisition/learning research. Focuses on learning a second or foreign language in the classroom.

TESL 5721. Methods in Teaching English as a Second Language. (3 cr; Prereq–Ling 3001 or 5001 or #)
Introduction to methods for teaching English as a second language to adults.

TESL 5722. Practicum in Teaching English as a Second Language. (6 cr; max 12 cr; S-N or Aud. Prereq–[SJT401 or SJT402 or SJT502, ESL major or ESL minor] or #) Observation of, and practice in, teaching English as a second language to adults at college or university level.

TESL 5723. Materials for Teaching English as a Second Language. (3 cr; Prereq–[SJT21, 5722] or #)
Principles for evaluating/preparing materials for teaching second languages as applied especially to English as a second language.

TESL 5724. Intro to Language Assessment. (3 cr; A-F or Aud)
How to engage in meaningful, appropriate, and fair second-language assessment practices; interpret test results; and construct new forms of assessment.

TESL 5900. Topics in Second Language Learning and Teaching. (1-4 cr; max 16 cr)
Topics vary. See Class Schedule.

TESL 5910. Seminar in Teaching English as a Second Language. (3 cr; max 9 cr)
Topics related to second language learning/teaching. Focuses on learning/teaching English as a second language. Topics specified in Class Schedule.

TESL 5993. Directed Studies. (1-4 cr; max 9 cr; Prereq–#)
Directed study for teaching English as a second language.
Courses

TESL 8751. Genre Analysis for Second Language Learning. (3 cr; Prereq–5401 or 5402 or 5271 or #) Critical review of literature on genre analysis. Languages for specific purposes. Focuses on English. Registers used in fields such as engineering, nursing, and business. Students gather data, write research reports.

TESL 8777. Thesis Credits: Masters'. (1-18 cr; max 50 cr; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

Theatre Arts (TH)

Department of Theatre Arts and Dance

College of Liberal Arts

TH 5100. Theatre Practicum. (1-4 cr; max 20 cr; Prereq–#; 4 cr of 5100 for undergrads) Individual creative projects in production of approved plays as an actor, director, dramaturgy, or playwright. (See 5500 for design practicums.)


TH 5117. Performance and Social Change. (3 cr; A-F or Aud. Prereq–Jr or sr or grad student) Reading, writing, research, presentations and workshops explore activist performance projects. Theories of social formation and ideology provide framework to discuss/animate theater’s potential for social change.

TH 5178. History and Theory of Performance Conventions. (3 cr; A-F or Aud. Prereq–[1322, 3171 or 3172] or grad student) Draws on visual materials, practical exercises, and theories of spatial representation in context of political/social function. Historical/cross-cultural overview of performance conventions and theatrical space from City of Dionysia to site-specific happenings of 20th century.

TH 5179. Text and Performance. (3 cr; A-F or Aud. Prereq–[1322, 3171 or 3172] or grad student) How to read texts toward performance in various dramatic/nondramatic material. Method of unlocking metaphorical energy of texts. Vocabulary/techniques of analysis that transform text from page to stage.

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

TH 5182. Contemporary Black Theatre: 1960–Present. (3 cr; §AFRO 5182) Essays, plays, playwrights, and theatres that have contributed to contemporary Black theatre. From the beginning of the Black Arts Movement to the present.

TH 5355. Puppetry: Techniques and Practice in Contemporary Theatre. (3 cr; Prereq–[5315 or 5313] or grad student) Fundamentals of puppet and object theater/ performance are introduced through traditional/contemporary puppetry forms. Focuses on object theater, toy theater, hand puppets, and shadow/ Bunraku-style puppets. Readings, in-class screenings of videos/slides. Students build/create series of short works for in-class performance.

TH 5500. Theatre Design Practicum. (1-3 cr [max 20 cr]; Prereq–3515 or #) Individual projects in production of approved plays as a designer of scenery/properities, costumes, lighting, or sound. (See 5100 for other creative practicums.)

TH 5510. Drawing, Rendering, and Painting for the Theatre Designer I. (3 cr; Prereq–3515 or grad or #) Development of skills necessary for presentation of theatre scene/costume designs. Materials, layout, and techniques in scene painting. Basic drawing/graphic skills.

TH 5515. Design Composition and Collaboration. (3 cr; Prereq–grad or 3515, 3711, #) Classical composition of art and its application to stage design and directing through the collaborative process.

TH 5520. Scene Design. (3 cr [max 9 cr]; Prereq–3515 or grad or #) Conceiving/communicating design ideas in both two-dimensional sketches and three-dimensional models for theatre and allied venues. Drafting.

TH 5530. Costume Design. (3 cr [max 9 cr]; Prereq–3515 or grad or #) Theory and process of costume design for theatrical productions (e.g., dance, opera, film) through hypothetical productions.

TH 5540. Lighting Design for the Theatre. (3 cr [max 9 cr]; Prereq–3515 or grad or #) Design aesthetics and exploration of design for various stage forms and venues. Development of the lighting plot and paperwork; use of the computer in lighting design.

TH 5545. Stage Lighting Technology. (3 cr; Prereq–3515 or grad or #) The lighting technician’s skills and crafts: equipment, techniques, control operation, wiring, and maintenance.

TH 5550. Video Project. (3 cr [max 6 cr]; Prereq–[4450 or 4560 [preferred], #] Students participate in a video-shoot project serving in various positions, including camera operator, gaffer, grip, audio engineer, cast, and possibly director and director of photography.

TH 5551. Editing and Post Production for Video and Film. (3 cr; Prereq–#) Students manipulate software and other technologies used in post production. Editing, audio, image manipulation.

TH 5553. Video Production Design and Aesthetics. (3 cr; Prereq–4553 or #) Use of technologies in video/film in making a statement or communicating an idea/emotion. Creativity, sensitivity to an audience. Students explore different creative uses of technologies/medium.

TH 5554. Multimedia Production for Live Performance. (3 cr; Prereq–5553 or #) Use of multimedia production technologies in actual production. Students apply knowledge/skill in conjunction with an artistic team on a production and are an integral part of the development/realization of that production.

TH 5556. Audio Engineering. (3 cr; Prereq–4556 or #) Mixing/recording technologies specific to music and dramatic dialogue. Students explore recording different styles of music. Hands-on experience in recording bands and doing final mixes to a demo CD. Field trips to professional studios and club/concert recordings.

TH 5558. Audio Systems Analysis and Installation. (3 cr; Prereq–4555 or #) Analyzing, designing, developing specifications, and installing sound systems. Students work from client program lists, with given resources and given spaces, to arrive at best possible audio system. Hands-on experience.

TH 5559. Sound Design for Performance. (3 cr; Prereq–4555 or #) Audio technology/psychology, their impact on audience in a performance. Communication, design process, psychoacoustics, script analysis.

TH 5560. Drawing, Rendering, and Painting for the Theatre Designer II. (3 cr; Prereq–3515 or grad or #) Development of skills necessary for presentation of theatre scene/costume designs. Materials, layout, and techniques in scene painting. Rendering and scene painting skills.

TH 5570. Properties/Scenery Technology. (1-3 cr [max 15 cr]; Prereq–3515 or grad or #) Management, structures, upholstery, mask-making, furniture construction, stage mechanics, soft properties, faux finishes. Topics specified in Class Schedule.

TH 5580. Costume Technology. (3 cr [max 15 cr]; Prereq–3515 or grad or #) Fabric enhancement techniques, masks, wig-making, millinery, makeup prosthetics, pattern drafting, and draping. Topics specified in Class Schedule.

TH 5590. Theatre Technology Practicum. (1-3 cr [max 15 cr]; Prereq–3515, # or grad student) Individual creative project in technology/craft area of theatre. Practical work in costume, lighting, makeup, props, scenery, sound, or theatre management.

TH 5711. Advanced Stage Direction. (3 cr; Prereq–[4711 or 4714, #] or grad student) Realistic/nonrealistic dramatic forms. Theory/technique of rehearsal. Production problems. Includes directing of three one-act plays.

TH 5713. Theory and Practice of Performance. (3 cr; A-F or Aud. Prereq–[3171, 3171, 3172, 3172 or #]) Role of myth in performance. Students choose a myth and study its iconography, tracing its journey in painting, sculpture, music, and other texts that accumulated around it throughout history. Course culminates in creation of a non-traditional performance score that embodies/reveals energies of contemporary culture within ancient metaphor of a chosen myth.

TH 5715. Actor-Director Collaboration. (3 cr; Prereq–grad or 3322, 3711) Applying advanced acting and directing technique to an artistic, collaborative process that promotes flexibility and creativity. Actors and directors are exposed to a challenging range of roles, styles, and scenes.


TH 5725. The Alchemy of an Object. (3 cr; Prereq–[1322, 3171, 3172 or 3172] or grad student) Field trips to professional studios and club/concert venues to meet guest professionals from Twin Cities arts/funding communities.

TH 5726. The Drama of Myth. (3 cr; Prereq–[1322, 3171, 3172] or grad student) Theories, practicalities, and techniques for rehearsal/performance. Organizing/managing various types of performance venues.

TH 5730. Properties/Scenery Technology. (3 cr; §AFRO 5181) Use of multimedia production technologies in actual production. Students apply knowledge/skill in conjunction with an artistic team on a production and are an integral part of the development/realization of that production.

TH 5731. Project Management. (3 cr; Prereq–3171, 3172, 3178 or #) Stage object as vehicle for investigating role of drama in culture from Middle Ages to present. Object as first connection that dramatic text makes with material world. Object as culturally inscribed link between language of drama and world of action in a historically given moment. Object as metaphor of cultural praxis.

TH 5732. Writing About Objects. (3 cr; Prereq–3171, 3172, 3178, 3172 or #) Stage object as vehicle for investigating role of drama in culture from Middle Ages to present. Object as first connection that dramatic text makes with material world. Object as culturally inscribed link between language of drama and world of action in a historically given moment. Object as metaphor of cultural praxis.

TH 5733. Writing About Objects. (3 cr; Prereq–3171, 3172, 3178, 3172 or #) Stage object as vehicle for investigating role of drama in culture from Middle Ages to present. Object as first connection that dramatic text makes with material world. Object as culturally inscribed link between language of drama and world of action in a historically given moment. Object as metaphor of cultural praxis.

For definitions of course numbers, abbreviations, and symbols, see page 169.
TH 5760. Advanced Stage Management. (2-3 cr [max 3 cr]; Prereq–5716 or 5718; 1-4 cr max for undergrads) Practical experience in stage management for specific productions of the University Theatre with emphasis on rehearsal and performance.

TH 5780. Advanced Topics in Arts Management. (2-4 cr [max 6 cr]; Prereq–5718) Students apply non-profit arts management theories/techniques learned in 5718. Marketing/audience development, fundraising and grant writing strategies, and financial management of a non-profit arts organization.

TH 5905. Topics in Theatre. (1-4 cr [max 20 cr]) Topics specified in Class Schedule.

TH 5993. Directed Study. (1-5 cr [max 20 cr]; Prereq–6 Th; #, Δ) Guided individual reading or study.

TH 8100. Theatre Practicum. (1-4 cr [max 20 cr]; Prereq–#) Individual creative projects in production of approved plays as an actor, director, dramaturg, or playwright (see 5900 for design practicums).

TH 8102. Theatre Historiography. (3 cr) Current trends in historiography; research strategies and methods.

TH 8111. History and Theory of Western Theatre: Ancient World and Early Medieval. (3 cr) History, theories, arts, and crafts of western theatre from the ancient world to the present.

TH 8112. History and Theory of Western Theatre: Medieval Through Renaissance. (3 cr) History, theories, arts, and crafts of western theatre from the ancient world to the present.

TH 8113. History and Theory of Western Theatre: National Theatres to the French Revolution. (3 cr) History, theories, arts, and crafts of western theatre from the ancient world to the present.

TH 8114. History and Theory of Western Theatre: Enlightenment Through Naturalism. (3 cr) History, theories, arts, and crafts of western theatre from the ancient world to the present.

TH 8115. History and Theory of Western Theatre: 20th Century Through World War II. (3 cr) History, theories, arts, and crafts of western theatre from the ancient world to the present.

TH 8116. History and Theory of Western Theatre: 20th Century From 1945 to the Present. (3 cr) History, theories, arts, and crafts of western theatre from the ancient world to the present.

TH 8120. Seminar. (3 cr [max 12 cr]) Selected research topics from various theatre fields and periods. Sample topics: Border Crossings—Theatre History and Representation; The Theatre and Drama of the Third Reich, 1927-1944.

TH 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required) (Plan A only)

Terapeutic Radiology (TRAD)

Department of Therapeutic Radiology

Medical School

TRAD 8204. Tumor Clinic Conference. (0 cr)

TRAD 8240. Radiation Therapy Conference. (0 cr)

TRAD 8310. Fundamentals of Radiation Therapy. (1 cr)

TRAD 8315. Radiation Therapy Pathology. (1 cr)

TRAD 8320. Radiation Therapy Treatment Planning Problems. (1 cr)

TRAD 8325. Radiation Therapy Pediatrics Oncology. (1 cr)

TRAD 8350. Research: Radiation Therapy. (1-15 cr [max 15 cr])

TRAD 8450. Research: Radiation Biology. (1-15 cr [max 15 cr])

TRAD 8550. Research: Radiological Physics. (1-15 cr [max 15 cr])

Toxicology (TXCL)

College of Veterinary Medicine

TXCL 5000. Directed Research in Toxicology. (1-4 cr [max 16 cr]; A-F or Aud. Prereq–#) Special project that addresses specific issue in toxicology. Under guidance of faculty member.

TXCL 5011. Principles of Toxicology. (2 cr; A-F or Aud. Prereq–Grad toc major or #) Introduction to fundamentals of poisoning in individuals and the environment, assessment of potential health hazards, and application of toxicology in various professional careers.

TXCL 5195. Veterinary Toxicology. (3 cr; A-F or Aud. §CVM 6195. Prereq–Grad student or #) Toxicology of minerals, pesticides, venoms, and various toxins. Identification of poisonous plants. Recognition, diagnosis, and treatment of animal poisons.

TXCL 5545. Introduction to Regulatory Medicine. (2 cr; A-F or Aud. §CVM 6545. Prereq–Grad student or #) Explanation of products requiring pre-market approval and those that may be marketed without approval. Post-market surveillance. Adverse reactions, removal of product from market.
Veterinary Medicine, Graduate (VMED)

College of Veterinary Medicine

VMED 5080. Problems in Veterinary Epidemiology and Public Health. (1-3 cr; max 3 cr; A-F or Aud)
Individual study on problem of interest to epidemiology or public health student.

VMED 5082. Diagnostic Epidemiology of Infectious Diseases. (2 cr; A-F only; Prereq–Statistics course or #)

VMED 5090. Seminar: Veterinary Epidemiology. (1 cr; max 3 cr; S-N or Aud. Prereq–Veterinary Medicine grad student)
Each student leads at least one seminar. Reviews of current research, literature reviews, and technique development. Students and participating faculty participate in presentation, discussion, and administration of the seminars.

VMED 5093. Directed Studies in Population Medicine. (1-4 cr; max 8 cr; A-F or Aud. Prereq–Grad student, #)
Directed studies arranged between student and instructor.

VMED 5165. Surveillance of Foodborne Diseases and Food Safety Hazards. (2 cr; SPUBH 6181. Prereq–SPUBH 5330, [professional school or grad student]) or #)

VMED 5190. Seminar and Presentation Development for Graduate Students. (2 cr; S-N only)
Skills needed to research, organize, develop, and deliver an oral or written presentation or to assist in finding, compiling, and organizing information for presentations, theses, or papers suitable for publication.

VMED 5193. Dairy Decision Making in a Financial Context. (2 cr; A-F or Aud. Prereq–Earned DVM, #)
Economic/decision making principles applied to commercial dairy farms in North America. Economic techniques, decision making under financially constrained conditions. Financial evaluation of a dairy operation. Modules assigned, written work submitted via the Internet, discussions at online course site.

VMED 5210. Advanced Large Animal Physiology I. (1-3 cr; max 6 cr)
Review of large animal physiology at level needed for specialty board certification or beginning research. Students present topics in physiology and supplement reading with clinical case material or journal articles.

VMED 5211. Advanced Large Animal Physiology II. (1-3 cr; max 3 cr; A-F or Aud. Prereq–5210 recommended)
Review of large animal physiology at level needed for specialty board certification or beginning research. Students present topics in physiology and supplement reading with clinical case material or journal articles.

VMED 5212. Large Animal Diagnostic Ultrasonography. (1 cr; A-F or Aud. Prereq–)
Fundamentals of diagnostic ultrasound in large animal patient. Ultrasonography of the equine limbs/joints, large animal abdomen/thorax. Lectures, lab.

VMED 5232. Comparative Clinical Veterinary Dermatologic Pathology. (2 cr; max 2 cr; S-N only. Prereq–VMED degree or foreign equiv)
Microscopic pathology of basic dermatologic reactions and of variable disease states.

VMED 5240. Advanced Small Animal Pathobiology I. (1 cr; A-F only. Prereq–VMED grad student, [DVM or foreign equiv] degree)
This course is intended for student pursuing residency and graduate training in companion animal veterinary medicine. The course is designed to provide an overview of the biology, physiology, pathology, and medicine of the disciplines relevant to veterinary medicine graduate students and residents working with companion animals. Objectives include students increasing their depth of understanding of the underlying pathogenesis and treatment of diseases of companion animals, and developing hypotheses that could be translated into clinical research.

VMED 5241. Advanced Small Animal Pathobiology II. (1 cr; A-F only. Prereq–VMED grad student, [DVM or foreign equiv] degree)
Overview of biology, physiology, pathophysiology, and medicine of disciplines. Underlying pathogenesis/treatment of diseases of companion animals. Developing hypotheses that could be translated into clinical research.

VMED 5242. Advanced Small Animal Pathobiology III. (1 cr; A-F only. Prereq–VMED grad student, [DVM or foreign equiv] degree)
Overview of biology, physiology, pathophysiology, and medicine. Underlying pathogenesis/treatment of diseases of companion animals. Developing hypotheses that could be translated into clinical research.

VMED 5274. Diseases of the Urinary System. (1 cr; A-F or Aud. Prereq–)
Expands on disorders of small animal urinary system. Introduction to clinical cases and to additional disorders.

VMED 5291. Independent Study in Veterinary Medicine. (2 cr; Prereq–DVM, #)
Arranged independent study in a clinical area of veterinary medicine.

VMED 5293. Directed Studies in Comparative Medicine and Pathology. (1-4 cr [max 8 cr]; A-F or Aud. Prereq–Grad student, #)
Directed studies arranged between student and instructor.

VMED 5295. Problems in Large Animal Clinical Medicine/Surgery and Theriogenology. (1 cr; max 3 cr; A-F or Aud. Prereq–VMED grad student, possess DVM)
Hospital cases using standardized format, audiovisual aids. Review literature pertaining to case. One or two cases presented by enrolled participants per month.

VMED 5310. Topics in Veterinary Clinical Pathology. (1 cr; max 2 cr; S-N only. Prereq–Grad student in CVM)
Modified rounds format. Cases from VMC used to explore cytology with associated chemistry/hematology data. Attendees/clinicians can request lab topics for discussion. Past topics have included lab measurement of chemical analyses, test sensitivity/ specificity (e.g., ethylene glycol test, FELV test), lab testing for infectious agents.

VMED 5319. Veterinary Gross Pathology. (1 cr; max 3 cr; S-N only. Prereq–Grad student in CVM)
Diagnostic gross lesions of tissues. Evaluating images from wide variety of animals submitted to lab. Mock exams. Students prepare two in-depth reviews on topics covered during in course.

VMED 5320. Advanced Veterinary Systemic Pathology I. (3 cr; A-F only. Prereq–Grad student in VMED or [CVM, [DVM degree or foreign equiv] or #)
Students review/summarize topics in systemic pathology using veterinary pathology textbooks and relevant updates from pathology and veterinary medical journals. Diagnostic cases in alimentary, respiratory, urinary, cardiovascular, and hematopoietic system pathology. Students give 10-15 presentations with handouts for other students.

VMED 5321. Advanced Veterinary Systemic Pathology II. (3 cr; A-F only. Prereq–Grad student in VMED or [CVM, DVM degree or foreign equiv] or #)
Students review/summarize topics in systemic pathology using veterinary pathology textbooks and relevant updates from pathology and veterinary medical journals. Representative diagnostic cases in endocrine, reproductive, musculoskeletal, nervous, special senses, and integumentary system pathology. Student give 10-15 presentations with handouts for other students.

VMED 5330. Veterinary Descriptive Histopathology. (1 cr [max 2 cr]; Prereq–Grad student in VMED or [CVM, [DVM degree or foreign equiv] or #)
Weekly, one-hour microscopic slide presentations, reviews on wide variety of diseases in domestic/non-domestic animals. Students present microscopic slide cases and prepare discussions about disease entities, differential diagnoses, and ancillary tests.

VMED 5380. Veterinary Diagnostic and Comparative Pathology. (2 cr [max 4 cr]; A-F only. Prereq–[DVM/VMD or equiv degree] from a foreign institution, [resident or grad student] in [veterinary anatomic or clinical pathology]) Diagnostic skills in gross/microscopic pathology. Students participate in necropsy services of veterinary diagnostic lab, examine carcasses from wide variety of animals. Interpretation of gross/microscopic lesions done under supervision of faculty pathologists. Students assist in supervision of veterinary students on the senior necropsy rotation.

VMED 5395. Problems in Veterinary and Comparative Pathology. (3 cr; A-F only. Prereq–Grad student in CVM, [DVM degree or foreign equiv])
Case material in Veterinary Diagnostic Lab. Students investigate pathogenesis/epidemiology of selected disease condition or case-related problem agreed upon with faculty pathologist.

VMED 5410. Scientific Writing and Speaking. (2 cr; A-F only. Prereq–Grad student in health sciences)

VMED 5420. Molecular Epidemiology of Infectious Disease. (3 cr; A-F only. Prereq–Basic course in microbiology)

VMED 5493. Directed Studies in Infectious Disease. (1-4 cr; max 8 cr; A-F or Aud. Prereq–Grad student, #)
Directed studies arranged between student and instructor.

VMED 5496. Training in Swine Production and Management. (4 cr; S-N only. Prereq–VMED grad student or #)
Production module introduces techniques/protocols for swine production system operation. Research module covers applied research trials for viral/bacterial pathogens in pigs.

VMED 5506. Swine Diseases and Diagnostics. (2-3 cr)
Review of recent advances in swine diseases; farm visits for on-farm disease diagnostics and control programs.

VMED 5510. Companion Animal Oncology. (2 cr; S-N or Aud. Prereq–VMED, #)
Principles of veterinary oncology. Biologic behaviors, treatments, and prognosis of neoplastic disorders.

VMED 5621. Principles of Veterinary Anesthesiology. (2 cr; A-F only. Prereq–VMED grad student, [DVM degree or foreign equiv], instr consent)
In-depth training in principles of veterinary anesthesiology. Lectures, anesthesia labs, presentations by students.

VMED 5670. Bovine Surgery Practicum. (2 cr; S-N only. Prereq–VMED grad student, [DVM or equiv foreign degree] or #)
Intensive training in ruminant surgery. Evaluation of food animal surgery principles, hands-on laboratory components.

For definitions of course numbers, abbreviations, and symbols, see page 169.
VMED 5691. Independent Research in Veterinary Anesthesiology. (1-3 cr [max 6 cr]; A-F or Aud. Prereq–Grad student, #) Independent research supervised by faculty member.

VMED 5693. Directed Studies in Surgery/Radiology/Anesthesiology. (1-4 cr [max 8 cr]; A-F or Aud. Prereq–Grad student, #) Directed studies arranged between student and instructor.

VMED 5720. Small Animal Orthopedic Radiology. (2 cr; Prereq–#) Roentgen signs of common bone diseases of small animals.

VMED 5722. Large Animal Orthopedic Radiology. (1-2 cr [max 2 cr]; Prereq–#) Roentgen signs of common bone diseases of large animals. Emphasizes the horse.

VMED 5893. Directed Studies in Theriogenology. (1-4 cr [max 8 cr]; A-F or Aud. Prereq–Grad student, #) Directed studies arranged between student and instructor.

VMED 8090. Epidemiology of Zoonoses and Diseases Common to Animals and Humans. (3 cr; A-F or Aud. Prereq–Epidemiology and infectious disease course or #) Major human zoonotic diseases, methods of transmission, diagnosis, control, and prevention.

VMED 8134. Ethical Conduct of Animal Research. (2 cr; A-F or Aud. 6ÅRIC 8134. Prereq–[Grad or professional school student or #) Ethical considerations in use of animal subjects in agricultural, veterinary, and biomedical research. Federal, state, and University guidelines relating to proper conduct for acquisition/use of animals for laboratory, observational, epidemiological, and clinical research. Regulatory requirements. Bases for proper conduct. Societal impact on scientific investigations utilizing animal subjects.

VMED 8195. Pre-Harvest Food Safety and Public Health Aspects of Food Animal Production. (1-3 cr [max 3 cr]) Includes presentations and discussions on on-farm HACCP principles and prudent use of antibiotics.

VMED 8201. Advanced Small Animal Veterinary Medicine. (1-5 cr [max 5 cr]; A-F or Aud. Prereq–#) Discussions of diseases of organs or systems in animals, including degenerative, psychological, anomalous, metabolic, nutritional, neoplastic, immune, inflammatory, toxic, and traumatic disorders.

VMED 8202. Internal Medicine in Small Companion Animals. (1-3 cr [max 3 cr]; A-F or Aud. Prereq–#) Lectures, assigned readings, and discussions on internal medical problems of dogs and cats.

VMED 8203. Advanced Diagnosis and Therapeutics of Animal Disease. (1-2 cr [max 2 cr]; A-F or Aud. Prereq–#) Detailed examination, treatment, and discussion of naturally occurring disease in patients admitted to Veterinary Medical Center.

VMED 8210. Seminar: Veterinary Medicine. (1 cr; Prereq–#) Participation and presentations of regularly scheduled seminars about internal medicine.

VMED 8220. Advanced Nephropyelogenic Clinical. (1-3 cr [max 3 cr]; A-F or Aud. Prereq–#) Clinical investigation of naturally occurring urinary diseases in patients admitted to Veterinary Medical Center.

VMED 8230. Medical Conference. (1-3 cr [max 3 cr]; Prereq–#) Participation in weekly conference about internal medical disorders.

VMED 8250. Problems in Acid-base, Electrolyte, and Fluid Metabolism. (2-4 cr [max 4 cr]; A-F or Aud. Prereq–#) Clinical problems and physiology of acid-base, electrolyte, and fluid disorders of dogs and cats.

VMED 8292. Journal Club: Large Animal Internal Medicine. (1 cr [max 3 cr]; A-F or Aud. Prereq–#) Students/faculty keep abreast of current literature in large animal internal medicine. Students critically evaluate the literature.


VMED 8294. Research Studies in Nephropyelogenic and Urology. (1-3 cr [max 3 cr]; Prereq–#) Individual research on selected problems.

VMED 8295. Advanced Large Animal Veterinary Medicine. (1-3 cr [max 6 cr]; A-F or Aud. Prereq–#) Discussions of diseases of organs or systems in animals in a clinical setting.

VMED 8333. FTE: Master’s. (1 cr; No grade. Prereq–Master’s student, advisor and DGS consent)

VMED 8360. Evidence-based Medicine. (2 cr; A-F or Aud. Prereq–#) Use of medicine literature in clinical problem solving.

VMED 8393. Medical Conference. (1-3 cr [max 6 cr]; A-F or Aud. Prereq–#) Medical, surgical, or obstetrical cases supported by anatomic, bacteriologic, pathologic, physiologic, pharmacologic, and radiologic evaluations whenever applicable.

VMED 8394. Research in Veterinary Medicine. (1-3 cr [max 3 cr]; Prereq–#) Research problems relating to any aspect of internal medicine or to the various systems in animals.

VMED 8396. Diagnostic and Therapeutic Techniques of Animal Diseases. (1-3 cr [max 6 cr]; Prereq–#) Detailed examination, discussions, and treatments of cases of animal diseases in a clinical setting.

VMED 8444. FTE: Doctoral. (1 cr; No grade. Prereq–Doctoral student, advisor and DGS consent)

VMED 8492. Seminar: Infectious Diseases and Swine Medicine. (1-2 cr [max 2 cr]) Students, faculty, and guest speakers present seminars on current research in diagnosis, control, and treatment of infectious diseases.

VMED 8494. Research in Infectious Diseases. (1-3 cr [max 3 cr]) Directed research.

VMED 8495. Problems in Infectious Diseases. (1-3 cr [max 3 cr]) In-depth discussion on specific problems for various infectious diseases of farm animals.

VMED 8520. Advanced Immunology. (2 cr) Lectures and case presentations.

VMED 8530. Advanced Swine Diseases. (2 cr) Lectures and discussion on advances.

VMED 8592. Infectious Disease Journals: Critical Thinking. (1 cr) Reading and critical discussion of journal articles.

VMED 8593. Advanced Veterinary Virology and Serology. (1-3 cr [max 3 cr]) Discussion and laboratory practice.

VMED 8666. Doctoral Pre-Thesis Credits. (1-6 cr [max 12 cr]) No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr).

VMED 8681. Advanced Small Animal Surgery. (1-3 cr [max 3 cr]) Advanced techniques and procedures.

VMED 8682. Advanced Large Animal Surgery. (1-3 cr [max 6 cr]; A-F or Aud. Prereq–DVM or equiv degree, #) Surgery of various systems in large animals, with preoperative and postoperative evaluation and management.

VMED 8683. Surgery of the Gastrointestinal System. (2-4 cr [max 4 cr]; A-F or Aud. Prereq–#) Advanced techniques and problems.

VMED 8854. Surgical Physiology. (1-3 cr [max 3 cr]) Discussions on pathophysiology of surgical diseases in dogs and cats.

VMED 8865. Neurosurgery. (2-3 cr [max 3 cr]; A-F or Aud) Advanced neurosurgical diseases of small animals amenable to surgical treatment.

VMED 8866. Thoracic and Cardiovascular Surgery. (2-4 cr [max 4 cr]; A-F or Aud) Advanced thoracic and cardiovascular diseases of small animals amenable to surgical treatment.

VMED 8868. New Techniques in Large Animal Surgery. (1-6 cr [max 6 cr]; A-F or Aud. Prereq–DVM or equiv degree, #) Independent research projects.


VMED 8894. Research in Small Animal Surgery. (1-3 cr [max 3 cr]; S-N or Aud)

VMED 8895. Problems in Large Animal Surgery. (1-3 cr [max 6 cr]; A-F or Aud. Prereq–DVM or equiv degree, #) New techniques and procedures in large animal orthopedic surgery.

VMED 8896. Research in Critical Care/Emergency Medicine. (1-3 cr [max 3 cr]; Prereq–DVM or equiv degree) Special problems course. Controlled study; prospective and retrospective models of evaluation are defined, critiqued, and used for experimental design and data collection to validate research methods.

VMED 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer, 10 cr total required [Plan A only])

VMED 8780. Advanced Avian Critical Care: Principles and Procedures. (2 cr; A-F or Aud. Prereq–Course each in veterinary pathophysiology, pharmacology, anatomy, small animal anesthesia and critical care) Procedures and protocols for managing avian medical emergencies such as starvation, toxicities, respiratory failure, and massive trauma.

VMED 8781. Seminar: Advanced Veterinary Anesthesiology. (1-3 cr [max 3 cr]; A-F or Aud. Prereq–[DVM 6321, CVM 6322 or equiv], grad student) Active interaction around topics of advanced anesthesiology in veterinary species.

VMED 8782. Advanced Veterinary Abdominal Imaging. (1-3 cr [max 3 cr]) Applications and discussion of basic principles through emerging techniques.


VMED 8789. Research in Avian Clinical Problems and Procedures. (1-3 cr [max 3 cr]; A-F or Aud. Prereq–#) Students conduct medical and surgical procedures involved in management of avian trauma and critical care patients.

VMED 8791. Research in Veterinary Anesthesia. (1-3 cr [max 3 cr]; A-F or Aud. Prereq–[DVM 6315, CVM 6325 or equiv] Research methodology; controlled prospective and retrospective research studies. Collection and analysis of scientific data.

VMED 8792. Seminar: Veterinary Radiology. (1 cr [max 6 cr]) Current topics in veterinary imaging, veterinary radiation therapy, or specific applications.

VMED 8792. Seminar: Veterinary Anesthesiology. (1-2 cr [max 2 cr]; A-F or Aud. Prereq–[DVM 6321 or equiv] DVM degree) Discussion and presentations; for veterinary anesthesiology and surgery residents and graduate students.
Courses

**Water Resources Science (WRS)**

**Department of Soil, Water, and Climate**

**College of Food, Agricultural and Natural Resource Sciences**

**WRS 5101. Water Resources: Individuals and Institutions.** (3 cr; Prereq–Grad student or #) Sociocultural, legal, and economic forces that affect use of water resources by individuals/institutions. Historical trends in water policy, resulting water laws in the United States. Institutional structures whereby water resources are managed at federal, state, and local levels.

**WRS 5241. Ecological Risk Assessment.** (3 cr; Prereq–#) Evaluating current/potential impact of physical, chemical, and biological agents on ecosystems. Identifying ecological stressors, assessing level of exposure, measuring ecological responses, communicating/managing risks. Class participation, two reaction papers, final exam, small-group project.

**WRS 8050. Special Topics in Water Resources Science.** (1-3 cr [max 3 cr]) Directed Studies in Water Resources Science.


**WRS 8095. Plan B Project.** (3 cr; S-N or Aud) Satisfies Plan B project requirement. May appear on master’s program, but does not count toward credit minimum in major. Project topic arranged between student and adviser. Written report required.

**WRS 8100. Interdisciplinary Seminar in Water Resources.** (1-3 cr [max 3 cr]) Interdisciplinary Seminar in Water Resources.

**WRS 8333. FTE: Master’s.** (1 cr; No grade. Prereq–Master’s student, adviser and DGS consent)

**WRS 8444. FTE: Doctoral.** (1 cr; No grade. Prereq–Doctoral student, adviser and DGS consent)

**WRS 8581. Research and Professional Ethics in Water Resources and Environmental Science.** (2 cr; S-N or Aud. §CE 8581) Prereq–(Environmental engineering or water resources science) grad student or #) Ethics of water resources science and environmental engineering research/practice. Societal responsibility, plagiarism, recording-keeping, authorship, confidentiality, conflicts of interest, professional relationships, fraud, reporting misconduct. Meets during first eight weeks of spring semester.

**WRS 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]) No grade. Prereq–Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

**WRS 8777. Thesis Credits: Master’s.** (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**WRS 8888. Thesis Credit: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

**Work and Human Resource Education (WCRE) Department of Work and Human Resource Education**

**College of Education and Human Development**

**WRE 5001. Survey: Human Resource Development and Adult Education.** (3 cr) Overview of fields of human resource development and adult education. Includes societal contexts, theories, processes, definitions, philosophies, goals, sponsoring agencies, professional roles, participants, and resources. Focus on the unique characteristics and ways the fields overlap and enhance one another.


**WRE 5031. Information Resources in Education.** (3 cr; S-N or Aud) Sources of knowledge and search strategies for accessing library, electronic, institutional, and informal resources of interest to educators.

**WRE 5101. Introduction to Leadership and Administration of WCRE.** (3 cr) Finance, public relations, communications, legal aspects, leadership, personnel policies/management, program planning/development, evaluation, inter-institutional collaboration of work and human resource education programs in school-based settings.

**WRE 5102. Leadership in WHRE.** (2 cr) Leadership, leadership roles/responsibilities. Application to work and human resource education.

**WRE 5121. Principles of Supervisory Management.** (3 cr) Introduction to the principles of supervision in education, business, industry, government, and service organizations.


**WRE 5141. Evaluation of WHRE.** (3 cr) Designing/conducting project, program, and systems evaluations in work and human resource education contexts/settings.

**WRE 5201. Family and Work Relationships.** (3 cr; A-F or Aud) Examination of the interactions of work and family to prepare professionals to improve work and family relationships.


**WRE 5341. Global Program Delivery Techniques and Technology of Extension.** (2 cr; A-F or Aud. §AFEE 5341) Special educational activities and teaching and communications methods and techniques for youth and adults, ranging from outreach to extension services, with an emphasis on youth and adult education programs in different global settings.

**WRE 5351. Methods for Change in Developing Countries.** (3 cr; A-F or Aud. §AFEE 5351) Sociocultural and ecological parameters as they pertain to promoting the adoption of improved practices in rural, community, and agricultural development, including formal and informal education institutions. Project planning, implementation, and evaluation related to actual change and development situations in developing countries.

**WRE 5401. Distance Learning in Adult Education and Training.** (3 cr; A-F or Aud) Distance learning concepts, theory, history, present practice, delivery systems, course design, major issues, future directions.

**WRE 5501. Organizational Learning.** (3 cr; A-F or Aud) Theoretical, empirical, and practical aspects of learning in organizations. Historical context. Definitions, theories, and applications of organizational learning. Learning organization, knowledge management, intellectual capital.

**WRE 5511. Education for Work.** (3 cr) Examination of contextual bases underlying education for work; implications for practice.

**WRE 5521. Work-Based Learning Policies.** (2 cr) Aims/purposes of federal, state, and local policies, related to work-based learning.


**WRE 5601. Student and Trainee Assessment.** (2 cr; A-F or Aud. §HEDD 5601) Exams and assessment strategies for work: implications for practice.

**WRE 5621. Developing Learning Progress Reporting Systems.** (3 cr; A-F or Aud) Developing learning progress reporting systems and tests of knowledge, affect, and processes for programs focused on instruction of skills associated with business/industry. Evaluating instructional effectiveness. Applying tests and other evaluation instruments to assess/report learning in business/industry and career/technical education fields. Students develop each type of test and an overall evaluation plan for a course.

**WRE 5612. Managing and Consulting in Human Resource Development and Adult Education.** (3 cr; Prereq–#) The theory of managing and consulting in human resource development and adult education. Includes a personal assessment of role responsibilities and the development of skills in consulting and collaboration with management and consultation processes and techniques.

**WRE 5628. Multimedia Presentations in Business.** (3 cr; Prereq–#) Designing, creating, and presenting information using multimedia resources in business settings.

**For definitions of course numbers, abbreviations, and symbols, see page 169.**
Courses

WHRE 5629. Course Development for Business and Industry. (2 cr; A-F or Aud. HRD 5629)
Designing instructional programs/courses that help learners develop desired competence. Designing instruction for performance based training and vocational/technical education. Developing course syllabus components that clarify course expectations. Developing academic/community-based elements that complement course goals. Reflect on and compare performance-based instruction with other curriculum models for the field.

WHRE 5661. Instructional Methods for Business and Industry. (2 cr; Prereq-Q: HRD 5661 or IE 5661)
Theory/practice in instructional methods for career/technical education (CTE) instructors and human resources/development (HRD) professionals. How to select various teaching methods and plan for their delivery. Preparing an instructional methods plan to clarify course content, teaching methods selected, rationale for their selection, and how a student organization might facilitate student learning.

WHRE 5696. Teaching Internship: Introduction. (1 cr; S-N only. §CI 5924. Prereq—Admission to initial licensure program)
Initial experiences in teaching profession. Observation of school organization/ administration, seminars, relationship building with cooperating teachers, reflection on personal involvement as a beginning student teacher.

WHRE 5697. Teaching Internship: School and Classroom Settings. (2 cr; Prereq—5696 for initial licensure program)
Part-time supervised teaching experience in schools. Seminars on managing student’s learning in context of work and human resource education programs in contemporary schools and on becoming a reflective educator.

WHRE 5698. Teaching Internship. (3-8 cr (max 8 cr)
Prereq—Admission to initial licensure program)
Teaching experience in a school system that provides programs for grades 5-12.

WHRE 5699. Teaching Internship: Extended. (1 cr; §CI 5927. Prereq—5698)
Extended student teaching experience in a school system that provides programs for grades 5-12.

WHRE 5771. Teaching Entrepreneurship: Small Business Management. (3 cr)
Methods, organization, curriculum development and modification, and implementation of educational programs for entrepreneurs.

WHRE 5801. Educating Special Populations in Work and Human Resource Education Settings. (3 cr)
Identifying/accommodating in work and human resource education settings educational traits of students with disabilities and disadvantage conditions.

Interagency planning/relationships relating to special populations for educational, business, and human service organization personnel, family members, and advocates.

WHRE 5803. Developmental Writing and the College Student: Theory and Practice. (3 cr; Prereq—Bachelor’s degree)

WHRE 5804. Research in Postsecondary Developmental Education. (3 cr; Prereq—Bachelor’s degree, courses in intro psychology, basic statistics)
Strategies for conducting three types of research that are central to developmental education: placement test validation, program evaluation, and classroom research. Students read examples and learn what constitutes best practices in each type.

Nature of diverse populations, their unique learning/training needs. Exemplary programs. Collaborative efforts among persons representing work and human resource education settings.

WHRE 5822. Diversity and Organizational Transformation in Work and Human Resource Education. (3 cr)
Developing models for understanding impact of diversity on individual, organizational, and community outcomes. Discussing organizational change in relation to diversity.

WHRE 5823. Program Planning and Improvement for Special Populations in Work and Human Resource Education. (2 cr)
Concepts, issues, and practices related to the design, implementation, and evaluation of efforts focused on developing new programs or modifying existing programs, in work and human resource education settings, for individuals with special learning needs.

WHRE 5901. Using Research in Work and Human Resource Education. (3 cr)

WHRE 5990. Special Topics in Work and Human Resource Education. (1-4 cr (max 4 cr)
Topics vary.

WHRE 5993. Directed Study in WHRE. (1-4 cr (max 4 cr)
Self-directed study, with faculty advice, in areas not covered by regular courses.

WHRE 8001. Advanced Theory in Human Resource Development and Adult Education. (3 cr; A-F or Aud. Prereq—5001 or AdEd 5001)
Theoretical understanding of individuals and organizations as adaptive entities; roles of human resource development and adult education in mediating complex demands.

WHRE 8100. Work and Human Resource Education Colloquium. (1-3 cr (max 12 cr)
Selected topics of significance to work and human resource education professionals. Topics based on interest and demand.

WHRE 8141. Foundations of Work and Human Resource Education. (3 cr)
Key historical/philosophical concepts in work, career, and adult development. Individual/organizational change. Learning through experience.

WHRE 8142. Comparative Systems in Work and Human Resource Education. (3 cr; Prereq—8141)
Looking critically across/within countries/regions at structures intended to deliver work-/career-related education/training.

WHRE 8143. Contemporary Workforce and Workplace Issues. (3 cr; A-F or Aud)
Workforce preparation/retraining. Impact of cultural, political, and economic changes.

WHRE 8233. FTE: Master’s. (1 cr; No grade. Prereq—Master’s student, adviser consent, DDS consent)

WHRE 8444. FTE: Doctoral. (1 cr; No grade. Prereq—Doctoral student, adviser consent, DDS consent)

WHRE 8666. Doctoral Pre-Thesis Credits. (1-6 cr (max 12 cr)
No grade. Prereq—Doctoral student who has not passed prelim oral; no required consent for 1st/2nd registrations, up to 12 combined cr; for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to 4 times, up to 60 combined cr.

WHRE 8777. Thesis Credits: Master’s. (1-18 cr (max 50 cr)
No grade)

WHRE 8888. Thesis Credit: Doctoral. (1-24 cr (max 100 cr)
No grade. Prereq—Max 18 cr per semester or summer; 24 cr required)

WHRE 8896. Internship. (1-10 cr (max 10 cr; S-N or Aud)
Student applies for position in professional setting; individual arrangements describe specific responsibilities during internship. Ed.D. program requirement.

WHRE 8911. Foundations of Inquiry in Work and Human Resource Education. (3 cr; A-F or Aud)
Practice of inquiry in work and human resource education. Identifying a research problem and research questions. Quantitative/qualitative methods of research. Issues related to ethics of research.

WHRE 8912. Quantitative Research In Work and Human Resource Education. (3 cr; Prereq—8911)
Assumptions, procedures for and considerations in planning/conducting quantitative research in work and human resource education.

WHRE 8990. Research Seminar. (1 cr (max 6 cr; S-N or Aud. Prereq—8911, 8912 or 8913 or 8921 or A)
Developing, reporting, and evaluating research. Participants make and react to presentations. (Two credits counted in doctoral program.)

Writing Studies (WRIT)

Department of Writing Studies
College of Liberal Arts

WRIT 5001. Introduction to Graduate Studies in Scientific and Technical Communication. (3 cr; A-F only. Prereq—Grad student or #)

WRIT 5051. Graduate Research Writing Practice for Non-native Speakers of English. (3 cr; Prereq—Grad student)
Graduate-level writing techniques/formats for summaries, critiques, research, and abstracts. Persuasion, documentation, structure, grammar, vocabulary, field-specific requirements. Writing through several drafts, using mentor in specific field of study. Revising/editing to meet graduate standards. Discussions.

WRIT 5052. Graduate Research Presentations and Conference Writing for Non-native Speakers of English. (3 cr; Prereq—Grad student, non-native speaker of English) or #
Practice in writing/presenting graduate-level research for conferences or professional seminars. Delivery of professional academic presentations to U.S. audiences. Conference abstract, paper, and poster presentation. Communication in research process. Students select topics from their own research/studies. Format, style, transitions, topic narrowing, non-verbal presentation skills.

WRIT 5111. Information Design: Theory and Practice I. (3 cr; A-F or Aud. Prereq—Grad student or #)
Audience analysis, media selection, message design through various theoretical perspectives, including cognitive/schema, social construction, feminist, intercultural theories. Usability testing, contextual inquiry as means to study effectiveness of messages.

WRIT 5112. Information Design: Theory and Practice II. (3 cr; A-F or Aud. Prereq—Grad student or #)
Political, economic, social, and technical aspects of media selection and message design. Media analyses, scripts, budgets, treatments, project design plans, interactive screens. Online design projects.

WRIT 5196. Internship in Scientific and Technical Communication. (3-6 cr (max 6 cr; S-N or Aud. Prereq—STC grad or #)
Internship sites may include the University, industry, or government agencies. An internship proposal, progress report, internship journal (optional), and final report with a letter from the internship supervisor are required.

WRIT 5270. Special Topics. (1-3 cr (max 3 cr; A-F or Aud. Prereq—[STC or RSTC or BIE] [major or grad student]) or #)
Topics specified in Class Announcements.

WRIT 5291. Independent Study. (1-3 cr (max 3 cr; Prereq—#)
Supervised reading/research on advanced projects not covered in regularly scheduled offerings.
Courses

WRIT 5511. Research in Scientific and Technical Communication. (3 cr; A-F or Aud. Prereq–Grad. Students must complete or have completed the Research Design and Methods course or have equivalent experience.) Introduction to the theoretical and methodological foundations of scientific and technical communication. Focus on the design and conduct of research studies in the field. Students will learn how to formulate research questions, design and analyze data, and interpret results. Students will also gain experience in writing for scientific and technical audiences.

WRIT 5332. Scientific and Technical Communication Course Development and Pedagogy. (1 cr; A-F or Aud. Prereq–Grad. Students must complete or have completed the Research Design and Methods course or have equivalent experience.) Introduction to the theoretical and methodological foundations of scientific and technical communication. Focus on the design and conduct of research studies in the field. Students will learn how to formulate research questions, design and analyze data, and interpret results. Students will also gain experience in writing for scientific and technical audiences.

WRIT 8510. Topics in Rhetorical Theory, History, and Criticism. (3 cr [max 12 cr]; A-F or Aud. Prereq–5775 or equiv) Rhetorical theory in context of culture influenced by science/technology. Topics vary. See Class Schedule.


WRIT 8550. Topics in Technology and Culture. (3 cr [max 12 cr]; A-F or Aud) Doctoral seminar on computer-mediated communication, democracy/technology, controversies over digital communication, privacy/ethical issues. Topics vary. See Class Schedule.

WRIT 8660. Digital Pre-Thesis Credits. (1-6 cr [max 12 cr]; No grade. Prereq–Doctoral student who has not passed prelim only; no required consent for 1st/2nd registrations, up to 12 combined cr; A for 3rd/4th registrations, up to 24 combined cr; doctoral student admitted before summer 2007 may register up to four times, up to 60 combined cr)

WRIT 8775. Classical Rhetorical Theory. (3 cr [max 12 cr]; A-F or Aud) Aristotle’s “Rhetoric” in context of its times and of Aristotle’s other works, especially “The Ethics” and “The Politics.”

WRIT 8777. Thesis Credits: Master’s. (1-18 cr [max 50 cr]; No grade. Prereq–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

WRIT 8792. Directed Readings. (1-4 cr [max 12 cr]; S-N only. Prereq–)

WRIT 8794. Directed Research. (1-4 cr [max 12 cr]; S-N only. Prereq–)

Supervised research project.

WRIT 8888. Thesis Credit: Doctoral. (1-24 cr [max 100 cr]; No grade. Prereq–Max 18 cr per semester or summer; 24 cr required)

Youth Development and Research (YOST)

School of Social Work
College of Education & Human Development

YOST 3031. International Youthwork. (3 cr; §YOST 3031. Prereq–2xxx or #) Lives of young people living outside the United States and of immigrants/refugees now resident in this country. Working with and on behalf of such groups. Socio-political analysis of globalized. Its impact on young people, youthwork, and youth policy worldwide.

YOST 3032. Adolescent and Youth Development for Youthworkers. (4 cr; §YOST 3032. Prereq–[1001 or 2001 or 2002W or 2101], [Any Psych or PsyPh course]) Application of research and theory to work with adolescents. How findings/theories facilitate understanding of behavior.

YOST 5101. Youth Work Practice I. Internship. (3 cr; Prereq–5101, 5032 or equiv, ¶5111) First course of a sequential internship that includes 15 hours per week working with youth in a community youth-serving organization. Develop and enhance competence and identity as a youth worker, and reflect on and integrate knowledge about youth with on-going experience in youth work.

YOST 5102. Youth Work Practice II. Internship. (3 cr; Prereq–5111, ¶5112, #) Second course of a sequential internship that includes 15 hours per week of work with youth in a community youth-serving organization. Develop and enhance competence and identity as a youth worker, and reflect on and integrate knowledge about youth with ongoing experience in youth work.

YOST 5111. Youth Work Methods I: Seminar. (1 cr; Prereq–5101, 5032 or equiv, ¶5110, #) Weekly discussion seminar taken concurrently with 5101 to integrate theory and praxis with youth work experience. Written and experiential assignments to increase knowledge, competency, and skills related to working with youth.

YOST 5112. Youth Work Methods II: Seminar. (1 cr; Prereq–5111, ¶5102, #) Weekly discussion seminar taken concurrently with 5102 to integrate theory and praxis with youth work experience. Written and experiential assignments to increase knowledge, competency, and skills related to working with youth.

YOST 5234. Youth Agencies, Organizations, and Youth Service System. (3 cr; §YOST 3234. Prereq–Two soc/anth courses, work experience in [youth agency or org] or #) Communities/governmental responses to young people as potential problems through agencies/programs and other organizational forms. Purpose, structure, activities of such forms. How forms are/are not integrated into youth service systems.

YOST 5235. Community Building, Civic Engagement, and Civic Youthwork. (4 cr; §YOST 3235. Prereq–[2001, one basic course in Pol, one basic course in Soc] or #) Reciprocity between youth development and community development brought about by young people’s civic engagement. Individual, social, and political change by/for young people and their community.

YOST 5240. Special Topics in Youth Studies. (2 cr [max 10 cr]; §YOST 3240. Prereq–Two social sci courses, exper working with youth or #) In-depth investigation of one area of youth studies. Teaching procedure and approach determined by specific topic and student needs. Topic announced in advance.

YOST 5241. Experiential Learning. (4 cr; §YOST 2241. Prereq–[1001, 2001] or #) History/theory of experiential learning, its application in youthwork. Observation, reflection, program design, and evaluation skills grounded in experiential learning theory. 15 hours of field observation required.

YOST 5291. Independent Study in Youth Studies. (1-8 cr [max 8 cr]) Independent reading and/or research under faculty supervision.

YOST 5301. Communicating With Adolescents About Sexuality. (3 cr; Prereq–[Upper div AdPy course, exper working with youth or]) How to communicate sensitively/effectively with adolescents and their concerned persons about sexuality in everyday life. Healthy sexual development (physical, emotional, ethical), sexual diversities. Gender/body image, disease, sexual violence. intimacy, sex in cyberspace.

YOST 5313. Direct Work with Adolescents. (2 cr; Prereq–Two social sci courses, exper working with youth or #) Designed to give an understanding of direct work with troubled and at-risk adolescents in a wide range of settings where youth workers or social workers are typically involved. Emphasis on young people in groups in the “lifespans” in everyday life, rather than in one-to-one office-based interactions.

YOST 5315. Youthwork in Schools. (4 cr; §YOST 4315. Prereq–Introductory course in education or #) Craft of youthwork as a framework to understand life-worlds of young people and a practice to enhance healthy development. How young people often make artificially/harmfully divide their lives into school and not school.

YOST 5319. Understanding Youth Subcultures. (3 cr; §YOST 4319. Prereq–2001 or one course each in [Arth, Soc] or #) Young people’s participation in and understanding of subcultures, life-styles, and event cultures. Place of these in young people’s identity, friendship, and life chances.

YOST 5321. Work With Youth: Individual. (2 cr; §YOST 4321. Prereq–1001 or 2002W or #) Basic assumptions underlying individual work with youth. Special issues/concerns of adolescents and of persons who work with them, especially those who work with youth in one-to-one interactions.


YOST 5323. Work with Youth—Groups. (2 cr; §YOST 4323. Prereq–1001 or 2002W or #) Social group work. Adolescent group needs/associations. Group process. Working with diverse groups of youth in community, in group living situations, and in group therapy.

YOST 5401. Young People’s Spirituality and Youthwork: an Introduction. (4 cr; A-F or Aud. §YOST 4401W. Prereq–[2001, one course each in [Arth, Soc, CPsy]] or #) Adolescent spirituality, its relation to working with young people. Faith/spirituality as actual/necessary aspects of healthy youth development. Research, active community-based programs. Knowledge, attitudes, and skills to meet adolescent needs/wants.

YOST 5402. Youth Policy: Enhancing Healthy Development in Everyday Life. (4 cr; §YOST 4402. Prereq–[2001, one course each in [FSoS, POLSCI, Soc]] or #) Youth policy as formulated in response to youth issues, problems, and community/public concerns. Policy as political response to youth panics, as indirect youthwork, and as a community’s moral compact with its young people. Perspectives are explored specific to student interests.