Key to Courses of Instruction

The University reserves the right to change courses in this section without notice. There is no assurance that a given course will be offered in complete accordance with the catalog listing.

KEY TO COURSES OF INSTRUCTION

1 2 3 4 5 6 7

*CO 150 03(3-0-0). College Composition. (GT-CO2, AUCC 1A), F, S, SS.

Prerequisite: SAT critical reading score of 600 or above or ACT English score of 26 or above or composition placement/challenge exam (score of 3, 4, or 5) or CO 130. (For students registered at CSU prior to Fall 2008, SAT verbal score of 500 or above or ACT English score of 20 or above.)

Expository and argumentative writing emphasizing purpose and audience; writing and reading processes; development of ideas; coherence; effective style. (S, NT-O)

Refer to the sections below for an explanation of each numbered item.

1. COURSE SYMBOLS

The following symbols are used in front of the course number to provide additional information concerning the course offering.

○ Offered in odd years (e.g., 2013).
* Offered in even years (e.g., 2014).
+ Certain field trips are a required part of this course and may incur additional expense to the student. See also the Financial Services for Students section in this catalog.

2. COURSE SUBJECT CODES

Courses offered by colleges, departments, or units are indicated by the following course subject codes.

Accounting ................................................................. ACT
Adult Education ......................................................... EDAE
Aerospace Studies (Air Force ROTC) ......................... AS
Agricultural and Resource Economics ....................... AREC
Agricultural Education ................................................ AGED
Agriculture .............................................................. AGRI
American Sign Language ......................................... LSGN
American Studies ..................................................... AMST
Anatomy and Neurobiology (see Biomedical Sciences) .. BMS
Animal Science ......................................................... ANEQ
Anthropology ............................................................ ANTH
Apparel and Merchandising ....................................... AM
Applied Human Sciences .......................................... AHS
Applied Statistics ..................................................... STAA
Arabic ....................................................................... LARA
Art ............................................................................. ART
Arts Advocacy, Leadership, Entrepreneurship .............. LEAP
Astronomy .................................................................... AA
Atmospheric Science ................................................ ATS
Bioagricultural Sciences and Pest Management .......... BPSM
Biochemistry and Molecular Biology ....................... BC
Biological Science (see also Life Science) .................... BZ or LIFE
Biomedical Engineering .......................................... BIOM
Biomedical Sciences ............................................... BMS
Biotechnology ......................................................... BTEC
Botany ...................................................................... BD
Business Accounting .................................................. ACT
Computer Information Systems ................................... CIS
Finance ....................................................................... FIN
General ....................................................................... BUS
Management ............................................................. MGT
Management Science ............................................... QNT
Marketing ..................................................................... MKT
Real Estate .................................................................... REL
Career and Technical Education ................................. ECT
Cell and Molecular Biology ....................................... CM
Chemical and Biological Engineering ....................... CBE
Chemistry ..................................................................... CHEM
Chinese ...................................................................... LCHI
Civil and Environmental Engineering ....................... CIVE
Clinical Sciences ........................................................ VS
Communication Studies ............................................. SPCM
Community College Education ............................... EDCL
Composition ............................................................. CO
Computer Engineering (see Electrical and Computer Engineering) ........................................ ECE
Computer Information Systems ................................... CIS
Computer Science ...................................................... CS
Computing Technology ............................................. CT
Conservation Biology (see Fish, Wildlife, and Conservation Biology) Computer Information Systems .... FW
Construction Management ....................................... CON
Consumer and Family Studies (see Family and Consumer Sciences) ........................................ FACS
Counseling and Development Education .................... EDCO
Dance ........................................................................ D
Design and Merchandising ....................................... DM
Ecology ....................................................................... ECOL

Agriculture .............................................................. AGRI
American Sign Language ......................................... LSGN
American Studies ..................................................... AMST
Anatomy and Neurobiology (see Biomedical Sciences) .. BMS
Animal Science ......................................................... ANEQ
Anthropology ............................................................ ANTH
Apparel and Merchandising ....................................... AM
Applied Human Sciences .......................................... AHS
Applied Statistics ..................................................... STAA
Arabic ....................................................................... LARA
Art ............................................................................. ART
Arts Advocacy, Leadership, Entrepreneurship .............. LEAP
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Biochemistry and Molecular Biology ....................... BC
Biological Science (see also Life Science) .................... BZ or LIFE
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Counseling and Development Education .................... EDCO
Dance ........................................................................ D
Design and Merchandising ....................................... DM
Ecology ....................................................................... ECOL
Courses of Instruction

Ecosystem Science and Sustainability ESS
Economics ECON
Education EDUC
Adult EDAD
Career and Technical ECCT
Community College EDCO
Counseling and Career Development EDCC
Higher EDHE
Licensure EDUC
Organization Performance and Change EDOD
Research Methods EDRM
Vocational (see Career and Technical Education) EDCT
Education Abroad (see also Study Abroad) ESDA
Electrical and Computer Engineering ECE
Engineering ENGR
Atmospheric Science ATS
Biomedical BIOM
Chemical and Biological CBIO
Civil and Environmental CIVE
Electrical and Computer ECE
Engineering Science EGSC
Environmental (subject code has been discontinued) ENVE
Mechanical MECH
Engineering Science EGSC
English E
English for Academic Purposes EAP
Entomology (see Bioagricultural Sciences and Pest Management) BSPM
Environmental and Radiological Health Sciences ERHS
Environmental Engineering ENVE
Environmental Health (see Environmental and Radiological Health Sciences) ERHS
Equine Science (see Animal Science) ANEQ
Ethnic Studies ETST
Exercise Science, Health and Exercise Science HES
Family and Consumer Sciences FACS
Family Studies HDFS
Finance FIN
Fire and Emergency Services Administration FESA
Fish, Wildlife, and Conservation Biology FW
Food Science and Human Nutrition FSHN
Food Technology FTEC
Foreign Languages and Literatures LGEN
American Sign Language LSGN
Arabic LARA
Chinese LCHI
French LFRE
General courses LGEN
German LGER
Greek LGRK
Italian LITA
Japanese LPAN
Korean LKOR
Latin LLAT
Russian LRU
Spanish LSPA
Forest Sciences F
French LFRE
General Business BUS
Geography GR
Geology (see Geosciences) GEOL
Geosciences GEOL
German LGER
Global Environmental Sustainability GES
Graduate School GRAD
Greek LGRK
Health and Exercise Science HES
Higher Education EDHE
History HIST
Home Economics (see Family and Consumer Sciences) FACS
Honors HONR
Horticulture HORT
Human Development and Family Studies HDFS
Human Sciences (see Applied Human Sciences) AHS
Interior Design INTD
International Education IE
International Studies INST
Intra-University IU
Italian LITA
Japanese LPAN
Journalism and Media Communication JTC
Key Academic Community KEY
Korean LKOR
Landscape Architecture LAND
Languages and Literatures, Foreign LGEN
Leadership, Entrepreneurship, and Arts Advocacy LEAP
Liberal Arts LB
Library Information LI
Licensure/Education EDUC
Life Science LIFE
Management MGT
Management Science QNT
Marketing MKT
Mathematics MATH
Mechanical Engineering MECH
Media Communication JTC
Microbiology, Immunology, and Pathology MIP
Military Science (Army ROTC) MLSC
Music MU
Natural Resource Recreation and Tourism NRRT
Natural Resources NR
Natural Sciences NSCI
Neurobiology NB
Nutrition FSHN
Occupational Therapy OT
Organization Performance and Change EDOM
Pathology (see Microbiology, Immunology, and Pathology) MIP
Performance and Change Education EDOM
Performing Arts EDOM
Philosophy PHI
Physical Education (see Health and Exercise Science) HES
Physics PH
Physiology (see Biomedical Sciences) BMS
Plant Disease (see Bioagricultural Sciences and Pest Management) BSPM
Political Science POLS
Psychology PSY
Public Health PBHL
Radiological Health Sciences (see Environmental and Radiological Health Sciences) ERHS
Rangeland Ecosystem Science RS
Real Estate REL
Research Methods EDRM
Restaurant/Resort Management RRM
Russian LRU
Sign Language, American LSGN
Social Work SOWK
Sociology SOC
Soil and Crop Sciences SOCR
Spanish LSPA
Speech Communication (see Communication Studies) SPCM
3. COURSE NUMBERING

Course numbering is based on the content level of material presented in a course.

100-299 Courses primarily for freshman and sophomore students.

300-499 Courses primarily for junior and senior students. Acceptable for graduate credit for students holding bachelor’s degrees when approved by the student’s graduate committee.

500-599 Courses primarily for students enrolled in master’s-level degree programs or equivalents. Qualified junior and senior students may enroll.

600-699 Courses primarily for students enrolled in master’s-level programs or equivalents. Undergraduate students may not enroll to satisfy undergraduate degree requirements.

700-799 Courses primarily for students enrolled in Ph.D.-level programs or equivalents and professional veterinary medicine courses. Undergraduate students may not enroll.

4. CLOCK HOUR DISTRIBUTION AND CREDITS

The distribution of credit for lecture-laboratory-discussion or recitation class periods per semester is as follows: in the example 04(2-2-1), the figure outside the parentheses indicates the number of credits assigned to this class. Inside the parentheses, the first figure indicates the number of clock hours spent in lectures each week, the second figure indicates the number of clock hours spent in laboratory/studio each week, and the third figure indicates the number of clock hours spent in discussion, recitation, seminar, or internship/practicum each week.

VARIABLE CREDIT COURSES

VAR indicates variable credit with no specific minimum credit or no maximum credit indicated. Varies 1-18 credits.

Var[3-9] indicates variable credit with minimum credit and maximum credit limitations per term. The course listing may indicate other credit limitations.

5. STATE GUARANTEED TRANSFER (GT-subcode)

By legislation, lower-division Colorado State University courses in categories 1-3 of the All-University Core Curriculum must be submitted to and approved by the Colorado Commission on Higher Education (CCHE) as general education courses guaranteed to transfer among all public higher education institutions within the state. The subcode refers to the specific statewide general education category the course fulfills. For a complete listing of the courses approved statewide, visit the CCHE website at highered.colorado.gov/Academics/Transfers/gtPathways/curriculum.html

6. ALL-UNIVERSITY CORE CURRICULUM CATEGORY (i.e., AUCC 1A)

This notation identifies which, if any, of the AUCC categories (1-3) the course fulfills.

Students are strongly advised to see if their preferred program of study has particular recommendations for satisfying All-University Core Curriculum requirements.

The AUCC categories are:

1 Basic Competencies
   1A Written Communication
   1B Mathematics

2 Additional Communication
   2 Advanced Writing

3 Foundations and Perspectives
   3A Biological and Physical Sciences
   3B Arts and Humanities
   3C Social and Behavioral Sciences
   3D Historical Perspectives
   3E Global and Cultural Awareness

7. TERM

F Taught fall semester
S Taught spring semester
SS Taught summer session

The term or terms listed are those which the course could be scheduled to be offered during the terms indicated. Since the frequency of class offerings is determined by
the department in accordance with program needs, students should consult the official, applicable on-line class schedule (available on RAMweb) for courses to be offered in a given term.

The following types of courses do not always indicate term; they will be offered when there is sufficient demand: -84, Supervised College Teaching; -86, Practicum; -87, Internship; -89, Cooperative; -90, -91, Workshop; -92, -93, Seminar; -94, -95, Independent Study; -96, -97, Group Study; -98, Research; and -99, Thesis or Dissertation.

8. PREREQUISITES

Current prerequisites for a course may be found in the courses of instruction section of the General Catalog.

Students must meet all course prerequisites prior to registration for a specific class, or acquire the instructor’s permission through an override.

Permission of the instructor for a student to attend a class is implied when the student has met specified prerequisites. All prerequisites may be considered to have been met if a student presents evidence of credit earned in equivalent courses or if knowledge equivalent to the prerequisites indicated is demonstrated.

Academic prerequisites notwithstanding, a department may limit the enrollment in a class; classes may be limited to a specified number of students, to students of particular majors, or to students of particular class levels.

In the listing in the catalog, only the most recent version of a course number is shown as a prerequisite.

9. COURSE DESCRIPTION

A brief description of the content of the course.

10. COURSE FEES ($)

Certain courses carry a special fee which is assessed at the time a student registers for the course. For a list of current course fees, refer to provost.colostate.edu/files/2014/06/Comprehensive-List-AY15.pdf

Certain courses carry a variable fee which is assessed each student enrolled in the course based on expenses that fluctuate, e.g., expendable materials. These fees may vary by student and/or by term within the fee range specified at provost.colostate.edu/files/2014/06/Comprehensive-List-AY15.pdf

11. NONTRADITIONAL COURSE OFFERING (NT-O, B, C, T, and/or V)

NT indicates the course has been approved to be offered in a nontraditional format, usually as a distance course (on-line, blended, correspondence, telecourse or videotape/DVD) through the Division of Continuing Education or other distance learning venue on campus. Students are encouraged to contact the department offering the course or the Division of Continuing Education about course availability for a particular term.
ASTRONOMY COURSES
Department of Physics
College of Natural Sciences

AA 100 03(3-0-0). Introduction to Astronomy. (GT-SC2, AUCC 3A).
F, S, SS. Prerequisite: None.
Description of the various objects found in the heavens as well as the
principles and techniques employed in investigations of these objects.

AA 101 01(0-2-0). Astronomy Laboratory. (GT-SC1, AUCC 3A). F,
S, SS. Prerequisite: AA 100 or concurrent registration.
Observations of the various objects found in the heavens with 5-inch
reflecting telescopes.

AA 150 03(2-3-0). Observational Astronomy. SS.
Astronomical objects in the night and day sky; observation with
16-inch telescope.

°AA 301 05(4-2-0). Astrophysics I. F. Prerequisite: MATH 124;
MATH 126; PH 110 or PH 121 or PH 141.
Celestial mechanics, earth-moon systems, planets and satellites,
interplanetary medium, origin of solar system.

°AA 302 05(4-2-0). Astrophysics II. S. Prerequisite: MATH 124;
MATH 126; PH 110 or PH 121 or PH 141.
Properties of sun and stars, variable stars, binary and multiple star
systems, star clusters, interstellar medium, stellar evolution.

*AA 303 05(4-2-0). Astrophysics III. F. Prerequisite: MATH 124;
MATH 126; PH 110 or PH 121 or PH 141.
Properties of the Milky Way, galaxies, quasars and related objects;
special and general relativity; cosmology.

AA 495 Var [1-6]. Independent Study in Astrophysics. Prerequisite:
Written consent of instructor.

° Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B =
blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All
University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
## ACCOUNTING COURSES

### Department of Accounting
### College of Business

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT 205</td>
<td>Fundamentals of Accounting</td>
<td>F, S, SS.</td>
<td>For nonbusiness majors. Credit not allowed for both ACT 205 and ACT 210. Understanding of financial statements to support financial and managerial decision making. (NT-O)</td>
</tr>
<tr>
<td>ACT 210</td>
<td>Introduction to Financial Accounting</td>
<td>F, S, SS.</td>
<td>Use of accounting information by decision makers; development of the basic accounting model, and issues concerning income and cash flows.</td>
</tr>
<tr>
<td>ACT 220</td>
<td>Introduction to Managerial Accounting</td>
<td>F, S, SS.</td>
<td>Use of accounting information in internal decision making.</td>
</tr>
<tr>
<td>ACT 311</td>
<td>Intermediate Accounting I</td>
<td>F.</td>
<td>Credit not allowed for both ACT 310 and ACT 311. Asset and liability accounting.</td>
</tr>
<tr>
<td>ACT 321</td>
<td>Cost Management</td>
<td>F.</td>
<td>Utilizing budgetary and cost accounting information for planning, controlling, and decision-making.</td>
</tr>
<tr>
<td>ACT 330</td>
<td>Introduction to Taxation</td>
<td>F. S.</td>
<td>Introduction to U.S. taxation, with emphasis on federal income tax; impact of taxation on business decisions.</td>
</tr>
<tr>
<td>ACT 411</td>
<td>Advanced Accounting</td>
<td>F, S.</td>
<td>Accounting for branches and subsidiaries, partnerships, and business combinations. Accounting for multinational business transactions.</td>
</tr>
<tr>
<td>ACT 430</td>
<td>Income Tax Accounting</td>
<td>F, S.</td>
<td>Basic structure of federal income tax law; impact of taxes on decision making; social security taxes.</td>
</tr>
</tbody>
</table>

**ACT 431** 03(3-0-0). **Corporate Taxation.** F. Prerequisite: ACT 220; ACT 330. Federal income tax principles pertaining to formation and operation of corporate entities. **ACT 441** 03(3-0-0). **Auditing Practices.** F, S. Prerequisite: ACT 312; ACT 350. Environment, professional standards, and practices involved in auditing financial statements and performance of other assurance services. **ACT 442** 03(3-0-0). **International Accounting.** SS. Prerequisite: ACT 220. Credit not allowed for both ACT 442 and ACT 642. International accounting issues facing multi-national enterprises. **ACT 487** Var. **Internship.** F, S, SS. Prerequisite: None. Supervised work experience in public, industry, or governmental accounting. **ACT 495** Var. **Independent Study.** F, S, SS. Prerequisite: None. **ACT 496** Var. **Group Study.** F, S, SS. Prerequisite: None. **ACT 498** Var [1-3]. **Research.** F, S, SS. Prerequisite: None. **ACT 501** 03(3-0-0). **Accounting for Global Sustainable Enterprise.** F. Prerequisite: Admission to GSSE program. Basics of U.S. and international financial reporting; accounting issues of not-for-profit enterprises; budgeting; managerial decision making. **ACT 511** 03(3-0-0). **Advanced Accounting.** F. Prerequisite: ACT 312. Accounting for business combinations and consolidations in corporate restructuring and alternative organizational forms. **ACT 540** 03(3-0-0). **Professional Ethics and Responsibilities.** F, S, SS. Prerequisite: ACT 311. Ethical practice of professional accounting. (NT-O) **ACT 541** 03(3-0-0). **Forensic Accounting and Fraud Auditing.** S. Prerequisite: ACT 441; graduate standing. Professional practices for addressing the related areas of forensic accounting and fraud. (NT-O) **ACT 550** 03(3-0-0). **Electronic Commerce Accounting Issues.** F. Prerequisite: ACT 350. Best practices for technology use in organizational accounting processes, including advanced skills in spreadsheet and database technologies. **ACT 561** 03(3-0-0). **Legal and Regulatory Issues in Accounting.** F. S. Prerequisite: BUS 205 or BUS 260; graduate standing or written consent of instructor. Contracts, ownership, bankruptcy (debtor/creditor relationship), formation of business entities, regulation of accounting profession. (NT-V) **ACT 570** 03(3-0-0). **Government and Nonprofit.** F. Prerequisite: ACT 441 or concurrent registration; graduate standing or written consent of instructor. Theory and practical application of accounting principles and auditing standards to governmental entities and not-for-profit organizations. (NT-V) **ACT 575** 03(3-0-0). **Oil and Gas Accounting.** F. Prerequisite: ACT 311. Specialized financial accounting procedures related to the oil and gas industry.

* Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCsubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
ACT 600 03(3-0-0). Accounting for Managers. F. Prerequisite: Admission to a master’s program in business.
Cost management, budgeting, profitability analysis, and decision making.

ACT 601A-B 03(3-0-0). Professional Practice.
Management of accounting practice; professional ethics and regulation; research techniques. A) Taxation. F. Prerequisite: ACT 330. (NT-O) B) Auditing. S. Prerequisite: ACT 612. (NT-O)

ACT 612 03(3-0-0), Contemporary Financial Accounting Issues. F. Prerequisite: ACT 312.
Historical development of accounting; controversial issues involved in calculations and disclosure of enterprise periodic income. (NT-O)

ACT 614 03(3-0-0). Financial Statement Analysis and Valuation. S. Prerequisite: Admitted to Master of Accountancy (M.Acc.) program.
Tools and techniques of financial statement analysis and application to equity valuation.

ACT 622 03(3-0-0). Advanced Cost and Managerial Accounting. S. Prerequisite: ACT 321.
Contributions of cost accounting to decision making and planning. (NT-O)

ACT 630 03(3-0-0). Tax and Accounting Research. F. Prerequisite: ACT 220.
Research aspects of professional accounting and tax practices; development of oral and written communication skills.

ACT 631 03(3-0-0). Corporate Taxation. F. Prerequisite: ACT 220; ACT 330.
Federal income tax principles pertaining to formation and operation of corporate entities. (NT-V)

ACT 633 03(3-0-0). Flow-Through Entities. S. Prerequisite: ACT 220.
Federal income tax principles and problems pertaining to flow-through entities. (NT-V)

ACT 635 03(3-0-0). State and Local Taxation. F. Prerequisite: ACT 220.
Tax planning and compliance issues for entities doing business in multijurisdictional locales. (NT-O)

ACT 636 03(3-0-0). Taxation of Corporations and Shareholders. SS. Prerequisite: ACT 220.
Federal income tax principles and problems relating to reorganization, consolidation, and termination of corporations. (NT-V)

ACT 639 03(3-0-0). Special Topics in Taxation. S. Prerequisite: ACT 601A; ACT 631.
Taxation of not-for-profit entities; international tax issues; other contemporary topics. (NT-O)

ACT 641 03(3-0-0). Contemporary Auditing. F. Prerequisite: ACT 441.
Seminar exploring various facets of the assurance services environment. (NT-V)

ACT 642 03(3-0-0). International Accounting. SS. Prerequisite: ACT 220. Credit not allowed for both ACT 642 and ACT 442.
Preparation for work with multinational companies in coordinating operations to adhere to global regulations and customs. (NT-O)

ACT 650 03(3-0-0). Advanced Accounting Information Systems. F. Prerequisite: ACT 350.
Research and review of best practices for technology in organizational accounting processes, including advanced skills in spreadsheets and databases.

ACT 679A-B 03(3-0-0). Capstone Seminar. F. S. SS.
Final project integrating material from prior courses. A) Taxation. Prerequisite: ACT 601A; ACT 631. (NT-O) B) Financial accounting. Prerequisite: ACT 601B. (NT-O)

ACT 695 Var. Independent Study.

ACT 696 Var. Group Study.
# AGRICULTURAL EDUCATION COURSES

*Department of Agricultural and Resource Economics*

*College of Agricultural Sciences*

+AGED 110 03(2-3-0). Agriculture Production Systems. F. Prerequisite: None. Required field trips.
  - Broad survey of the diverse aspects of Colorado agriculture. ($)  

AGED 220 01(1-0-0). Understanding Agricultural Education. F. Prerequisite: None.
  - Understanding different agricultural education systems. Understanding delivery models of agricultural education programs.

AGED 240 02(1-3-0). Technical Tool Applications in Agricultural Education. F. Prerequisite: None.
  - Development of safe competencies and applications related to power and technical tools utilized in school based agricultural education programs. ($)  

AGED 241 01(1-0-0). Plumbing and Electrical Applications in Agricultural Education. S. Prerequisite: None.
  - Development of competencies and theory related to plumbing and electrical applications utilized in school-based Agricultural Education programs. ($)  

AGED 244 01(1-0-0). Power Systems in Agricultural Education. S. Prerequisite: None.
  - Development of competencies and theory related to agricultural power systems utilized in school-based agricultural education programs. ($)  

AGED 320 01(0-3-0). Technology Lab for Agricultural Education. S. Prerequisite: AGED 240 or concurrent registration or AGED 241 or concurrent registration or AGED 244 or concurrent registration. May be taken twice for credit.
  - Laboratory applications related to the power, structure, and technical systems pathway utilized in school-based agricultural education programs. ($)  

AGED 330 03(3-0-0). Program Design and Evaluation in Agricultural Literacy. F. Prerequisite: AGED 220.
  - Design and evaluate programs in agricultural literacy using experiential methods.

AGED 420 03(3-0-0). Developing School-Based Agricultural Education Programs. S. Prerequisite: AGED 220.
  - Developing knowledge in the approach and delivery of school-based agricultural education programs. ($)  

AGED 430 03(3-0-0). Methods of Agricultural Literacy. S. Prerequisite: AGED 330.
  - Prepare and conduct agricultural literacy instructional units to work with a variety of audiences and instructional topics.

AGED 487 Var[1-6]. Internship. F, S, SS. Prerequisite: None.  

AGED 495 Var[1-6]. Independent Study. F, S, SS. Prerequisite: None.  

AGED 496 Var[1-12]. Group Study. F, S, SS. Prerequisite: None.  

AGED 540 02(2-0-0). Agricultural Education Laboratory Management and Safety. F, SS. Prerequisite: EDCT 420.
  - Theory, management, and pedagogy of delivering safety instruction and experiential curriculum in secondary agricultural education laboratory settings.

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### AGRICULTURE COURSES

#### Nondepartmental College of Agricultural Sciences

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Prerequisites/Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRI 116/IE 116 03(2-0-1)</td>
<td>Plants and Civilizations. (GT-S53, AUCC 3E)</td>
<td>F, S. Prerequisite: None. Credit not allowed for both AGRI 116 and IE 116. Plant origins and their relationships with cultures/civilizations as food, spices, perfumes, and medicines and in art, religion, wars, slavery, etc.</td>
</tr>
<tr>
<td>AGRI 140 03(0-0-3)</td>
<td>Technology in Agriculture. F, S, SS.</td>
<td>Prerequisite: None. Computer concepts and terminology. PC operating systems, Web tools, e-mail, presentation technology, word processing, spreadsheet, and database. (NT-O)</td>
</tr>
<tr>
<td>AGRI 192 01(0-0-1)</td>
<td>Orientation to Agricultural Systems. F, S.</td>
<td>Prerequisite: None. Freshman inquiry course in agriculture. Information and skills necessary to succeed in majors in the agricultural sciences.</td>
</tr>
<tr>
<td>AGRI 270/IE 270 03(3-0-0). World Interdependence – Population and Food. (GT-S53, AUCC 3E)</td>
<td>S. Prerequisite: None. Credit not allowed for both AGRI 270 and IE 270. Survey of world population and food; emphasis on understanding the problems and opportunities in a world context.</td>
<td></td>
</tr>
<tr>
<td>AGRI 292 01(1-0-0)</td>
<td>Transfer Seminar. F, S.</td>
<td>Prerequisite: Transfer student. The university and its resources, college success skills, careers in the various disciplines of agriculture; current issues in agriculture.</td>
</tr>
<tr>
<td>AGRI 300 02(2-0-0)</td>
<td>Issues in Agriculture. F.</td>
<td>Prerequisite: None. Credit not allowed for both AGRI 300 and AGRI 500. Scientific, technical, cultural, and social issues facing agriculture, and their interrelationships. (NT-O)</td>
</tr>
<tr>
<td>AGRI 330/PHL 330 03(3-0-0). Agricultural and Food System Ethics.</td>
<td>S. Prerequisite: CO 150. Credit not allowed for both AGRI 330 and PHL 330. Basic concepts in ethics and their application to agriculture and the food system.</td>
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</tr>
<tr>
<td>AGRI 374 01(0-0-1). Professional Development Seminar. F, S, SS.</td>
<td>Prerequisite: Junior or senior standing. Assess personal workplace skills and strengths, including teamwork and decision-making, for use in career planning.</td>
<td></td>
</tr>
<tr>
<td>+AGRI 383/NR 383 02(0-2-1). U.S. Travel-Integrated Resource Management.</td>
<td>S. Prerequisite: None. Credit not allowed for both AGRI 383 and NR 383. Required field trips. Evaluation of integrated ranch management decision alternatives in conjunction with professional resource managers. ($)</td>
<td></td>
</tr>
<tr>
<td>AGRI 465 03. Pesticide Management. F, S, SS.</td>
<td>Prerequisite: None. Offered as correspondence course only. Reasons for and safe correct pesticide use. (NT-C)</td>
<td></td>
</tr>
<tr>
<td>AGRI 466 01. Management of On-Farm Stored Grain. F, S, SS.</td>
<td>Prerequisite: None. Offered as correspondence course only. Basic principles of grain storage and management strategies for insects and fungi; chemical controls and safe pesticide use. (NT-C)</td>
<td></td>
</tr>
<tr>
<td>AGRI 467 02. Management and Control of Wood-Destroying Pests. F, S, SS.</td>
<td>Offered as correspondence course only. Wood-destroying agents; wood preservative chemicals and treatment; industry regulations; labels; safety; environmental concerns. (NT-C)</td>
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</tr>
<tr>
<td>AGRI 468 03. Management and Control of Turfgrass Pests. F, S, SS.</td>
<td>Prerequisite: None. Offered as correspondence course only. Classification of turfgrass pests; pest management, control; environmental concerns, industry regulations; safety, skill in pesticide applications. (NT-C)</td>
<td></td>
</tr>
<tr>
<td>AGRI 487A-B Var[1-12]. Internship. F, S, SS.</td>
<td>Prerequisite: None. No more than a total of 12 credits allowed for AGRI 487. A) Domestic. (NT-O) B) International. (NT-O)</td>
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</tr>
<tr>
<td>AGRI 492 Var[1-3]. Seminar. F, S, SS.</td>
<td>Prerequisite: None.</td>
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<tr>
<td>AGRI 495 Var[1-12]. Independent Study. F, S, SS.</td>
<td>Prerequisite: None.</td>
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</tr>
<tr>
<td>AGRI 500 03(2-0-1). Advanced Issues in Agriculture. F.</td>
<td>Prerequisite: None. Credit not allowed for both AGRI 500 and AGRI 300. Scientific, technical, cultural, and social issues facing agriculture, and their interrelationships. (NT-O)</td>
<td></td>
</tr>
<tr>
<td>AGRI 521 03(3-0-0). Emerging Issues and Challenges for Global Agr. F, S, SS.</td>
<td>Prerequisite: Written consent of instructor. Offered only online. Interdisciplinary course containing tools and knowledge to discuss the emerging challenges of the global agriculture, water, and food system. (NT-O)</td>
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</tr>
<tr>
<td>*AGRI 545 02(2-0-0). Plant Tissue Culture. F.</td>
<td>Prerequisite: BZ 440. Theory, technology, and techniques of cell, organ, tissue, and protoplast culture of plants.</td>
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<tr>
<td>AGRI 546 03(3-0-0). Principles of Cooperative Extension. F, S, SS.</td>
<td>Prerequisite: None. Traditional and contemporary delivery systems of Cooperative Extension emphasizing structures of nonformal education. (NT-C/O)</td>
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<tr>
<td>AGRI 547 04(2-0-2). Delivery of Cooperative Extension Programs. S.</td>
<td>Prerequisite: Written consent of instructor. Methods, techniques, and procedures in planning, implementation, and delivery of Cooperative Extension programs. (NT-C/V/O)</td>
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<tr>
<td>AGRI 550 03(3-0-0). Capacity Building for a Changing Workplace. F, S.</td>
<td>Prerequisite: Graduate standing in agricultural sciences. A framework for competence in workplaces applies situation analysis/problem-solving to solve real life agricultural situations shared by experts.</td>
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<tr>
<td>AGRI 562/SOC 562 03(2-0-1). Sociology of Food Systems and Agriculture. F.</td>
<td>Prerequisite: SOC 100 or SOC 105. Credit not allowed for both AGRI 562 and SOC 562. How agricultural choices generate intended and unintended consequences for human communities and the natural environment.</td>
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<tr>
<td>*AGRI 570/*VS 570 02(2-0-0). Issues in Animal Agriculture. F.</td>
<td>Prerequisite: None. Credit not allowed for both AGRI 570 and VS 570. Issues that have a major impact on the direction of changes in animal agriculture.</td>
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<tr>
<td>AGRI 587A-B Var[1-12]. Internship. F, S.</td>
<td>Prerequisite: None. No more than a total of 12 credits allowed for AGRI 587. A) Domestic. (NT-O) B) International. (NT-O)</td>
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</tbody>
</table>

* Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
AGRI 601/ENGR 601 03(2-2-0). Bioenergy Technology. F. Prerequisite: None. Required field trips.
Science and engineering aspects of bioenergy production, including plant biology, fermentation, and biofuel properties.

AGRI 602 03(2-2-0). Bioenergy Policy, Economics, and Assessment. S. Prerequisite: AGRI 601/ENGR 601.
Bioenergy policy; economic principles applied to biofuel production; evaluation of environmental impacts of bioenergy production.

AGRI 630 03(3-0-0). Integrated Decision Making/Management Skills. F. Prerequisite: None.
Motivation for management, decision making, introduction to systems, information management, introduction to statistics. (NT-O)

AGRI 631 03(3-0-0). Building the Business. F, S. Prerequisite: None.
Skills required to organize and implement a modern business enterprise with focus on land-based operations. (NT-O)

AGRI 632 03(2-2-0). Managing for Ecosystem Sustainability. F, S. Prerequisite: None.
Impacts of ecological processes, use of mechanism-based understanding, and tools used to manage the ecosystem for sustainability. (NT-O)

AGRI 633 03(2-2-0). Understanding and Managing Animal Resource. F, S. Prerequisite: None.
Evaluating nutritional requirements of a variety of animals, how and why requirements vary according to level of production. (NT-O)

AGRI 634 03(2-2-0). Animal Production Systems. F, S. Prerequisite: None.
Developing animal management systems for a variety of animal species in a forage-based environment. (NT-O)

AGRI 635 03(3-0-0). Integrated Forage Management. F, S. Prerequisite: None. Required field trips.
Development of management plans that integrate diverse forage resources including native rangeland and cultivated forages. (NT-O)

AGRI 636 03(3-0-0). Analyzing and Managing the Business. F, S. Prerequisite: None.
Assimilating, preparing, and analyzing records; reading financial statements to manage a land-based business. (NT-O)

AGRI 637 03(3-0-0). Understanding Policy and Emerging Issues. F, S. Prerequisite: None.
Origination, purpose, and policy effects of policy on land-based enterprises; policy effects on management decisions. (NT-O)

AGRI 638 03(3-0-0). Ecosystem Services on Agricultural Lands. F, S. Prerequisite: None. Required field trips.
Within an economics framework, explores the unique management challenges involved in a modern, diversified agricultural operation. (NT-O)

AGRI 639 03(3-0-0). Products to Profit. F, S. Prerequisite: None.
Marketing all aspects of the enterprise, beginning with land and forage resource and tracking all revenue generation. (NT-O)

AGRI 640 03(3-0-0). Integrated Resource Management Plan. F, S. Prerequisite: None.
Formulation of an optimal land management plan for a specific site based on specific goals and objectives. (NT-O)

AGRI 684 Var[1-2]. Supervised College Teaching. F, S, SS. Prerequisite: None. Maximum of 4 credits allowed in course.

AGRI 692 01(0-0-1). Seminar. F, S, SS. Prerequisite: None.

AGRI 695 Var[1-12]. Independent Study. F, S, SS. Prerequisite: None. (NT-O)

AGRI 698 Var[1-6]. Research. F, S, SS. Prerequisite: None. (NT-O)

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APPLIED HUMAN SCIENCES COURSES
Nondepartmental
College of Health and Human Sciences

AHS 201 03(3-0-0). Perspectives in Gerontology. F, S. Prerequisite: HDFS 101 or PSY 100 or SOC 100. Using multidisciplinary perspectives to explore a variety of issues in human aging; emphasis on applied gerontology. (NT-O)

AHS 484 02(0-0-2). Supervised College Teaching. F, S, SS. Prerequisite: None. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

AHS 487 Var[1-16]. Internship in Human Services. Prerequisite: Written consent of instructor. Application of skills learned in interdisciplinary program or major to a variety of human service settings.

AHS 490 Var[1-5]. Workshop. F, S, SS. Prerequisite: None.

AHS 492 Var[1-5]. Seminar. F, S, SS. Prerequisite: None.

AHS 495 Var[1-5]. Independent Study. F, S, SS. Prerequisite: None.

AHS 590 Var[1-5]. Workshop. F, S, SS. Prerequisite: None.

AHS 692 Var[1-5]. Seminar. F, S, SS. Prerequisite: None.

AHS 695 Var[1-5]. Independent Study. F, S, SS. Prerequisite: None.

AHS 697 Var[1-6]. Group Study. F, S, SS. Prerequisite: None. Offered as an online course only. (NT-O)

° Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
APPAREL AND MERCHANDISING COURSES
Department of Design and Merchandising
College of Health and Human Sciences

AM 101 03(3-0-0). Fashion Industries. F, S, SS. Prerequisite: None.
Development, organization, and trends of domestic and foreign fashion industries. (NT-O)

AM 110 03(2-2-0). Apparel and Merchandising Digital Technology.
F, S. Prerequisite: None.
Introduction to computer technologies used in apparel and merchandising industries.

AM 130 03(3-0-0). Design Foundation-Apparel and Merchandising.
F, S. Prerequisite: None.
Impact of elements and principles of design on apparel and merchandising within 20th century art. (NT-O)

AM 143 04(2-4-0). Introduction to Apparel Design. S. Prerequisite:
Acceptance into the Apparel Design and Production program concentration.
Apparel and garment-pattern development, construction, quality; skill development in technical drawing and rendering. ($)

AM 240 03(0-6-0). Computer-Aided Apparel Design. S. Prerequisite:
AM 143; portfolio review.
Apparel design using the computer to generate drawings for fabric, graphic logo, and apparel. ($)

AM 241 03(1-4-0). Apparel Production. F. Prerequisite: AM 143;
MATH 124 or concurrent registration; portfolio review.
Production processes of sewn textile products, flat pattern, pattern grading, marker making, and writing specifications. ($)

AM 243 03(3-0-0). Adobe Photoshop for Textile Design. F, S, SS.
Prerequisite: None. Offered as online course only.
Textile design using Adobe Photoshop to generate drawings for surface and structural textile design. (NT-O)

AM 244 03(1-4-0). Illustration for Apparel Design. F. Prerequisite:
AM 143; portfolio review. Credit not allowed for both AM 244 and AM 343.
Illustration skills using traditional media/CAD applications and analysis of visual communication.

AM 250 03(3-0-0). Clothing, Adornment and Human Behavior.
(GT-S3, AUCC 3E). F, S. Prerequisite: None.
Psychological, sociological, and cultural factors influencing clothing and adornment.

AM 270 03(3-0-0). Merchandising Processes. S. Prerequisite: AM 101
with a C- or better; AM 130 with a C- or better; DM 120 with a C- or better; MATH 124.
Forecasting, planning, evaluating, and presenting merchandising lines to meet target market demands. (NT-O)

AM 290 Var. Workshop. F, S, SS. Prerequisite: None.

AM 321 03(3-0-0). Advanced Textiles. S. Prerequisite: DM 120.
Textile product serviceability; effect of fiber structure on properties and performance; new developments.

AM 330 03(3-0-0). Textile and Apparel Economics. F. Prerequisite:
AM 270 with a C- or better; DM 120 with a C- or better; DM 272 with a C- or better; AREC 202 with a C- or better or ECON 202 with a C- or better.
Manufacture of textile and apparel products; structure of the industries; international trade and consumption.

AM 341 03(1-4-0). Computer-Aided Apparel Production. S. Prerequisite:
AM 241.
Computer-aided design technology used in apparel sketching, pattern drafting, grading, and marker making. ($)

AM 342 03(0-6-0). Computer-Aided Textile Design. F. Prerequisite:
AM 110.
Computer-aided technology and multicultural research used to create repeat fabric designs; fabric printing using silkscreen.

AM 344 03(3-0-0). Adobe Illustrator for Apparel Designers F, S, SS.
Prerequisite: AM 243 or concurrent registration. Offered only through the Division of Continuing Education.
Apparel design using Adobe Illustrator to generate drawings for garment technical sketching, fashion illustration, and graphic logos. (NT-O)

AM 345 03(0-6-0). Draping Design. S. Prerequisite: AM 241.
Apparel designing through basic draping techniques. ($)

AM 363 03(3-0-0). Historic Costume. S. Prerequisite: None.
Influence of social, political, and economic conditions on costume of predynastic Egypt to present time.

AM 364 03(3-0-0). History of Fashion Designers/Manufacturers. F,
S, SS. Prerequisite: None. Offered as online course only.
Fashion designers and manufacturers who established the field and their contemporaries. (NT-O)

AM 366 03(3-0-0). Merchandising Promotion. F. Prerequisite: AM
270 or MKT 300 or MKT 305.
Activities used to influence sale of merchandise and services; to promote trends and ideas.

AM 370 03(3-0-0). Fashion Trend Analysis and Forecasting. F, S.
Prerequisite: AM 270.
Fashion trend analysis and forecasting between markets and products; the direction of fashion.

AM 371 04(3-2-0). Merchandising Systems. F, S. Prerequisite: ACT
205 or ACT 210; AM 270 with a C- or better.
Business mathematics and current practices related to acquisition, negotiation, distribution, and sale of merchandise.

+AM 375 03(2-2-0). Product Design and Development. F, S.
Prerequisite: DM 272; AM 270. Required field trips.
Product design and development for apparel and other soft goods through industry-driven projects.

AM 384 Var[1-3]. Supervised College Teaching. F, S, SS. Prerequisite:
None. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

AM 421 03(1-4-0). Textile Analysis. F. Prerequisite: DM 120.
Performance evaluation of selected fabrics through standard testing procedures; individual projects. ($)

*AM 430 03(3-0-0). International Retailing. S. Prerequisite: AM 330; 
DM 360/MKT 360.
Application of retail principles to analyze the internationalization process of retailing.

AM 446 03(1-4-0). Apparel Design and Production. F. Prerequisite:
AM 341; AM 342.
Computer-aided design technology used in apparel sketching, pattern drafting, grading and marker making; final portfolio preparation and review. ($)

*AM 450 03(3-0-0). Social-Psychological Aspects of Clothing. S.
Prerequisite: AM 250; PST 100 or SOC 100.
Psychological and social factors influencing clothing and its effect on others.

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AM 460 03(3-0-0). Historic Textiles. F. Prerequisite: None.
Historic development of textiles from a global perspective, focusing on textiles produced by diverse cultures.

°AM 466 03(2-2-0). Retail Environment Design and Planning. S.
Prerequisite: AM 130; AM 270.
Application of design/merchandising principles to retail selling environments, including traditional store design/layout, direct mail, and websites.

AM 479 03(3-0-0). Merchandising Policies and Strategies. F, S.
Prerequisite: AM 270; AM 330; AM 366; AM 371; DM 360/MKT 360.
Examination of merchandising environment as influenced by its structure, and economic, legal, demographic, and psychographic trends.

AM 495A-D Var[1-3]. Independent Study. F, S, SS. Prerequisite: None.

AM 496A-D Var. Group Study. F, S, SS. Prerequisite: None.

AM 500 01(1-0-0). Apparel Supply Chains/Social Responsibility. F.
Prerequisite: None. Offered as online course only.
Challenges for social responsibility in the context of the structure, relationships, and long-standing practice of the apparel industry. (NT-O)

*AM 525 03(1-2-1). Application of Textile Technology to Design. F.
Prerequisites: AM 321 or AM 421.
Advanced study of textile technology in apparel, merchandising and interior design; recent advances in the field.

*AM 546 03(1-2-1). Theoretical Apparel Design Solutions. F.
Prerequisite: None.
Applications of theoretical frameworks and computer-aided design techniques for the development of wearable and fiber art. ($)

*AM 550 03(0-0-3). Appearance, Self, and Society. S. Prerequisite: AM 450 or six credits in psychology and/or sociology.
Analysis of social science theories and concepts as they apply to appearance and dress research.

°AM 572 03(0-0-3). Merchandising Theories and Strategies. S.
Prerequisite: Graduate student standing.
Theoretical perspective on the design and development of merchandising strategies for U.S. and global production, distribution, and consumption.

AM 590B Var. Workshop-Apparel. F, S, SS. Prerequisite: None.

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AMERICAN STUDIES COURSES  
Department of English  
College of Liberal Arts

AMST 100 03(3-0-0). Self/Community in American Culture, 1600-1877. (GT-AH2, AUCC 3D). F. Prerequisite: None.  
Meaning and development of American culture, 1600-1877, through themes of self and community, in art, politics, society, and religion.

AMST 101 03(3-0-0). Self/Community in American Culture Since 1877. (GT-AH2, AUCC 3D). S. Prerequisite: None.  
Meaning and development of American culture since 1877, through themes of self and community, in art, politics, society, and religion.

AMST 300/E 300 03(3-0-0). American Lives—Methods in American Studies. F, S. Prerequisite: AMST 100; AMST 101. Credit not allowed for both AMST 300 and E 300. 
Methods and changing approaches of American studies since 1950s using autobiography as organizing theme.

AMST 492 03(3-0-0). Seminar in American Studies. Prerequisite: AMST 300/E 300.

AMST 495 Var[1-3]. Independent Study in American Studies. Prerequisite: Written consent of instructor. 
Individually guided studies in interdisciplinary work in American culture.

AMST 499 03. Thesis in American Studies. Prerequisite: AMST 492.

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<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Special Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANEQ 101</td>
<td>Food Animal Science. F, S. Prerequisite: None. Required field trips. Development, organization, trends, and management of the livestock industry; emphasis on applying science to the production of food and fiber.</td>
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<tr>
<td>ANEQ 102</td>
<td>Introduction to Equine Science. F. Prerequisite: None. Required field trips. Equine physiology, production systems and management systems as it pertains to the equine industry and management. ($)</td>
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<tr>
<td>ANEQ 104/PHIL 104</td>
<td>Values, Culture, and Food Animal Agriculture. S. Prerequisite: Non-Animal Science majors with a freshman or sophomore standing. Credit not allowed for both ANEQ 104 and PHIL 104.</td>
<td></td>
<td>Evolution of the social values and cultural understandings shaping modern animal agriculture; current problems in animal agriculture.</td>
</tr>
<tr>
<td>ANEQ 201A-B</td>
<td>Preparation of Horses for Competition. F. S. Prerequisite: Written consent of instructor. Development of skills to prepare and present horses in competitions aimed at enhancing their value. A) Western. (S) B) English. ($)</td>
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<tr>
<td>ANEQ 202</td>
<td>Safety in Horse Handling. F. Prerequisite: None. Horse handling safety skills. ($)</td>
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<tr>
<td>ANEQ 203</td>
<td>Equine Management. S. Prerequisite: ANEQ 102. Equine management and care techniques with hands-on experience. ($)</td>
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<tr>
<td>ANEQ 204</td>
<td>Equine Facilities Management. S. Prerequisite: ANEQ 102. Required field trips. Understanding of all aspects required to manage an equine facility coupled with hands-on experience. ($)</td>
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<tr>
<td>ANEQ 220</td>
<td>Feeds and Feeding. F, S. Prerequisite: ANEQ 101 or ANEQ 102. Advantages and limitations of feedstuffs; nutrients and their functions; and feed practices for all physiological stages of livestock.</td>
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<tr>
<td>ANEQ 230</td>
<td>Farm Animal Anatomy and Physiology. F, S. Prerequisite: Three credits of 100-level LIFE. Credit not allowed for both ANEQ 230 and ANEQ 305. Basic concepts of farm animal anatomy and physiology; emphasis on growth, digestion, and reproduction.</td>
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<tr>
<td>ANEQ 249</td>
<td>Introduction to the Trail Riding Industry. F, S. Prerequisite: Written consent of instructor. Emphasis on horse care, regulations, first aid, health, training, and hosting a trail ride. ($)</td>
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<tr>
<td>ANEQ 250</td>
<td>Live Animal and Carcass Evaluation. F, S. Prerequisite: ANEQ 101 or ANEQ 102. Growth, development, and value-determining characteristics of market animals. ($)</td>
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<tr>
<td>ANEQ 286</td>
<td>Livestock Practicum. F, S. Prerequisite: ANEQ 101 or ANEQ 102. Livestock breed and terminology; classification of feedstuffs; livestock handling and care; basic animal management techniques, hands-on experience. ($)</td>
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<tr>
<td>ANEQ 292</td>
<td>Equine Industry Seminar. S. Prerequisite: ANEQ 102. May be offered as a partial semester course. Overview of the equine industry and industry careers. (NT-B)</td>
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<tr>
<td>ANEQ 300A-W</td>
<td>Topics in Animal Sciences. F, S. A) Livestock handling 01(1-0-0). B) /BSPM 300. Livestock entomology 01(1-0-0). Prerequisite: 3 credits of BZ or LIFE at the 100-level. Credit not allowed for both ANEQ 300B and BSPM 300. E) Family ranching 01(1-0-0). S (odd years). Prerequisite: ANEQ 101 or ANEQ 102. L) Quality Assurance 02(2-0-0). Prerequisite: ANEQ 101 or ANEQ 102. N) Seed-stock merchandising 02(2-0-0). F. Prerequisite: Junior or senior standing. Overview of beef seedstock industry, including hands-on selection, management, and marketing of cattle. Course required to apply for seedstock team. +R) Calves and Calf Care 02(1-2-0). Prerequisite: ANEQ 310; ANEQ 478. Required field trips. ($) T) Event, fair, and show management 01(1-0-0). Prerequisite: ANEQ 101 or ANEQ 102. Credit not allowed for both ANEQ 300T and ANEQ 358. U) Seedstock sale management 02(2-0-0). Prerequisite: ANEQ 300N. S, W) Equine manure management 01(1-0-0). S. Prerequisite: ANEQ 101 or ANEQ 102.</td>
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<tr>
<td>ANEQ 305</td>
<td>Functional Large Animal Anatomy/Physiology. F, S, S. Prerequisite: CHEM 107 or CHEM 111; 3 credits of 100-level LIFE. Credit not allowed for both ANEQ 305 and ANEQ 230. Concepts of large animal anatomy and physiology; emphasis on growth, digestion, and reproduction.</td>
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<tr>
<td>ANEQ 310</td>
<td>Animal Reproduction. F, S, S. Prerequisite: ANEQ 230 or ANEQ 305 or BMS 300. Anatomy and physiology of the reproductive system; causes of reproductive failure in farm animals; methods of improving reproductive performance. (NT-O)</td>
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<tr>
<td>ANEQ 312</td>
<td>Animal Ultrasonography. F. Prerequisite: ANEQ 230 or ANEQ 305; ANEQ 310. Fundamentals and application of using ultrasound in farm animals; basic reproductive technologies; utilizing ultrasound as a management tool. ($)</td>
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<tr>
<td>ANEQ 313</td>
<td>Prevention and Control of Livestock Diseases. F. Prerequisite: ANEQ 230 or ANEQ 305 or BMS 300; ANEQ 310 or concurrent registration; ANEQ 320 or concurrent registration; junior or senior standing. Credit not allowed for both ANEQ 313 and VS 313. Common ailments of livestock; sanitation and disease prevention and control.</td>
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<tr>
<td>ANEQ 315</td>
<td>Equine Behavior. S. Prerequisite: ANEQ 102; sophomore or higher standing. Equine behaviors related to training and learning.</td>
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<tr>
<td>ANEQ 322</td>
<td>Pet Nutrition. F, S, S. Prerequisite: ANEQ 320; ANEQ 345; FSHN 350. Offered as correspondence course or online course only. Nutrients, nutrient requirements, feeding practices, food sources and management for companion animals (dogs, cats, birds, fish, reptiles, etc.). (NT-C/O)</td>
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<tr>
<td>ANEQ 323</td>
<td>Zoo Nutrition. F, S, S. Prerequisite: ANEQ 320; ANEQ 345; FSHN 350. Offered as correspondence course or online course only. Unique nutritional requirements of mammalian, avian, and reptile captive wild animals; management protocols needed. (NT-C/O)</td>
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<tr>
<td>ANEQ 325</td>
<td>Equine Exercise Physiology. S. Prerequisite: ANEQ 230 or ANEQ 305 or BMS 300. Overview of the main aspects of equine exercise physiology. ($)</td>
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ANEQ 328 03(3-0-0). Foundations in Animal Genetics. S. Prerequisite: ANEQ 101 or ANEQ 102; LIFE 102.

Foundational information of the influence of the genome and its genes on qualitative and quantitative traits in animal populations.

ANEQ 330 03(3-0-0). Principles of Animal Breeding. F, S. Prerequisite: ANEQ 328 or BZ 350 or SOCR 330; 3 credits of STAT 200-279 or 300-379.

Genetic principles underlying animal improvement; elementary population genetics; heritability; selection response; mating systems; DNA markers. (NT-O)

ANEQ 334 03(3-0-0). Principles of Equine Genetics. S. Prerequisite: ANEQ 102; ANEQ 328 or SOCR 330 or BZ 350; STAT 301 or STAT 307.

Principles of selection and genetic improvement of horses, including economically relevant qualitative and quantitative traits.

ANEQ 340 03(0-6-0). Horse Training and Sale Preparation I. F. Prerequisite: Written consent of instructor.

Practical training skills using a yearling or two year old: in-hand, restraint, ground driving, longeining, first rides, stable management. ($)

ANEQ 341 03(0-6-0). Horse Training and Sale Preparation II. S. Prerequisite: ANEQ 340.

Skills in training for specific riding maneuvers, conditioning, fitting for sale. Additional time outside of class required on weekends. ($)

ANEQ 344 04(3-2-0). Principles of Equine Reproduction. F. Prerequisite: ANEQ 102; ANEQ 230 or ANEQ 305 or BMS 300.

Principles of reproduction and reproductive management of the mare and stallion. ($)

ANEQ 345 03(3-0-0). Principles of Nutrition: Equine Applications. F, S. Prerequisite: ANEQ 102; ANEQ 230 or ANEQ 305 or BMS 300; three credits 100-level chemistry; three credits of mathematics.

Principles of nutrition; application in feeding horses in different physiological states to promote health and well-being. (NT-O)

ANEQ 346 04(3-2-0). Equine Disease Management. F. Prerequisite: ANEQ 230 or ANEQ 305 or BMS 300.

Normal and abnormal body structures and functions of major systems of the horse. Recognition of main diseases, causes, prevention and treatments. ($)

ANEQ 348 02(1-2-0). Equine Training Techniques. S. Prerequisite: ANEQ 315.

Training techniques in multiple riding disciplines.

ANEQ 349 02(1-2-0). Packing and Outfitting. F, S. Prerequisite: ANEQ 102; written consent of instructor.

Business aspects of outfitting/packing the horse; hitches, knots, horse care; planning pack trips, setting up camp. Overnight pack trip. ($)

ANEQ 351 02(1-2-0). Techniques in Therapeutic Riding. F, S. Prerequisite: ANEQ 102.

Equine assisted activities: therapeutic horseback riding, hippotherapy, driving/vaulting, mental health treatments, programs for youth at risk. ($)

ANEQ 352 02(0-4-0). Introduction to Horse Evaluation. S. Prerequisite: ANEQ 102.

Criteria and techniques for evaluation of horses; development of logical decision processes for establishing comparative value.

ANEQ 353 03(0-6-0). Advanced Horse Evaluation. F. Prerequisite: ANEQ 352.

Advanced criteria/techniques for horse evaluation; logical decision process development to establish comparative value; intercollegiate competition.

ANEQ 354 03(0-6-0). Introduction to Livestock Evaluation. F. Prerequisite: ANEQ 101.

Criteria and techniques for evaluation of livestock; development of logical decision processes for establishing comparative value.

ANEQ 355 01(0-9-0). Advanced Livestock Evaluation. F, S. Prerequisite: ANEQ 354. Course may be taken twice for a maximum of 2 credits.

Advanced criteria and techniques for evaluation of livestock; establishing comparative value; participating in intercollegiate competition.

ANEQ 356 03(0-6-0). Introduction to Dairy Evaluation. S. Prerequisite: None.

Criteria and techniques for evaluation of dairy cattle; development of logical decision processes for establishing comparative value.

ANEQ 357 02(0-4-0). Advanced Dairy Evaluation. F. Prerequisite: ANEQ 356.

Advanced criteria and techniques for evaluation of dairy cattle; establishing comparative value; participating in intercollegiate competition.

ANEQ 358 02(2-0-0). Equine Event and Sales Management. F. Prerequisite: ANEQ 102. Credit not allowed for both ANEQ 358 and ANEQ 300T.

Skills necessary to produce, organize, and promote equine related events. ($)

ANEQ 359 02(0-4-0). Equine Sales Production. S. Prerequisite: ANEQ 358; written consent of instructor.

Emphasizes skills necessary to host and evaluate an equine sale.

ANEQ 360 03(3-0-0). Principles of Meat Science. F. Prerequisite: Three credits 100-level chemistry.

Structure, composition, and biology of muscle and associated tissues; wholesomeness, nutritive value, and palatability of beef, pork, and lamb.

ANEQ 361 03(0-6-0). Introduction to Meat Product Evaluation. F. Prerequisite: None.

Criteria and techniques for evaluation of meat products; development of logical decision processes for establishing comparative value.

ANEQ 362 01(0-4-0). Advanced Meat Production Evaluation. F, S. Prerequisite: ANEQ 361. Course may be taken twice for a maximum of 2 credits.

Criteria and techniques for evaluation of meat products; establishing comparative value; participating in intercollegiate competition.

ANEQ 363 01(0-2-0). Introduction to Wool and Fiber Evaluation. F. Prerequisite: None.

Criteria and techniques for evaluation of wool; development of logical decision processes for establishing comparative value.

ANEQ 364 01(0-2-0). Advanced Wool and Fiber Evaluation. S. Prerequisite: ANEQ 363.

Criteria and techniques for evaluation of wool; establishing comparative value; participating in intercollegiate competition.

ANEQ 365 03(2-0-0). Principles of Teaching Therapeutic Riding. S. Prerequisite: ANEQ 351 and sophomore standing or above. Required field trips. Practical experiences and knowledge of the techniques to be a professional certified therapeutic riding instructor. ($)

1 For Animal Science and Equine Science majors, a maximum of five credits is allowed for ANEQ 350A-E, ANEQ 352, ANEQ 353, ANEQ 354, ANEQ 355, ANEQ 356, ANEQ 357, ANEQ 361, ANEQ 362, ANEQ 363, and ANEQ 364. A maximum of 12 credits is allowed for any combination of the following: ANEQ 350A-E, ANEQ 352, ANEQ 353, ANEQ 354, ANEQ 355, ANEQ 356, ANEQ 357, ANEQ 361, ANEQ 362, ANEQ 363, ANEQ 364, ANEQ 384, ANEQ 487, ANEQ 495, and ANEQ 496.

º Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
ANEQ 305 or BMS 300; ANEQ 310; ANEQ 320; senior standing.

Integration of nutrition, genetics, physiology, and economics for ANEQ 473 03(2-3-0). Dairy Systems. breeding, nutrition, reproduction, and management systems.
Sheep production under farm and ranch conditions; products, breeds, environment.
ANEQ 472 03(3-0-0). Sheep Systems. Prerequisite: Any two of the following courses: ANEQ 334, ANEQ 344, ANEQ 345, ANEQ 346.

For students planning a career in the horse industry; management of facilities, production systems, personnel, marketing, and biological systems.
ANEQ 441 02(2-0-0). Integrated Equine Science. F, SS. Prerequisite: ANEQ 334; ANEQ 344; ANEQ 345; ANEQ 346.

Describe, understand, and integrate the newest scientific principles in equine sciences with equine management.
ANEQ 442 02(0-4-0). Riding Instructor Training. F, S. Prerequisite: ANEQ 102; written consent of instructor.
Teaching techniques; theory; handling of large mounted groups, beginner through advanced levels. ($)

ANEQ 443 02(1-2-0). Applied Equine Nutrition. S. Prerequisite: ANEQ 345. Required field trips.
Applying principles of nutrition to feeding horses in different physiological states in an effort to promote their health and well-being.

ANEQ 444 02(2-0-0). Equine Business Management. F, SS. Prerequisite: ANEQ 440. Required field trips.
“Real life” equine industry experience and the ins and outs of managing an equine facility/business. ($)

ANEQ 445 02(1-3-0). Foaling Management. S. Prerequisite: ANEQ 344 or PVM sophomore standing.
Management of the foaling mare and newborn foal; monitoring techniques, preventative and emergency care procedures. ($)

ANEQ 448 03(2-2-0). Livestock Manure Management and Environment. F. Prerequisite: Three credits 100-level chemistry. Credit allowed for only one of the following courses: ANEQ 448, ANEQ 548, SOCR 448, SOCR 548. Required field trips.
Manure management; maximizing benefits to soils and crops; minimizing air and water quality hazards; complying with regulations.

ANEQ 460 02(2-0-0). Meat Safety. F. Prerequisite: Three credits 100-level chemistry.
Meat safety; food born pathogens; hazard analysis critical control points (HACCP) and total quality management (TQM) practices.

ANEQ 470 04(3-2-0). Meat Processing Systems. F. Prerequisite: ANEQ 360; senior standing.
Advanced understanding of the manufacturing, packaging, distribution, storage, and cooking of meat products. ($)

ANEQ 472 03(2-2-0). Sheep Systems. S. Prerequisite: Senior standing.
Sheep production under farm and ranch conditions; products, breeds, breeding, nutrition, reproduction, and management systems.
ANEQ 473 03(2-3-0). Dairy Systems. F. Prerequisite: ANEQ 230 or ANEQ 305 or BMS 300; ANEQ 310; ANEQ 320; senior standing.
Integration of nutrition, genetics, physiology, and economics for management decisions of dairy farm operations and production and marketing of milk.

ANEQ 474 03(2-2-0). Swine Systems. S. Prerequisite: Senior standing.
Production of purebred and commercial swine; breeds, breeding, feeding, marketing, and management. ($)

ANEQ 475 02(2-0-0). Travel Abroad-Animal Agriculture. F, S, SS. Prerequisite: Written consent of instructor.
Onsite evaluation of international animal agriculture systems with emphasis on production, marketing, and management.
ANEQ 476 03(3-0-0). Feedlot Systems. S. Prerequisite: ANEQ 320; senior standing.
Feedlot facilities; nutrition; procurement, merchandising, handling, processing cattle; health care; custom feeding; managerial duties. ($)

ANEQ 478 03(2-2-0). Beef Systems. F. Prerequisite: Senior standing.
Beef production as related to consumer through seedstock segments. Major emphasis on cow-calf management. ($)

ANEQ 486 01(0-3-0). Therapeutic Riding Instructor Practicum. F. Prerequisite: ANEQ 365.
Mentor-guided teaching hours to students preparing for the PATH International Instructor examination.
ANEQ 486 01(0-3-0). Therapeutic Riding Instructor Practicum. F. Prerequisite: ANEQ 365.
Mentor-guided teaching hours to students preparing for the PATH International Instructor examination.
ANEQ 487A-B Var [1-6]. Internship. F, S, SS. Prerequisite: Written consent of instructor. Maximum of 6 credits allowed in course.

ANEQ 495 Var. Independent Study. F, S, SS. Prerequisite: Written consent of instructor. Maximum of 6 credits allowed in course.

ANEQ 496 Var[1-5]. Group Study. F, S, SS. Prerequisite: Written consent of instructor. Maximum of 6 credits allowed in course.

ANEQ 500 Var[1-6]. Recent Developments. SS. Prerequisite: Graduate standing.
Recent developments in animal science, avian science, and food technology. ($)

ANEQ 510 04(3-2-0). Bovine Reproduction Management. F. Prerequisite: ANEQ 310.
Role of reproduction in economic efficiency of cattle production systems. Causes of delayed breeding and nonpregnancy, abortion and perinatal mortality. ($)

ANEQ 520 03(3-0-0). Applied Comparative Nutrition. F. Prerequisite: ANEQ 320 or FSHN 550 and FSHN 551.
Comparative digestion strategies and mechanisms of nutrient utilization for terrestrial vertebrates: livestock, pets, wildlife, and zoo animal models.
ANEQ 522 03(3-0-0). Animal Metabolism. F. Prerequisite: CHEM 245 and CHEM 246 or CHEM 346.
Nutrient digestion, absorption, transport and metabolism in monogastric and ruminant domestic species as affected by physiological changes.

ANEQ 548 04(2-2-1). Issues in Manure Management. F. Prerequisite: Three credits 100-level chemistry. Credit allowed for only one of the following courses: ANEQ 448, ANEQ 548, SOCR 448, SOCR 548. Required field trips.
Manure management practices maximizing benefits to soils and crops while minimizing hazards to air and water quality and complying with regulations.

*: Alternate year offering (even); **: Alternate year offering (odd); +: Field trips; S: Special course fee; NT Approved for nontraditonal course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
ANEQ 550A-B 02(1-2-0). Basic Research Surgery. Basic principles and techniques of animal surgery to meet ACUC requirements for experimental procedures. A) Farm animal. F. Prerequisite: ANEQ 230 or ANEQ 305 or BMS 300 or BMS305; junior, senior, or graduate standing. ($) B) Rodent. S. Prerequisite: ANEQ 230 or ANEQ 305 or BMS 300 or BMS 305 or VS 333; junior, senior, or graduate standing. ($)

ANEQ 551 02(1-2-0). Field Necropsy. F. S. Prerequisite: ANEQ 230 or ANEQ 305 or BMS 300; ANEQ 346 or MIP 315A-B or ANEQ 313/Vs 313; junior or senior standing.
Field necropsy techniques for collection of animal tissues for submission to a diagnostic laboratory. ($)

ANEQ 565 03(3-0-0). Interpreting Animal Science Research. S. Prerequisite: ANEQ 101 or ANEQ 102; 3 credits statistics.
Designing, conducting, analyzing, and reporting of animal science research.

ANEQ 567 02(2-0-0). HACCP Meat Safety. S. Prerequisite: ANEQ 460. This is a partial-semester course.
Control of health problems in meat products through hazard analysis critical control point (HACCP) and total quality management (TQM) practices.

ANEQ 575 03(2-2-0). Computational Biology in Animal Breeding. F. Prerequisite: Graduate standing.
Numerical analysis and use of computers to solve problems in animal improvement.

ANEQ 587 Var [1-9]. Internship. F, S, SS. Prerequisite: Written consent of instructor.

ANEQ 610 02(2-0-0). Hormonal Regulation of Growth. S. Prerequisite: BMS 501.
Cellular and molecular regulation of animal growth by hormones and growth factors.

ANEQ 621 03(3-0-0). Vitamin and Mineral Metabolism. S. Prerequisite: Graduate standing.
Vitamin and mineral metabolism in domestic animals.

ANEQ 631 03(2-0-1). Selection Index Theory. S. Prerequisite: Graduate standing.
Quantitative methods for genetic evaluation; selection index theory and introduction to best linear unbiased prediction.

ANEQ 660 01(1-0-0). Topics in Meat Safety. F, S. Prerequisite: ANEQ 567.
Topics of current concern in meat safety.

ANEQ 676 03(1-4-0). Molecular Approaches to Food Safety. F. Prerequisite: MIP 300 or MIP 334.
Molecular subtyping, tracking, and control; molecular ecology and evolution of food-borne pathogens; molecular pathogenesis of food-borne diseases. ($)

ANEQ 699 Var. Thesis. F, S, SS. Prerequisite: Written consent of instructor.

ANEQ 720 03(3-0-0). Nutritional Energetics. F. Prerequisite: Graduate standing.
Dietary energy use to meet animal requirements for maintenance, growth, pregnancy, and lactation; environmental, nutritional, and physiological effects.

ANEQ 725 03(3-0-0). Rumen Metabolism. S. Prerequisite: Graduate standing.
Microbial degradation, transformation, and synthesis of ingested nutrients, feed particle passage kinetics in the rumen.

ANEQ 730 03(3-0-0). Advances in Cattle Breeding. S. Prerequisite: Graduate standing.
Literature and research methods in beef cattle breeding.

ANEQ 731 03(3-0-0). Advanced Genetic Prediction. S. Prerequisite: ANEQ 575; graduate standing.
Models and methods for prediction of genetic merit in livestock population.

ANEQ 784 Var. Supervised College Teaching. F, S, SS. Prerequisite: Graduate standing; written consent of instructor.

ANEQ 792A-F 01(0-0-1). Seminar. F, S, SS. Prerequisite: Graduate standing.

ANEQ 795 Var. Independent Study. F, S, SS. Prerequisite: Graduate standing; written consent of instructor.

ANEQ 799 Var. Dissertation. F, S, SS. Prerequisite: Graduate standing; written consent of instructor.

° Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
ANTHROPOLOGY COURSES

Department of Anthropology

College of Liberal Arts

ANTH 100 03(3-0-0). Introductory Cultural Anthropology. (GT-SS3, AUCC 3C) F, S. Prerequisite: None.
Human societies and their cultural settings; variation in beliefs, social customs, and technologies; human differences in anthropological terms. (NT-O)

ANTH 120 03(3-0-0). Human Origins and Variation. (GT-SC2, AUCC 3A). F, S. Prerequisite: None.
Mechanisms of evolution; genetics. Living primate biology, behavior, and history. Human evolutionary history. Human variation and adaptation. (NT-O)

ANTH 121 01(0-2-0). Human Origins and Variation Laboratory. (GT-SC1, AUCC 3A). F, S, SS. Prerequisite: ANTH 120 or concurrent registration.
Labs demonstrating genetic and evolutionary processes, comparative skeletal anatomy, human evolution through fossil casts, and modern human variation. (NT-O) (S)

ANTH 140 03(3-0-0). Introduction to Prehistory. (GT-HI1, AUCC 3D). F, S, SS. Prerequisite: None.
Origins of human society from the Stone Age to urban civilization using architecture, art, tools, and other material remains. (NT-O)

ANTH 200 03(3-0-0). Cultures and the Global System. (GT-SS3, AUCC 3E). F, S. Prerequisite: None.
Analyze diversity, cultural responses, and adaptations of smaller-scale societies to emerging global trends. (NT-O)

ANTH 260 02(1-2-0). Introduction to Field Archaeology. F, S, SS. Prerequisite: ANTH 140.
Field methods including map preparation and interpretation, site location and recording, site excavation, and stratigraphy.

ANTH 295 Var[1-3]. Independent Study. F, S, SS. Prerequisite: None.

*ANTH 310 03(3-0-0). Peoples and Cultures of Africa. S. Prerequisite: ANTH 100.
Sub-Saharan life styles including marriage and family, traditional government, religion and magic, ecology and economy, art, music, and literature.

*ANTH 312 03(3-0-0). Modern Indian Culture and Society. S. Prerequisite: ANTH 100 or ANTH 200.
Anthropological contributions to the understanding of contemporary India.

ANTH 313 03(3-0-0). Modernization and Development. F, S, SS. Prerequisite: ANTH 100 or ANTH 200.
Processes by which cultures change and modernize, 1989 to the present. (NT-O)

*ANTH 314 03(3-0-0). Southeast Asian Cultures and Societies. S. Prerequisite: ANTH 100 or ANTH 200.
Colonial and post-colonial cultures, globalization processes, and changing ethnic and gender identities in Southeast Asian societies.

*ANTH 318/ETST 318 03(3-0-0). Peoples and Cultures of the Southwest. F, S. Prerequisite: ANTH 100. Credit not allowed for both ANTH 318 and ETST 318.
Analyze development of cultures of the American Southwest; colonialism, migration, political incorporation, and socioeconomic processes. (NT-O)

ANTH 319/ETST 319 03(3-0-0). Latin American Peasantries. F, S. Prerequisite: ANTH 100 or ANTH 200 or ETST 100. Credit not allowed for both ANTH 319 and ETST 319.
Socio-cultural, economic, and political responses of Latin American peasantries to poverty and global processes.

*ANTH 329 03(3-0-0). Cultural Change. F. Prerequisite: ANTH 100 or ANTH 200.
Cultural change and effects of directed global forces; colonial origins of underdevelopment on small-scale societies.

*ANTH 330 03(3-0-0). Human Ecology. F. Prerequisite: ANTH 100 or ANTH 200; ANTH 120 or BZ 101 or LAND 220/LIFE 220.
Roles of technology, economics, social organization, and ideology in human adaptations to and survival in natural and cultural environments. (NT-O)

ANTH 334 04(3-2-0) Narrative Traditions and Social Experience. S. Prerequisite: ANTH 100 or ANTH 200 or E 140 or SOC 100.
Relationship between narrative traditions and social contexts of their creation.

ANTH 335 03(3-0-0). Language and Culture. F, S. Prerequisite: None.
Human language and primate communication, nonverbal channels, sociolinguistics, and language change.

ANTH 336 03(3-0-0). Art and Culture. F, S, SS. Prerequisite: ANTH 100 or ANTH 200.
Art expression is a defining factor in cultural identity and representation in a modern world where geographical and political borders are diminishing. (NT-O)

*ANTH 338 03(3-0-0). Gender and Anthropology. S. Prerequisite: ANTH 100 or ANTH 200.
Theory, themes, and debates in anthropological gender studies, ethnographic survey of women and men cross-culturally. (NT-O)

ANTH 340 03(3-0-0). Medical Anthropology. F. Prerequisite: ANTH 100 or ANTH 200.
Cultural adaptation to disease; non-Western theories of health and disease: categories, causes, cures; learned roles of patients and healers.

ANTH 343 03(3-0-0). Applied Medical Anthropology. F, S, SS. Prerequisite: ANTH 100 or ANTH 200.
How and why we get sick and what sickness means from biological, social, and cultural perspectives. (NT-O)

*ANTH 350 03(3-0-0). Archaeology of North America. F. S. Prerequisite: ANTH 140.
Native American life, tools, architecture, religion, food-getting from cultures of 12,000 years ago or earlier until European contact. (NT-O)

*ANTH 351 03(3-0-0). Archaeology of Europe and Africa. S. Prerequisite: ANTH 140.
Human culture, tools, art, religion, social life, subsistence, and paleoecology from 4 million B.C. to 1200 B.C. in the Old World.

ANTH 352 03(3-0-0). Geoarchaeology. S. Prerequisite: ANTH 140.
Analytical techniques, concepts, and field methodologies from the earth sciences to better understand the archaeological record.

ANTH 359 03(2-0-1). Colorado Prehistory. F. Prerequisite: None.
Human behavioral responses to environmental diversity, cultural adaptation, Pleistocene and Recent climates, anthropogenic environmental change.

ANTH 360 03(2-2-0). Archaeological Investigation. S. Prerequisite: ANTH 140.
Investigation of the archaeological record, how the record was formed, and how archaeological data are analyzed and interpreted.

ANTH 365 03(3-0-0). Quantifying Anthropology. S. Prerequisite: ANTH 100 or ANTH 120 or ANTH 140 or ANTH 200.
Managing, quantifying and illustrating anthropological data-sets with appropriate software.

° Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
ANTH 370 03(3-0-0). Primate Behavior and Ecology. F, S, SS. Prerequisite: ANTH 120 or BZ 101.
Behavioral patterns, ecological relationships, and communication of nonhuman primates. (NT-O)

ANTH 372 03(2-2-0). Human Osteology. F. Prerequisite: ANTH 120 or BZ 101 or BZ 110 or LIFE 102.
Human bones and teeth in a review of functional human evolution.

ANTH 373 03(3-0-0). Human Evolution. S. Prerequisite: ANTH 120 or BZ 110.
Current topics and debates in human evolution concentrating on biocultural changes in the human lineage.

*ANTH 374 03(2-0-1). Human Biological Variation. S. Prerequisite: ANTH 120 or BZ 101 or BZ 110 or LIFE 102.
Biological diversity of human populations; history of development of race concept.

*ANTH 375 03(3-0-0). Evolution of Primate Behavior. F. Prerequisite: ANTH 120 or BZ 110 or LIFE 102.
Primate behavior from an evolutionary perspective, drawing on a variety of studies of humans, primates, and mammals.

ANTH 376 03(2-0-1). Evolution of Human Adaptation. F. Prerequisite: ANTH 120 or BZ 110 or LIFE 102.
Unique characteristics of humans: bipedalism, encephalization, dentition, birth process, an attenuated period of development.

ANTH 400 03(3-0-0). History of Anthropological Theory. F, S, SS. Prerequisite: ANTH 100 or ANTH 200; ANTH 120; ANTH 121; ANTH 140; senior standing.
Anthropological theory from its beginnings in 19th century through recent developments in the latter half of the 20th century. (NT-O)

ANTH 411 03(0-0-3). Indians of South America. F, S, SS. Prerequisite: ANTH 100 or ANTH 200 or ANTH 413 or ANTH 414/ETST 414.
Ethnographic and cultural characteristics of South American indigenous groups and the current critical issues they face. (NT-O)

ANTH 412 03(3-0-0). Indians of North America. F, S, SS. Prerequisite: ANTH 100 or ANTH 200 or ANTH 413 or ANTH 414/ETST 414.
Native American peoples, their cultural variation across the continent, and cultural encounters with colonial expansion. (NT-O)

ANTH 413 03(3-0-0). Indigenous Peoples Today. F. Prerequisite: ANTH 200 or ANTH 412 or ANTH 414/ETST 414.
Contemporary cultural and social issues of indigenous peoples around the globe, including North and South American Indians and Australian Aborigines.

°ANTH 414°ETST 414 03(3-0-0). Development in Indian Country. F. Prerequisite: None. Credit not allowed for both ANTH 414 and ETST 414.
Critical examination of history, public policy, and tribal strategies for economic development and natural resource management in Indian Country.

ANTH 415 03(3-0-0). Indigenous Ecologies and the Modern World. F, S, SS. Prerequisite: None.
Impact of the modern world on indigenous peoples’ relationship to their environments and natural resources. (NT-O)

*ANTH 422°SOC 422 03(3-0-0). Comparative Legal Systems. S. Prerequisite: ANTH 100 or SOC 100. Credit not allowed for both ANTH 422 and SOC 422.
Traditional approaches to law, competing concepts of law in the global system, and experiences of minorities in state legal systems.

°ANTH 423 03(3-0-0). Cultural Psychiatry. F. Prerequisite: ANTH 100 or ANTH 200.

ANTH 438 03(0-0-3). Approaches to Community-Based Development. F, S, SS. Prerequisite: ANTH 100 or ANTH 200.
Explores the structure and practice of community development globally, engaging in critical analysis of different approaches and their impact. (NT-O)

ANTH 439 03(0-0-3). Community Mobilization. F, S, SS. Prerequisite: ANTH 100 or ANTH 200.
Structural, social, and psychological barriers that inhibit cooperation and collective action. (NT-O)

°ANTH 440 03(3-0-0). Theory in Cultural Anthropology. F, S. Prerequisite: ANTH 100 or ANTH 200.
Theoretical paradigms used to explain culture including evolutionary, functional, ecological, political economy, postmodernism, and hegemony.

°ANTH 441 03(3-0-0). Method in Cultural Anthropology. F. Prerequisite: ANTH 100 or ANTH 200.
Methodological orientations and research techniques. Ethnographic and cross-cultural approaches including quantitative and formal models.

ANTH 442 Var[3-8]. Ethnographic Field School. SS. Prerequisite: ANTH 100 or ANTH 200 or 9 credits in ANTH coursework.
Directed fieldwork with American Indian communities; methodology, protocols, and social relations of ethnographic field research. ($)

ANTH 443 03(0-6-0). Ethnographic Field Methods. S. Prerequisite: ANTH 100 or ANTH 200.
Directed experiential preparation for applied ethnographic field methods and research questions.

ANTH 444 03(3-0-0). Cultures of Virtual Worlds: Research Methods. S. Prerequisite: ANTH 100 or ANTH 200; junior or senior standing.
Methodologies and directed research related to virtual worlds and internet and gaming communities.

ANTH 445 03(3-0-0). Psychological Anthropology. S. Prerequisite: ANTH 100 or ANTH 200.
Cross-cultural exploration of the human mind by studying the ideas, desires, and practices of individuals in various sociocultural settings.

ANTH 446 03(3-0-0). New Orleans and the Caribbean. F. Prerequisite: ANTH 100 or ANTH 200.
New Orleans and the Caribbean connections through colonization, slavery, modernity, legacies of race, gender, and class, the expressive arts.

ANTH 447 03(0-0-3). Gender Equity in Development. F, S, SS. Prerequisite: ANTH 100 or ANTH 200.
Various forms of women’s power, and potentials for empowerment within the context of international development. (NT-O)

ANTH 448 03(0-0-3). Development and Empowerment. F, S, SS. Prerequisite: ANTH 100 or ANTH 200.
Development as an economic process of wealth accumulation, as well as a socio-political process of empowerment. (NT-O)

ANTH 449 03(3-0-0). Participatory Monitoring and Evaluation. S. Prerequisite: ANTH 100 or ANTH 200.
Participatory methods in the monitoring and evaluation of development projects, where multiple stakeholders are involved in the process. (NT-O)

ANTH 450 03(0-0-3). Hunter-Gatherer Ecology. S. Prerequisite: ANTH 100; ANTH 120; ANTH 121; ANTH 140.
Development of anthropological method and theory; study of contemporary and prehistoric foraging peoples.

° Alternate year offering (odd); * Alternate year offering (even); $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCsubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
ANTH 451 03(3-0-0). Andean Archaeology and Ethnohistory. S. Prerequisite: ANTH 100 or ANTH 140.
Prehistory and colonial experiences of native Andean peoples.

ANTH 452 03(3-0-0). Archaeology of Mesoamerica. F. Prerequisite: ANTH 140.
Ancient cultures and civilizations in Middle America.

ANTH 453 03(3-0-0). Impacts on Ancient Environments. S. Prerequisite: ANTH 140.
Major issues and case studies in the archaeology of ancient human societies and their environmental impacts.

*ANTH 455 03(3-0-0). Great Plains Archaeology. F. Prerequisite: ANTH 140.
Prehistoric people on Great Plains from earliest hunter-gatherers to historic contact; cultural responses to changing conditions.

**ANTH 456 03(3-0-0). Archaeology and the Public. S. Prerequisite: ANTH 140; 3 additional credits of anthropology. Required field trips.
Applied archaeology in public settings, including publication, museum display, education, the illicit artifact trade, and other ethical issues.

°ANTH 457 03(2-2-0). Lithic Technology. F. Prerequisite: ANTH 140.
Method and theory behind production, use, and discard of stone tools by prehistoric peoples. Hands-on application in laboratory setting.

+ANTH 460 Var[3-8]. Field Class in Archaeology. SS. Prerequisite: Written consent of instructor. Required field trips.
Directed fieldwork in local archaeology, site survey, and excavation; recovery, preservation, cataloging, analysis of artifactual and skeletal materials. (S)

ANTH 461 03(0-0-3). Anthropological Report Preparation. F. Prerequisite: ANTH 460; written consent of instructor.
Producing written and oral presentations for anthropological research, employment, or graduate work. Grant writing and manuscript preparation.

°ANTH 465 03(2-2-0). Zooarchaeology. S. Prerequisite: ANTH 120; ANTH 140.
Analysis of animal bones from archaeological sites to develop interpretations of past human behavior.

ANTH 469 03(0-0-3). Archeology Seminar in Mesopotamian Prehistory. F, S, SS. Prerequisite: 6 credits of anthropology.
Origins of human society from the stone age to urban civilizations using architecture, art, tools, and other material remains. (NT-O)

ANTH 470 04(2-4-0). Paleontology Field School. SS. Prerequisite: ANTH 120 or BZ 110 or LIFE 104.
Field methods in fossil excavation, preservation, and curation; the evolution of the primate order. (S)

ANTH 472 03(3-0-0). Human Biology. S. Prerequisite: ANTH 120 or BZ 110 or LIFE 102.
Human biological responses to environmental conditions and constraints including diet, nutrition, disease, climate, culture change, and urbanization.

*ANTH 473 03(2-0-1). The Neandertals. S. Prerequisite: ANTH 120 or BZ 110; ANTH 372 or ANTH 373 or ANTH 374 or ANTH 375 or ANTH 376.
Socio-historical foundations of questions regarding Neandertal paleobiology and culture and the Neandertal role in the evolution of Homo sapiens.

ANTH 475 03(3-0-0). Methods of Analysis in Paleoanthropology. F. Prerequisite: ANTH 373.
Practical discussion of techniques used to reconstruct dietary and locomotor behavior and evolutionary relationships in human fossil remains.

°ANTH 478/HIST 478 03(3-0-0). Heritage Resource Management. S. Prerequisite: Junior or senior standing. Credit not allowed for both ANTH 478 and HIST 478.
Cultural resource laws and policy; practices commonly employed in management and preservation of these diverse resources.

ANTH 479/IE 479 03(3-0-0). International Development Theory and Practice. F. Prerequisite: Junior or senior standing. Credit not allowed for both ANTH 479 and IE 479.
Contemporary issues in international community and economic development, with practical and theoretical analysis from interdisciplinary perspectives.

ANTH 484 Var[1-5]. Supervised College Teaching. F, S. Prerequisite: Written consent of instructor. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

ANTH 486 Var[1-6]. Practicum.
Application of anthropological methods under actual project conditions.

ANTH 487 Var[1-9]. Internship. F, S. SS. Prerequisite: 9 credits of anthropology.
Academic-based work experience with selected organizations or agencies. Supervised application of anthropological principles.

ANTH 492A-B 03(0-0-3). Seminar. F, S, SS. Prerequisite: Six credits of anthropology.
A) Archaeology. (NT-O) B) Biological anthropology.

ANTH 493 01(0-0-1). Capstone. F, S, SS. Prerequisite: Concurrent registration in a 4A course (see department list).
Linkages between anthropological subfields and how professional anthropologists approach issues. (NT-O)

ANTH 495 Var[1-3]. Independent Study.

ANTH 496 Var[1-3]. Group Study.

ANTH 500 03(3-0-0). Development of Anthropological Theory. F. Prerequisite: Undergraduates must have written consent of instructor.
Contemporary development of anthropological thought.

ANTH 513/ETST 513 03(3-0-0). Capitalism and Global Ethnic Conflicts. S. Prerequisite: ANTH 200 or ETST 100. Credit not allowed for both ANTH 513 and ETST 513.
Causes of global ethnic conflicts with emphasis on resource competition, capitalist development schemes, and role of the state.

ANTH 515 03(3-0-0). Culture and Environment. F. Prerequisite: Graduate standing.
Theoretical accounts of societies’ variable relationships to their environments; indigenous peoples’ interactions with nature in context of modernity.

*ANTH 520 03(3-0-0). Women, Health, and Culture. S. Prerequisite: Graduate standing.
Women’s experiences and interpretations of their health; cultural, political, and economic forces affecting women’s health.

*ANTH 521 03(3-0-0). Gender, Sexuality, and Culture. S. Prerequisite: Graduate standing.
Gender and sexuality cross-culturally; theory, cultural constructions, colonialism, class, race, ethnicity, health, violence.

ANTH 528 03(0-0-3). Economic Anthropology. S. Prerequisite: Nine credits in anthropology.
Theoretical approaches to the cultural context of economic activity.

ANTH 529 03(0-0-3). Anthropology and Sustainable Development. F. Prerequisite: Nine credits in anthropology.
Global development goals, poverty and hunger, environmental sustainability, education, and equity.

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ANTH 530 03(3-0-0). Human-Environment Interactions. F. Prerequisite: Nine credits in anthropology.
Paradigms and concepts in ecological anthropology with an emphasis on adaptation and resilience.

ANTH 532 03(0-0-3). The Culture of Disaster. S. Prerequisite: Graduate student standing.
Study of how the human impacts of disaster and the process of recovery are shaped by cultural as well as structural realities.

*ANTH 535 03(0-0-3). Globalization and Culture Change. F. Prerequisite: Nine credits in anthropology.
Evolving paradigms and patterns of globalization and international development; cultural responses--resistance, dependency, fragmented identities.

*ANTH 539 03(3-0-0). Anthropology of Modernity. F. Prerequisite: None.
Critical examination of the institutions, values, and processes which constitute the modern world. Impact of modern forces on "traditional" peoples.

*ANTH 540 03(0-0-3). Medical Anthropology. S. Prerequisite: Graduate standing.
Cultural and biocultural approaches to health, illness, and the body; theory and application in medical anthropology.

*ANTH 541 03(1-0-2). Seminar in Archaeological Method. S. Prerequisite: Nine credits in anthropology.
Methods of archaeological recovery and interpretation, and process of archaeological analysis and reporting.

*ANTH 542 03(1-0-2). Seminar in Archaeological Theory. S. Prerequisite: Nine credits in anthropology.
Theories of recovery, reconstruction, and interpretation of the archaeological record.

ANTH 544 03(1-0-2). Anthropological Method and Theory. F. S. Prerequisite: Nine credits in anthropology.
Current trends of research in archaeology; cultural and physical anthropology.

*ANTH 546 03(3-0-0). Culture, Mind, and Cognitive Science. S. Prerequisite: Graduate standing.
Anthropological contributions to cognitive science. Culture, mind, and social context. Theory building and practical applications.

*ANTH 547 04(3-2-0). Mind, Medicine, and Culture. S. Prerequisite: Graduate standing.
Cultural-psychological influences on health and healing; mind-body medicine; complementary and alternative medicine; indigenous and spiritual healing.

ANTH 550A-C 03(0-0-3). Regional Prehistory.

*ANTH 551 03(3-0-0). Historical Archaeology. S. Prerequisite: Graduate standing.
Theory, methods, and issues in historical archaeology.

*ANTH 553 03(0-0-3). Archaeology of Complex Societies. S. Prerequisite: Graduate standing.
Issues in development and organization of complex societies with emphasis on the Americas.

*ANTH 554/NR 554 03(2-2-0). Ecological and Social Agent-based Modeling. S. Prerequisite: Junior or senior standing. Credit not allowed for both ANTH 554 and NR 554.
Exploring the use and making of agent-based models featuring interacting individuals in ecological and social simulation, with examples and projects.

*ANTH 555 03(0-0-3). Paleoindian Archaeology. F. Prerequisite: ANTH 140.
Archaeology of the Americas during late Pleistocene/early Holocene; background and development of contemporary models.

ANTH 566 03(2-2-0). Field Methods Training in Online Environments. S. Prerequisite: Graduate standing.
Collaborative analysis of ethnographic field data collected in online virtual worlds; mixed methods applicable to other built and natural places.

ANTH 570 03(0-0-3). Contemporary Issues-Biological Anthropology. F. Prerequisite: Six credits in biological anthropology.
Theory and applications in biological anthropology focusing on syntheses and interpretations of human biology, variation, adaptability, and evolution.

*ANTH 571 03(3-0-0). Anthropology and Global Health. F. Prerequisite: Graduate standing.
Global health concerns and problems including poverty, urbanization, malnutrition, diet, war and refugees, climate, and environment.

*ANTH 572 03(0-0-3). Human Origins. S. Prerequisite: Graduate standing.
Major trends in human evolution through use of detailed case studies and regionally focused primary research.

*ANTH 573 03(3-0-0). Paleoclimate and Human Evolution. S. Prerequisite: Graduate Standing.
Methods used to reconstruct past environments and understand the effects of past climate on the major trends of human evolution.

ANTH 643 03(0-0-6). Advanced Ethnographic Field Methods. S. Prerequisite: None.
Development of applied field methods and research questions for graduate-level ethnographic field research.

+ANTH 660 Var[2-10]. Field Archaeology. F, SS. Prerequisite: ANTH 460 or two seasons field experience. Required field trips.
Field application of nondestructive survey methods, advanced cartographic and excavation methods, project supervision skills. (S)

*ANTH 679/IE 679 03(3-0-0). Applications of International Development. F. S. Prerequisite: Graduate standing. Credit not allowed for both ANTH 679 and IE 679.
In-depth interdisciplinary analysis of theoretical and practical issues in implementing economic and community-based international development programs.

ANTH 684 Var. Supervised College Teaching.

ANTH 686 Var. Practicum-Field Archaeology.
Direction of anthropological fieldwork under professional supervision.

ANTH 692 03(0-0-3). Seminar.
Current trends of research in archaeology; cultural and physical anthropology.

ANTH 695 Var. Independent Study.

Intensive analysis of selected topics and theories in anthropology, both historical and contemporary.


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AGRICULTURAL AND RESOURCE ECONOMICS COURSES
Department of Agricultural and Resource Economics
College of Agricultural Sciences

AREC 202 03(3-0-0). Agricultural and Resource Economics. (GT-S1, AUCC 3C). F. S. Prerequisite: MATH 117 or concurrent registration or MATH 118 or MATH 124 or MATH 125 or MATH 126 or MATH 141 or MATH 155 or MATH 160. Credit not allowed for both AREC 202 and ECON 202.
Introduction to decision-making by consumers, firms, and government, and resulting allocation of resources through markets.

AREC 224 01(0-0-1). Introduction to Agribusiness Entrepreneurship. F. Prerequisite: AREC 202 or concurrent registration or ECON 202 or concurrent registration. Field trips required.
Introductory exposure to entrepreneurship for agribusinesses through presentations by industry professionals. ($, NT-O)

AREC 240/ECON 240 03(3-0-0). Issues in Environmental Economics. (GT-S1, AUCC 3C). F, S. Prerequisite: None. Credit not allowed for both AREC 240 and ECON 240.
Discussion and economic analysis of current environmental issues with special emphasis on the impact of economic growth. (NT-C)

AREC 305 03(2-2-0). Agricultural and Resource Enterprise Analysis. F, S. Prerequisite: BUS 150 or CIS 120 or CS 110; AREC 202 or ECON 202.
Use of records in agricultural and resource enterprise management; analytical methods, budgets, and planning techniques for improved decision making. (NT-O)

AREC 310 03(3-0-0). Agricultural Marketing. F, S, SS. Prerequisite: AREC 202 or ECON 202.
Market structure, behavior, and performance including futures market and market games theory. (NT-O)

AREC 311 03(3-0-0). Agricultural and Resource Product Marketing. F. Prerequisite: AREC 202 or ECON 202.
Theory and practice of marketing differentiated agricultural products and natural resource amenities with focus on strategies and market trends.

AREC 325 03(3-0-0). Personal Management in Agriculture. F. Prerequisite: AREC 202 or ECON 202.
Human resource issues for agribusiness firms. Selecting and training employees, dealing with employee problems, negotiation methods.

AREC 328 03(3-0-0). Small Agribusiness Management. F. Prerequisite: AREC 202 or ECON 202.
Apply business principles to small agribusinesses and cooperatives.

AREC 335/ECON 335 03(3-0-0). Introduction to Econometrics. F, S. Prerequisite: ECON 204; MATH 141 or MATH 155 or MATH 160; STAT 201 or STAT 204 or STAT 301 or STAT 307. Credit not allowed for both AREC 335 and ECON 335.
Estimating statistical regression models of economic relationships; treatment of special problems that may arise in analysis of economic data.

AREC 340/ECON 340 03(3-0-0). Introduction: Economics of Natural Resources. S. Prerequisite: AREC 202 or ECON 202. Credit not allowed for both AREC 340 and ECON 340.
Concepts, theories, institutions; analytical methods for economic evaluation of alternative resource use patterns and land use plans.

AREC 341 03(3-0-0). Environmental Economics. F. Prerequisite: AREC 202 or ECON 202; AREC 240/ECON 240.
Economic theories and analytic frameworks are developed and applied to contemporary problems of the use and protection of the natural environment.

AREC 342 03(3-0-0). Water Law, Policy, and Institutions. S. Prerequisite: None.
Legal water issues within the context of historical, social and economic development with emphasis on the southwestern United States. (NT-O)

AREC 346/ECON 346 03(3-0-0). Economics of Outdoor Recreation. F. Prerequisite: AREC 202 or ECON 202. Credit not allowed for both AREC 346 and ECON 346.
Benefit-cost framework in planning for outdoor recreation, pricing problems, projecting demand, and regional economic development.

AREC 375 03(3-0-0). Agricultural Law. F. Prerequisite: Junior standing.
Laws, regulations, case decisions affecting ranching and farming in the Rocky Mountain area. (NT-O)

AREC 405 03(2-2-0). Agricultural Production Management. S. Prerequisite: AREC 305.
Economic principles of agricultural production decisions with linear programming analysis of production choices and farm planning.

AREC 408 03(3-0-0). Agricultural Finance. S. Prerequisite: AREC 305.
Monetary affairs of agribusiness and agricultural production emphasizing credit institutions and procurement, investment, and management. (NT-O)

AREC 412 03(3-0-0). Agricultural Commodities Marketing. F. Prerequisite: AREC 310.
Agricultural marketing and agribusiness principles applied to current marketing problems relating to livestock and field and horticultural crops. ($, NT-O)

AREC 415 03(3-0-0). International Agricultural Trade. F. Prerequisite: AREC 310; ECON 204.
Agricultural trade patterns and institutions; trade theory with applications to agriculture. Current issues in agricultural trade. (NT-O)

AREC 428 03(3-0-0). Agricultural Business Management. F, S. Prerequisite: AREC 305; AREC 310; senior standing.
Economic analysis, organization, and management practices of agriculture and food industries studied through simulation, case study, computer labs. (NT-O)

AREC 440 03(3-0-0). Advanced Environmental and Resource Economics. S. Prerequisite: AREC 340/ECON 340; AREC 341; ECON 306.
Microeconomic techniques to rigorously explore economic decision-making and policy as they apply to environmental and natural resource problems.

AREC 442 03(3-0-0). Water Resource Economics. S. Prerequisite: AREC 342; ECON 306 or concurrent registration. Credit not allowed for both AREC 442 and AREC 542.
An in-depth exploration of the role of economics in water resource planning.

AREC 452/REL 452 02(2-0-0). Real Estate Appraisal Principles. S. Prerequisite: AREC 202 or ECON 202; AREC 305 or REL 360. Credit not allowed for both AREC 452 and REL 452.
Theoretical principles that underlie real estate appraisal methods. (NT-O)

AREC 453/REL 453 02(2-0-0). Real Estate Appraisal Practices. S. Prerequisite: AREC 452 or REL 452. Credit not allowed for both AREC 453 and REL 453.
Procedures and Practices used in real estate appraisal. (NT-O)

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AREC 460 03(3-0-0). Ag- and Resource-Based Economic Development. S. Prerequisite: ECON 306.
Indicators, tools, and approaches for agriculture-based and natural resource-based economic development in resource dependent countries and communities.

AREC 478 03(3-0-0). Agricultural Policy. F, S. Prerequisite: AREC 202 or ECON 202 or AREC 240/ECON 240.
Formulation and administration of public policies affecting agricultural industries and rural areas in the United States. (NT-O)

AREC 484 Var[1-5]. Supervised College Teaching. F, S. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

AREC 487 Var[1-6]. Internship. F, S. SS. Prerequisite: None. May be taken for a maximum of 6 credits. (NT-O)

AREC 495 Var[1-6]. Independent Study. F, S. SS. Prerequisite: None. May be taken for a maximum of 6 credits. (NT-O)

AREC 496 Var. Group Study.

AREC 505 03(3-0-0). Agricultural Production Economics. F. Prerequisite: AREC 405 or ECON 306; MATH 141.
Empirical applications of production economic theory for use of inputs and allocation of resources in agricultural, natural resource sectors.

AREC 506/ECON 506 03(3-0-0). Applied Microeconomic Theory. F. Prerequisite: ECON 306. Credit not allowed for both AREC 506 and ECON 506.
Introduction to mathematical models in modern microeconomics, including choices and demand, production and supply, and market structures and failures.

How policies are crafted to effectively address social issues, especially for agriculture and the environment, and how they impact society.

AREC 508 03(3-0-0). Financial Management in Agriculture. S. Prerequisite: AREC 408.
Systematic approach to understanding and applying financial management in farm businesses.

AREC 510 03(3-0-0). Agricultural Product Marketing. F. Prerequisite: AREC 310; AREC 335/ECON 335.
Marketing techniques, industrial organization/competition for agricultural products in U.S. domestic, international trade, and developing country markets.

AREC 530 03(3-0-0). Agricultural Price Analysis. S. Prerequisite: None.
Agricultural commodity prices related to neoclassical economics; current literature emphasizing management problems.

AREC 535/ECON 535 03(3-0-0). Applied Econometrics. F. Prerequisite: AREC 335/ECON 335; ECON 304 or ECON 306. Credit not allowed for both AREC 535 and ECON 535.
Econometric techniques applied to testing and quantification of theoretical economic relationships drawn from both microeconomics, macroeconomics.

AREC 540/ECON 540 03(3-0-0). Economics of Natural Resources. F. Prerequisite: AREC 340/ECON 340; MATH 141. Credit not allowed for both AREC 540 and ECON 540.
Public natural resources policy, effect on resource use in private sector, optimal pricing of minerals, timber and fisheries, public project analysis.

AREC 541/ECON 541 03(3-0-0). Environmental Economics. S. Prerequisite: ECON 306. Credit not allowed for both AREC 541 and ECON 541.
Economics of environmental policy; partial equilibrium and general equilibrium model; pollution; natural environments; population and economic growth.

AREC 542 04(3-2-0). Applied Advanced Water Resource Economics. S. Prerequisites: AREC 342; ECON 306; MATH 141 or MATH 155 or MATH 160; STAT 301. Credit not allowed for both AREC 442 and AREC 542.
Theory and application of economics in water resource planning.

AREC 547 03(3-0-0). Public Lands Planning and Management. S. Prerequisite: AREC 202 or ECON 202.
Principles and techniques used by federal land management agencies including Forest Service, Park Service, Fish and Wildlife Service, and BLM.

AREC 563/ECON 563 03(3-0-0). Regional Economics-Theory, Methods, and Issues. F. Prerequisite: ECON 306; ECON 501 or concurrent registration. Credit not allowed for both AREC 563 and ECON 563.
Tools and methods of regional economics, including supply, demand, and externality analyses. Applications to current urban and regional policy issues.

AREC 566/ECON 566 03(3-0-0). Contemporary Issues of Developing Countries. S. Prerequisite: Two or more courses in AREC or ECON or SOC. Credit not allowed for both AREC 566 and SOC 566.
Social, economic, and technological factors in developing countries.

AREC 570/ECON 530 03(3-0-0). Methodology of Economic Research. F. Prerequisite: ECON 304; ECON 306. Credit not allowed for both AREC 570 and ECON 530.
Philosophical foundations of science and research. Concepts and skills for planning, performing, reporting, and evaluating economic research.

AREC 572 03(3-0-0). Social Benefit Cost Analysis. F. Prerequisite: ECON 306.
Theory, application of concepts relating to social benefit cost analysis of public projects, policies intended to promote social welfare, economic growth.

AREC 605 02(2-0-0). Agricultural Production and Cost Analysis. S. Prerequisite: AREC 506; AREC 535/ECON 535.
Empirical application and analysis of production and cost issues in the agricultural and natural resource sectors.

AREC 606/ECON 606 03(3-0-0). Microeconomic Analysis I. S. Prerequisite: ECON 306; ECON 501. Credit not allowed for both AREC 606 and ECON 606.
Advanced price/allocation theory; consumer/producer decisions; uncertainty; market structure; partial/general equilibrium; efficiency/ welfare.

AREC 610 02(2-0-0). Agricultural Marketing and Demand Analysis. S. Prerequisite: AREC 506; AREC 535/ECON 535.
Empirical Application and analysis of agricultural marketing and demand issues in the agricultural and natural resource sectors.

AREC 615 02(3-0-0). Optimization Methods for Applied Economics. F. Prerequisite: AREC 506.
Theory and practice of optimization techniques used in economic applications with emphasis on linear and nonlinear programming.

AREC 635/ECON 635 03(3-0-0). Econometric Theory I. F. Prerequisite: AREC 535/ECON 535; ECON 501 or concurrent registration. Credit not allowed for both AREC 635 and ECON 635.
Theory of mathematical statistics and classical linear regression model in context of economic application.

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AREC 660 03(3-0-0). Development of Rural Resource-Based Economics. S. Prerequisite: AREC 506.
Economic literature-based exploration of human welfare measures and implications of approaches to agriculture and resource-based economic development.

AREC 678 03(3-0-0). Agricultural and Resource Policy. F. Prerequisite: ECON 306; MATH 141.
Evaluate and analyze economic theory, applications and public incentives related to government policies for agriculture and natural resources.

AREC 695 Var. Independent Study.


°AREC 705 02(2-0-0). Advanced Production and Technological Change. S. Prerequisite: AREC 605.
Production theory is applied to real-world issues including risk, innovation, and environment, through lectures and readings of current literature.

AREC 706/ECON 706 03(3-0-0). Microeconomic Analysis II. F. Prerequisite: ECON 606. Credit not allowed for both AREC 706 and ECON 706.
Advanced topics in microtheory: game theory; market imperfections; adverse selection; principal-agent problems; social choice theory; incentives, etc.

°AREC 710 02(2-0-0). Advanced Agricultural Marketing Issues. S. Prerequisite: ECON 706; AREC 735/ECON 735.
Theoretical and modeling issues of consumer demand, market structure, product differentiation and market behavior.

AREC 735/ECON 735 02(2-0-0). Econometric Theory II. S. Prerequisite: AREC 635/ECON 635. Credit not allowed for both AREC 735 and ECON 735. This is a partial-semester course.
Econometrics models and estimators in econometrics, from fully parametric to semiparametric and nonparametric approaches.

°AREC 740 03(3-0-0). Advanced Resource and Environmental Economics. F. Prerequisite: AREC 540 or ECON 540; AREC 541 or ECON 541; AREC 635 or ECON 635; ECON 706.
Advanced theory, methods, and literature of natural resource and environmental economics, including dynamic programming and non-market valuation.

*AREC 770 03(3-0-0). Advanced Methods and Topics in AREC. S. Prerequisite: ECON 706; AREC 735/ECON 735.
Advanced research methods in applied economics: lab and field experiments, non-market valuation and discrete choice experiments.

AREC 784 Var[1-3]. Supervised College Teaching. F, S, SS.

AREC 792A-C Var. Seminar.

AREC 795 Var. Independent Study.


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ART COURSES  
Department of Art  
College of Liberal Arts

ART 100 03(3-0-0). Introduction to the Visual Arts. (GT-AH1, AUCC 3B). F, S, SS. Prerequisite: None. Exploration of the development of visual arts.

ART 101 03(0-6-0). Visual Form. F, S, SS. Prerequisite: None. Two- and three-dimensional design to develop visual awareness and insight into structure and organization of visual arts.

ART 105 01(1-0-0). Issues and Practices in Art. F, S. Prerequisite: None. Current issues, practices, and resources in the visual arts; integration of unified vocabulary in various art disciplines.

ART 106D 03(0-6-0). Art Studio-Fibers. F, S, SS. Prerequisite: None.

ART 110 03(3-0-0). Art History I. F. Prerequisite: None. The arts of ancient cultures and civilizations.

ART 111 03(3-0-0). Art History II. S. Prerequisite: ART 110. Medieval through early modern art history.

*ART 112 03(3-0-0). History of Asian Art. F. Prerequisite: None. Arts of China, Japan, and India.

*ART 113 03(3-0-0). Native Art Survey. F. Prerequisite: None. Visual arts of native peoples of North America, Africa, and Oceania.

ART 135 03(0-6-0). Introduction to Drawing. F, S, SS. Prerequisite: None. Elements of artistic freehand drawing emphasizing experimentation with wide variety of media.

ART 136 03(0-6-0). Introduction to Figure Drawing. F, S, SS. Prerequisite: ART 135. Human form as basis for self-expression through various drawing media. ($)

ART 160 03(0-6-0). Two-Dimensional Visual Fundamentals. F, S. Prerequisite: None. Concepts of organization and color theory structured for understanding and manipulation of two-dimensional space. ($)

ART 170 03(0-6-0). Three-Dimensional Visual Fundamentals. F, S. Prerequisite: None. Understanding and manipulating three-dimensional form and space; use of materials and tools.

+ART 208/ETST 208 03(3-0-0). Native American Art and Material Culture. S. Prerequisite: None. Credit not allowed for both ART 208 and ETST 208. Required field trips. Traditional arts and material culture of the indigenous peoples of North America.

ART 212 03(3-0-0). Art History III. F, S. Prerequisite: ART 111. Modern to contemporary art history.

ART 230 03(0-6-0). Photo Image Making I. F, S. Prerequisite: ART 111; ART 136; ART 160; ART 170. Photographic imagery as an art medium; exploration of silver-based (film) materials. ($) 

ART 235 03(0-6-0). Intermediate Drawing I. F, S, SS. Prerequisite: ART 136. Drawing using models and various still life material. ($) 

ART 240 03(0-6-0). Pottery I. F, S. Prerequisite: ART 111; ART 136; ART 160; ART 170. Basic techniques of studio ceramics and wheel throwing; exploration of expressive potential in pottery. ($)

ART 245 03(0-6-0). Metalsmithing and Jewelry I. F, S. Prerequisite: ART 111; ART 136; ART 160; ART 170. Basic metal techniques; forming and construction; surface treatment and finishing processes; behavior and mechanical properties of metals. ($) 

ART 250 03(0-6-0). Fibers I. F, S. Prerequisite: ART 110; ART 135; ART 160 or ART 170. Fibers and fabric as expressive media; weaving and basic fiber structures; fabric painting and surface techniques. ($) 

ART 255 03(0-6-0). Introduction to Graphic Design. F, S. Prerequisite: ART 111; ART 136; ART 160; ART 170; 2.55. G.P.A. or better. Problems emphasizing typography, layout, symbols, illustration, and package design. ($) 

ART 256 03(0-6-0). Introduction to Electronic Art. F, S. Prerequisite: ART 111; ART 136; ART 160; ART 170. Introduction to digital media and internet-based art design.

ART 260 03(0-6-0). Painting I. F, S. Prerequisite: ART 111; ART 136; ART 160; ART 170. Basic oil painting procedures, techniques, and concepts. ($) 

ART 265 03(0-6-0). Printmaking I – Intaglio and Relief. F, S. Prerequisite: ART 110; ART 135; ART 160 or ART 170. Problems in composition utilizing basic techniques and principles of printmaking processes. ($) 

ART 270 03(0-6-0). Sculpture I. F, S. Prerequisite: ART 111; ART 136; ART 160; ART 170. Introduction to sculptural techniques and concepts. ($) 


ART 311 03(3-0-0). Art of Africa. F. Prerequisite: ART 212. History of the art of Africa.

*ART 312 03(3-0-0). History of Pre-Columbian Art. F. Prerequisite: ART 212. History of the art of Central and South America.

*ART 314 03(3-0-0). Women in Art History. S. Prerequisite: ART 212. Women as artists in history of art and women’s media in art.


ART 316 03(3-0-0). Art of the Pacific. S. Prerequisite: ART 212. Arts of Australia, Indonesia, Melanesia, Micronesia, and Polynesia.

*ART 319 03(3-0-0). History of Graphic Design. F. Prerequisite: ART 212. History of graphic design emphasizing 19th- and 20th-century work.

° Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCSubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
ART 321A-D Var[3-5]. Travel Abroad—Studio Workshop in Italy. SS.
Exploration of studio techniques in Italy. A) Drawing. Prerequisite:
ART 135. B) Photo image making. Prerequisite: ART 230 or portfolio
review; written consent of instructor. C) Fibers. Prerequisite: ART 250
or portfolio review; written consent of instructor. D) Sculpture. Var[3-5]
Prerequisite: ART 270.

ART 325 03(3-0-0). Concepts in Art Education. S. Prerequisite:
EDUC 275; admission to teacher licensure.
Artistic learning in children, adolescents, adults, and special
populations.

ART 326 04(0-0-4). Art Education Studio. F, S. Prerequisite: EDUC
275; admission to teacher licensure.
Artares required for teacher licensure as indicated by individual
student needs. ($)

ART 330 04(0-8-0). Photo Image Making II. F, S. Prerequisite: ART
230 or portfolio review.
Studio course designed to develop the growth of photographic
expression. ($)

ART 331 04(0-8-0). Photo Image Making III. F, S. Prerequisite: ART
330.
Studio course designed to further growth of concept, materials in
photographic expression as an art medium. ($)

ART 335 04(0-8-0). Intermediate Drawing II. F, S, SS. Prerequisite: ART
235. May be taken 3 times for credit.
Assigned and independent drawing projects; use of traditional and
non-conventional materials. ($)

ART 336 04(0-8-0). Intermediate Drawing III. F, S. Prerequisite: ART
336.
Assigned and independent drawing projects; art theory and criticism;
readings and written assignments. ($)

ART 340 04(0-8-0). Pottery II. F, S, SS. Prerequisite: ART 240.
Studio ceramic and wheel throwing techniques; surface treatment,
kiln firing, clay and glaze formulation. ($)

ART 341 04(0-8-0). Pottery III. S. Prerequisite: ART 340.
Form and surface exploration; supportive ceramic technologies;
expression in historical pottery. ($)

ART 345 04(0-8-0). Metalsmithing and Jewelry II. F, S. Prerequisite: ART
245.
Raising and casting techniques in combination with construction;
metal spinning. ($)

ART 346 04(0-8-0). Metalsmithing and Jewelry III. F, S. Prerequisite: ART
246.
Forging and enameling techniques on nonferrous and ferrous metals;
stone setting. ($)

ART 350 04(0-8-0). Fibers II. F, S. Prerequisite: ART 250.
Intermediate fiber structures and fabric and surface design; dyes and
pigments; continued investigation of fibers and fabric as expressive
media. ($)

ART 351 04(0-8-0). Fibers III. F, S. Prerequisite: ART 251.
Investigation of fibers and fabric as expressive media; research in
historic textiles. ($)

ART 355 04(0-8-0). Typography and Design Systems. F. Prerequisite:
ART 255.
Emphasis on typographic solutions for advertising, corporate identity,
packaging, and publication design. ($)

ART 356 04(0-8-0). Illustration. S. Prerequisite: ART 255; 6 credits in
drawing.
Problems emphasizing media, experimental techniques, and
compositions. ($)

ART 357 04(0-8-0). Interactive Media. F. Prerequisite: ART 255 or
ART 256.
Technical, conceptual, and historic aspects of creating interactive
electronic media.

ART 358 04(0-8-0). Experimental Video. F. Prerequisite: ART 255 or
ART 256.
History, theory, application of experimental video and digital special
effects, animation and video techniques as they apply to experimental
video.

ART 360 04(0-8-0). Painting Methods and Materials. F, S.
Prerequisite: ART 361.
Experimentation with the painting process in relationship to method,
material and tools. ($)

ART 361 04(0-8-0). Figure Painting. F, S. Prerequisite: ART 235; ART
260.
Compositions and techniques in oil and/or acrylic emphasizing the
human figure. ($)

ART 365 04(0-8-0). Printmaking II – Lithography. F, S. Prerequisite:
ART 136.
Preparation, processing, and printing techniques in stone and metal
plate lithography. ($)

ART 366 04(0-8-0). Printmaking III – Studio Workshop. F, S.
Prerequisite: ART 365.
Advanced intaglio, relief, planographic, and stencil processes in the
workshop; continued emphasis on individual creative growth. ($)

ART 370 04(0-8-0). Sculpture II. S. Prerequisite: ART 270.
Intermediate-level exploration of materials, concepts, process, and
outcomes rooted in the sculpture area. ($)

ART 371 04(0-8-0). Sculpture III. S. Prerequisite: ART 270.
Intermediate-level development of studio practice, exploration of
technical process, theory and professionalism. ($)

ART 375 03(0-6-0). Figure Modeling and Drawing. F. Prerequisite:
ART 270. Maximum of 9 credits allowed in course.
Studio course based on observation of the human figure in sculpture
and drawing. ($)

ART 384 Var[1-4]. Supervised College Teaching. F, S. A maximum
of 10 combined credits for all 384 and 484 courses are counted towards
graduation requirements.
Supervised assistance in instruction.

ART 392 03(0-0-3). Undergraduate Professional Practices Seminar.
F. Prerequisite: 60 credits; ART 212; 6 credits from ART 135, ART
136, ART 160, ART 170.
Skills and tools beneficial in pursuing professional and/or academic
goals in the visual arts.

ART 401 03(3-0-0). Greek Art. F. Prerequisite: ART 212.
Aegean and Greek architecture, painting, and sculpture.

ART 411 03(3-0-0). History of Medieval Art. S. Prerequisite: ART
212.
Early Christian, Byzantine, Islamic, Romanesque, and Gothic visual
art forms.

ART 412 03(3-0-0). History of Renaissance Art. S. Prerequisite: ART
212.
Architecture, sculpture, painting, and minor arts, 1300 to 1600.

° Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B =
blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT- subcode = State Guarantee Transfer course and AUCC Subcode = All
University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
ART 414 03(3-0-0). History of Baroque and Rococo Art. S. Prerequisite: ART 212.
17th- and 18th-century visual arts.

*ART 415 03(3-0-0). History of 19th-Century European Art. F. Prerequisite: ART 212.
Architecture, sculpture, painting, and other arts in Europe, 1780 to 1900.

°ART 416 03(3-0-0). History of European Art, 1900 to 1945. S. Prerequisite: ART 212.
Visual arts in Europe, 1900 to 1945.

°ART 417 03(3-0-0). Roman Art. S. Prerequisite: ART 212.
Roman sculpture, painting, and architecture.

ART 418 03(3-0-0). Contemporary Artists and Art Critics. S. Prerequisite: ART 212.
Critical study of contemporary artists and art criticism.

ART 419 03(3-0-0). Historiography and Methodology of Art History. F. Prerequisite: Written consent of instructor.
Historiography/methodology/research methods in art history.

ART 420 Var[3-5]. Travel Abroad – Art History in Italy. SS. Prerequisite: ART 212.
Art historical study of painting, sculpture, and architecture in Italy.

ART 430 04(0-8-0). Advanced Photo Image Making I. F, S. Prerequisite: ART 331.
Advanced problems in use of photo image making as an art medium. ($)

ART 431 04(0-8-0). Advanced Photo Image Making II. F, S. Prerequisite: ART 430.
Studio course to refine individual directions and professional goals in photography as an art medium. ($)

ART 435 04(0-8-0). Advanced Drawing I. F, S, SS. Prerequisite: ART 336.
Independent projects and identification of personal artistic direction; research in art-related topics. ($)

ART 436 04(0-8-0). Advanced Drawing II. F, S, SS. Prerequisite: ART 435.
Capstone course; production of professional exhibition-quality work. ($)

ART 440 04(0-8-0). Pottery IV. F. Prerequisite: ART 341.
Advanced individual research in pottery form and expression; supportive technology; expression in contemporary American pottery. ($)

ART 441 04(0-8-0). Pottery V. S. Prerequisite: ART 440.
Advanced individual research in pottery form and expression of personal subject matter; supportive technology. ($)

ART 445 04(0-8-0). Metalsmithing and Jewelry IV. F, S. Prerequisite: ART 345; ART 346.
Chasing and repousse techniques in two- and three-dimension; inlay, engraving, and etching techniques. ($)

ART 446 04(0-8-0). Metalsmithing and Jewelry V. S. Prerequisite: ART 345; ART 346.
Advanced techniques: granulation, electroforming, phototetching, makume, niello; ferrous metals techniques. ($)

ART 450 04(0-8-0). Fibers IV. F, S. Prerequisite: ART 350; ART 351.
Maximum of 8 credits allowed in course.
Advanced studio problems in expressive use of fibers and fabric. ($)

ART 451 04(0-8-0). Fibers V. F, S. Prerequisite: ART 351 or ART 450.
Maximum of 8 credits allowed in course.
Advanced studio problems in the expressive use of fibers and fabric. ($)

ART 455 04(0-8-0). Advanced Typography and Design Systems. F. Prerequisite: ART 355. Maximum of 8 credits allowed in course.
Two- and three-dimensional solutions for advertising, corporate identity, packaging, and publication design. ($)

ART 456 04(0-8-0). Advanced Illustration. S. Prerequisite: ART 356. Maximum of 8 credits allowed in course.
Projects in editorial and reportorial illustration emphasizing techniques applied to solving problems in advanced composition. ($)

ART 457 04(0-8-0). Advanced Interactive Media. F, S, SS. Prerequisite: ART 255 or ART 256; ART 357.
Technical, conceptual, and historic aspects of creating interactive electronic media.

ART 458 01(0-8-0). Advanced Experimental Video. F. Prerequisite: ART 255 or ART 256; ART 358.
Advanced experimental video and visual effects.

ART 460 04(0-8-0). Advanced Painting I. F. Prerequisite: ART 360; ART 361. Maximum of 8 credits allowed in course.
Advanced composition and exploration of individual creative expression. ($)

ART 461 04(0-8-0). Advanced Painting II. S. Prerequisite: ART 460. Maximum of 8 credits allowed in course.
Continuation in direction of individual creative expression. ($)}

ART 465 04(0-8-0). Printmaking IV–Studio Workshop. F, S. Prerequisite: ART 366.
Advanced printmaking workshop; intaglio, relief, planographic, and stencil; continued emphasis on individual creative growth. ($)

ART 466 04(0-8-0). Printmaking V–Studio Workshop. F, S. Prerequisite: ART 465. Maximum of 8 credits allowed in course.
Advanced printmaking concepts in studio and research problems. ($)

ART 470 04(0-8-0). Sculpture IV. F, S. Prerequisite: ART 370; ART 371. Maximum of 12 credits allowed in course.
Development of individual expression using sculptural techniques. ($)

ART 471 04(0-8-0). Sculpture V. F, S. Prerequisite: ART 470. Maximum of 8 credits allowed in course.
Advanced expression using sculptural techniques. ($)}

Supervised work experience in an approved location.

ART 492A-B 03(0-0-3). Seminar.
A) Art history. Prerequisite: ART 212. B) Art education. Prerequisite: Concurrent registration in ART 232.

ART 495A-K Var[1-4]. Independent Study. Maximum of 8 credits allowed per subtopic.

ART 496A-K Var[1-4]. Group Study. Maximum of 8 credits allowed per subtopic.
ART 510A-Q 03(3-0-0). Advanced Study in Art History. F, S. 
Prerequisite: Written consent of instructor.

*ART 514 03(0-0-3). Contemporary American Art Critics and Artists. S. Prerequisite: ART 510E.
Issues in contemporary American art are explored through the work of critics and artists who visit through the Critic and Artist Residency Series.

ART 515 03(0-0-3). Seminar-Contemporary Art Theory. F. Prerequisite: ART 510E.
Relationship between critical theory and the visual arts; how artists and critics apply theory in their work.


ART 592 03(0-0-3). Art History Seminar. Prerequisite: Twenty-one credits of art history.

ART 675A-G Var[1-15]. Studio Problems. F, S, SS. Prerequisite: Ten credits of ART 575 in one concentration.

ART 684 Var. Supervised College Teaching.


ART 699A-G Var. Thesis. Prerequisite: Twelve credits in studio area of concentration.
AS 101 01(1-0-0). Foundations of the Air Force I. F. Prerequisite: None.
Air Force opportunities, benefits; emphasis on officership, customs, and communicative skills, group problem solving.

AS 102 01(1-0-0). Foundations of the Air Force II. S. Prerequisite: None.
Organizational structure and missions of Air Force organizations; emphasis on leadership, military history, and communicative skills.

AS 196 A-B 01(0-2-0). Aerospace Studies Group Study I. F, S.
Prerequisite: None.
Leadership Group Study is mandatory for students who are members of ROTC or are eligible to pursue a commission as determined by the Professor of Aerospace Studies. A) Fall. B) Spring.

AS 201 01(1-0-0). Evolution of Air and Space Power I. F. Prerequisite: None.
History of the development of air power and air doctrine from Wright brothers to present emphasizing role of air power; communications skills emphasized.

AS 202 01(1-0-0). Evolution of Air and Space Power II. S. Prerequisite: None.
History of air power from World War II to present examining role of air power in Berlin Airlift, Korean War, Mideast, and Vietnam War.

AS 296 A-B 01(0-2-0). Aerospace Studies Group Study II. F, S.
Prerequisite: None.
Leadership Group Study is mandatory for students who are members of ROTC or are eligible to pursue a commission as determined by the Professor of Aerospace Studies. A) Fall. B) Spring.

AS 301 03(3-0-0). Air Force Leadership Studies I. F. Prerequisite: None.
Leadership and quality management fundamentals, officer professional knowledge, ethics, and values; communication skills heavily emphasized.

AS 302 03(3-0-0). Air Force Leadership Studies II. S. Prerequisite: None.
Officer professional development, emphasizing leadership, management fundamentals, knowledge, evaluation systems, ethics, and communication skills.

AS 333 02(2-0-0). Operational Air Force Writing. S. Prerequisite: CO 150.
Common writing practices and procedures encountered by junior officers in the Air Force. Emphasizes proper writing content as well as form.

AS 396 A-B 01(0-2-0). Aerospace Studies Group Study III. F, S.
Prerequisite: AS 296A or AS 296B.
Concept of leadership; relationship between leadership and management; importance of leadership in the operation and success of any organization. A) Fall. B) Spring.

AS 401 03(3-0-0). National Security Affairs/Active Duty I. F. Prerequisite: None.

AS 402 03(3-0-0). National Security Affairs/Active Duty II. S. Prerequisite: None.
Professionalism, military justice system, military ethics, commissioning essentials, and emphasis on communication skills.


AS 496A-B 01(0-2-0). Aerospace Studies Group Study IV. F, S.
Prerequisite: AS 396A or AS 396B.
Concept of leadership; relationship between leadership and management; importance of leadership in the operation and success of any organization. A) Fall. B) Spring.

○ Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
ATS 150 03(3-0-0). Science of Global Climate Change. S. 
Prerequisite: None.
Physical basis of climate change. Energy budget of the earth, the greenhouse effect, carbon cycle, paleoclimate, projections of 21st-century climate.

ATS 300 02(2-0-0). Climate of Colorado. S. Prerequisite: None.
Fundamentals of climate and climate changes; seasonal and regional Colorado climate regimes; types and availability of climate information.

ATS 350 02(2-0-0). Introduction to Weather and Climate. F, S. 
Prerequisite: None.
Behavior of atmosphere and its influence upon human's activities.

ATS 351 01(0-3-0). Introduction to Weather and Climate Laboratory. F, S. 
Prerequisite: ATS 350 or concurrent registration.
Actual weather data, visualization of meteorological phenomena, in-depth discussion of current environmental issues.

ATS 495 Var. Independent Study.

ATS 555 03(3-0-0). Air Pollution. S. Prerequisite: CHEM 113, MATH 261 or MATH 340; PH 122 or PH 142.
Nature, ambient concentrations, sources, sinks, and physiological activities of pollutants; meteorology; legislation; social and economic factors.

ATS 560 02(1-3-0). Air Pollution Measurement. F. Prerequisite: CHEM 114.
Examination and application of techniques for air pollution measurement. Includes sampling and analysis of gases, aerosols, and precipitation.

ATS 601 03(3-0-0). Atmospheric Dynamics I. F. Prerequisite: MATH 261; MATH 530.
Momentum, continuity equations; circulation, vorticity, thermodynamics; boundary layer; synoptic scale motions in midlatitudes.

ATS 602 02(2-0-0). Atmospheric Dynamics II. S. Prerequisite: ATS 601.
Sound waves, gravity waves, Rossby waves; numerical weather prediction; baroclinic instability; general circulation; tropical dynamics.

ATS 604 03(3-0-0). Atmospheric Modeling. F. Prerequisite: ATS 601.
Design of numerical models of the atmosphere; applications to current problems. Emphasis on practical understanding of relevant numerical methods.

ATS 605 03(3-0-0). General Circulation of the Atmosphere. S. 
Prerequisite: ATS 602 or concurrent registration.
Observations and theory of the general circulation of the atmosphere, with emphasis on understanding physical mechanisms.

ATS 606 03(3-0-0). Introduction to Climate. F. Prerequisite: MATH 261; MATH 530.
Exchange of energy, water, and momentum through the atmosphere, surface, vegetation, oceans. Paleoclimate, climate change, variability, and feedbacks.

ATS 607 03(2-3-0). Computational Methods for Atmospheric Science. S. Prerequisite: ATS 601 or concurrent registration.
Computer programming tools unique to and common in the atmospheric sciences.

ATS 610 03(3-0-0). Physical Oceanography. F. Prerequisite: None.
Foundations of ocean circulation theory and the general circulation of the oceans using observational data and rotating tank experiments.

*ATS 703 02(2-0-0). Numerical Weather Prediction. F. Prerequisite: ATS 602.
Quasi-geostrophic approximation; barotropic, baroclinic, primitive equation, and general circulation models; numerical methods.

*ATS 704 02(2-0-0). Large-Scale Atmospheric Dynamics. F. Prerequisite: ATS 602.
Quasi-static, quasi-geostrophic equations; planetary waves; geostrophic adjustment; barotropic, baroclinic instability; frontogenesis; tropical cyclones.

*ATS 707 03(2-0-1). Atmospheric Waves and Vortices. F. Prerequisite: ATS 605.
Atmospheric wave motions and embedded vortices spanning mountain waves to large-scale Rossby waves and critical layers.

ATS 708 03(3-0-0). Middle Atmospheric Dynamics. S. Prerequisite: ATS 602.
Dynamics of the stratosphere and mesosphere with emphasis on the lower and middle stratosphere.

*ATS 710 03(3-0-0). Geophysical Vortices. F. Prerequisite: ATS 602.
Observational, experimental, and theoretical aspects of geophysical vortices, such as hurricanes, polar lows, tornadoes, and dust devils.

*ATS 711 02(2-0-0). Micrometeorite. F. Prerequisite: ATS 623; MATH 340.
Momentum, heat, water, and trace gas fluxes near the earth’s surface, including fluxes between the atmosphere and the land/ice surfaces.

*ATS 712 03(3-0-0). Dynamics of Clouds. S. Prerequisite: ATS 623.
General theory of cloud dynamics; parameterization of microphysics and radiation; models of fog, stratuscumuli, cumulonimbi, and orographic clouds.

*ATS 715 02(2-0-0). Atmospheric Oxidation Processes. F. Prerequisite: ATS 621.
Atmospheric hydrocarbon and nitrogen oxide reactions; aqueous phase scavenging and reactions; chemical pathways in the atmosphere.

ATS 716 02(1-2-0). Air Quality Characterization. S. Prerequisite: ATS 555 or ATS 621; ATS 560.
Planning, executing, and reporting on a measurement campaign to characterize local air quality.

*ATS 721 03(3-0-0). Theoretical Topics in Radiative Transfer. F. Prerequisite: ATS 622.
Physics of atmospheric radiation; theoretical techniques used to show radiation transfer equation.

*ATS 722 03(2-0-1). Atmospheric Radiation and Energetics. S. Prerequisite: ATS 622.
Radiative transfer in the atmosphere; implications on remote sensing and energetics.

*ATS 724 02(2-0-0). Cloud Microphysics. S. Prerequisite: ATS 621.
Theories and observations of nucleation; cloud droplet spectra broadening; precipitation growth and breakup; ice multiplication; cloud electrification.

*ATS 730 03(3-0-0). Mesoscale Modeling. F. Prerequisite: ATS 602; ATS 623.
Development of basic equations used in mesoscale models and methodology of solution.

*ATS 735 03(3-0-0). Mesoscale Dynamics. F. Prerequisite: ATS 602.
Analysis of physical and dynamical processes that initiate, maintain, and modulate atmospheric mesoscale phenomena.

*ATS 737 03(3-0-0). Satellite Observation of Atmosphere and Earth. S. Prerequisite: ATS 622; ATS 652.
Satellite measurements; basic orbits and observing systems; applications of remote sensing and imaging to investigations of atmospheric processes.

*ATS 741 03(3-0-0). Radar Meteorology. S. Prerequisite: ATS 652.
Radar systems; radar equation and applications; multiple Doppler observation and processing; radar studies of mesoscale systems.

*ATS 742 02(2-0-0). Tropical Meteorology. S. Prerequisite: ATS 601; ATS 602; ATS 606.
Tropical atmosphere, monsoons, intraseasonal variability, hurricanes, theory of tropical convection and the large-scale circulation.

*ATS 743 03(3-0-0). Interactions of the Ocean and Atmosphere. S. Prerequisite: ATS 602.
Ocean-atmosphere interactions in observations, theory, and models. Time mean atmosphere-ocean circulations through climate variability and change.

*ATS 745 03(3-0-0). Atmospheric General Circulation Modeling. S. Prerequisite: ATS 602; ATS 605.
Current problems in modeling of the general circulation of the atmosphere.

*ATS 750 03(3-0-0). Climate Dynamics: Atmospheric Variability. F. Prerequisite: ATS 621; ATS 655.
Analysis and interpretation of large-scale patterns of climate variability and observed climate change.

ATS 752 02(2-0-0). Inverse Methods in Atmospheric Science. F. Prerequisite: Ph.D. standing in Atmospheric Science.
Introduction to inverse modeling, with particular application to remote sensing retrievals, flux inversions and data assimilation.

*ATS 753 03(3-0-0). Global Hydrologic Cycle. S. Prerequisite: ATS 601; ATS 622 or ATS 652.
Hydrologic cycle; moisture transport and air-ground exchange; water budgets of meteorological phenomena; climatology of atmospheric water.

*ATS 755 03(3-0-0). Topics in Climate Research. F. Prerequisite: ATS 606.
Current topics in climate research.

*ATS 760 02(2-0-0). Global Carbon Cycle. S. Prerequisite: ATS 606.
Exchanges of CO₂ between the atmosphere, the land surface, and oceans. Biogeochemical processes. Micrometeorological and inverse flux estimation.

*ATS 762 02(2-0-0). Biosphere-Chemistry-Climate Interactions. S. Prerequisite: ATS 621.
Explore the sensitivity of the climate system to atmospheric chemical composition with emphasis on connections to biospheric processes and feedbacks.

*ATS 765 03(3-0-0). Climate Dynamics: Ocean Variability. F. Prerequisite: ATS 606.
Climate variability on time scales of years to millennia with focus on the role of the ocean circulation. Approach through dynamical systems theory.

*ATS 770 03(3-0-0). Ocean Modeling. F. Prerequisite: ATS 601.
Conceptual and numerical ocean models and their application to current problems in climate science and biogeochemical cycles.

*ATS 772 02(2-0-0). Aerosol Chemistry. F. Prerequisite: CHEM 114; MATH 161; PH 122 or PH 142.
Physics and chemistry of atmospheric aerosols including composition, surface properties, size, interaction with radiation sources, sinks.
ATS 784 Var. Supervised College Teaching. F, S, SS.

ATS 786 Var. Practicum.

ATS 795 Var. Independent Study.

ATS 796 Var. Group Study.


BIOCHEMISTRY AND MOLECULAR BIOLOGY COURSES

Department of Biochemistry and Molecular Biology

College of Natural Sciences

BC 192 02(1-0-1). Biochemistry Freshman Seminar. F. Prerequisite: None.
Introduction to curriculum and career options for biochemistry majors.

BC 295 Var[1-3]. Introductory Independent Study. F, S, SS. Preferred: CHEM 112 or concurrent registration; LIFE 102.
Apply principles and knowledge being learned in first and second year life sciences and chemistry courses.

BC 351 04(4-0-0). Principles of Biochemistry. F, S. Prerequisite: BZ 110 or BZ 120 or LIFE 102; CHEM 245 or CHEM 341 or CHEM 345. For majors in biological sciences, engineering, and professional students in the health sciences.
Structure and function of biological molecules; biocatalysis; metabolism and energy transduction; gene expression. (NT-O)

BC 401 03(3-0-0). Comprehensive Biochemistry I. F. Prerequisite: CHEM 245 or CHEM 343 or concurrent registration or CHEM 346 or concurrent registration; MATH 155 or MATH 160.
Macromolecular structure and dynamics; membranes; enzymes; bioenergetics.

BC 403 03(3-0-0). Comprehensive Biochemistry II. S. Prerequisite: CHEM 245 or CHEM 341 or CHEM 345.
Metabolic pathways and their regulation; cellular biochemistry.

BC 404 02(0-0-6). Comprehensive Biochemistry Laboratory. F. Prerequisite: BC 401 or concurrent registration; CHEM 246 or CHEM 344 or CHEM 346; LIFE 203; LIFE 212.
Experimental approaches to studying macromolecules, metabolism, and gene expression. ($) 

BC 405 01(0-0-1). Comprehensive Biochemistry II-Honors Recitation. S. Prerequisite: Concurrent registration in BC 403–Honors section. For students participating in the Honors program.
Read and discuss current literature related to material presented in BC 403.

BC 411 04(3-0-1). Physical Biochemistry. F. Prerequisite: BC 401, or BC 351 with a B or better; CHEM 113; MATH 161 or MATH 255.
Thermodynamics; reaction rates quantum chemistry; spectroscopy; macromolecular folding and interactions; ligand binding; enzyme kinetics; membranes.

BC 441 01(0-1.5-5). 3D Molecular Models for Biochemistry. F. Prerequisite: BC 401 or concurrent registration.
Computer instruction to construct 3D models of proteins and nucleic acids using leading software.

BC 463 03(3-0-0). Molecular Genetics. F. Prerequisite: BC 351 with a C or better, or BC 401 with a C or better, or concurrent registration; BZ 350 with a C or better or LIFE 201B with a C or better. Credit not allowed for both BC 463 and BC 563.
Molecular basis of gene structure, replication, repair, recombination, and expression.

BC 464 01(0-0-1). Molecular Genetics Recitation. F. Prerequisite: BC 351 or concurrent registration or BC 401 or concurrent registration; concurrent registration in BC 463; LIFE 201B.
Methods used to study the molecular basis of gene structure, replication, repair, recombination, and expression.

BC 465 03(3-0-0). Molecular Regulation of Cell Function. S. Prerequisite: BC 403 or concurrent registration or BC 351; LIFE 210. Credit not allowed for both BC 465 and BC 565.
Molecular regulation of cell organization, membrane formation, organelle biogenesis, cell communication, shape and motility, growth, aging, and death.

BC 466 01(0-0-1). Molecular Regulation of Cell Function–Honors. S. Prerequisite: Concurrent registration in BC 465.
Discussions of current articles in cell biology including methods and molecular mechanisms that explain cell behavior in health and disease.

BC 477 03(3-0-0). Biochemistry of Disease. S. Prerequisite: BC 401.
Biochemical basis of specific human diseases.

BC 475 03(0-6-1). Mentored Research. F, S, SS. Prerequisite: BC 404. Maximum of 9 credits allowed in course.
Plan and conduct mentored research with weekly discussion of progress, presentation at all-university symposium, and submission of written report.

BC 484 Var. Supervised College Teaching. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.
Assist in teaching selected courses in biochemistry and molecular biology.

BC 487-A B Var. Internship. A) Prerequisite: BC 401; BC 403; BC 404; cumulative GPA of 2.000. Work experience with an approved preceptor outside of a university laboratory environment. B) International. Prerequisite: BC 401; BC 463; BC 495 (one credit in lab of CSU mentor); selection by department committee. Research in foreign host laboratory in contact with CSU mentor.

BC 493 01(0-0-0-1). Senior Seminar. F, S. Prerequisite: BC 401 or concurrent registration.
Critical analysis of selected literature in biochemistry and molecular biology.

BC 495 Var. Independent Study. Prerequisite: Minimum cumulative GPA of 3.000.
Faculty-directed exploration of areas of special interest in biochemistry and molecular biology.

BC 498 Var[1-6]. Research.
Supervised laboratory research in biochemistry and molecular biology.


BC 511 04(3-0-1). Structural Biology I. F. Prerequisite: BC 401 or concurrent registration.
Structural principles of biological macromolecules and techniques of structural analysis.

BC 512 01(1-0-0). Principles of Macromolecular Structure. F. Prerequisite: BC 411 or concurrent registration.
Physical interactions controlling folding and solution behavior of biological macromolecules, including proteins, nucleic acids, and membranes.

BC 513 01(1-0-0). Enzymology. S. Prerequisite: BC 403.
Kinetic methods, mechanism, and regulation of enzyme catalysis.

° Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
BC 517 02(0-0-0). Metabolism. F. Prerequisite: BC 351 or BC 403.
Design and regulation of metabolic pathways.

BC 521/CHEM 521 03(3-0-0). Principles of Chemical Biology. F.
Prerequisite: CHEM 245 or CHEM 343 or CHEM 346. Credit not
allowed for both BC 521 and CHEM 521.
Principles of chemical biology. Chemical methods for understanding
and controlling the structure and function of biopolymers.

BC 563 04(3-0-1). Molecular Genetics. F. Prerequisite: BC 401; LIFE
201B. Credit not allowed for both BC 563 and BC 463.
Mechanisms of replication, transcription, processing, translation, and
packaging of genetic material, emphasizing original literature and
methods.

BC 565 04(3-0-1). Molecular Regulation of Cell Function. S.
Prerequisite: BC 403 or concurrent registration or BC 351; LIFE
210. Credit not allowed for both BC 565 and BC 465.
Molecular regulation of cell organization, membrane formation,
organelle biogenesis, cell communication, shape and motility, growth,
aging, and death.

BC 571 01(1-0-0). Quantitative Biochemistry. S. Prerequisite: BC 511
or concurrent registration.
Introduction to statistics, error analysis, and curve fitting of bio-
chemical data with a focus on practical examples.

BC 589 02(1-2-0). Current Trends in Molecular Biosciences. SS.
Prerequisite: B.S. or B.A. in biology or chemistry; secondary school
teaching certification. Offered only through Division of Continuing
Education.
Biochemical and molecular biological foundations of molecular
genetics/genetic engineering; molecular analysis of genes. (NT)

*BC 601 01(1-0-0). Responsible Conduct in Biochemistry. S. Prereq-
usite: None.
Design of experiments; error and fraud, publishing/grant application
submission, scientific misconduct, classic examples of fraud, case
studies.

BC 611 02(2-0-0). Structural Biology II. S. Prerequisite: BC 511.
Structure and interactions of biological macromolecules related to
function.

BC 663 02(2-0-0). Gene Expression. S. Prerequisite: BC 563.
Eukaryotic transcription mechanisms with emphasis on methods of
study and regulatory mechanisms.

BC 665A-B 02(2-0-0). Advanced Topics in Cellular Regulation. S.
Prerequisite: BC 565.
A) Microscopic Methods. Analysis of cell behavior, function and
regulation using microscopic methods. B) Modern Methods. Modern
methods in cell biology.

BC 695 Var. Independent Study.

BC 698 Var. Research.


BC 701 01(1-0-0). Grant Proposal Writing and Reviewing. F.
Prerequisite: BC 403; BC 511 or concurrent registration; BC 563 or
concurrent registration.
Didactic and hands-on experience with locating funding sources,
writing effective grant proposals and the review process in the bio-
molecular sciences.

BC 711A-F 01(1-0-0). Advanced Topics in Structural Biology. F, S.
Prerequisite: BC 511; BC 611.
A) Protein structure and function. B) Membrane proteins. C) Protein-
DNA interactions. D) Biomolecular spectroscopy. E) Biomolecular
NMR. F) Macromolecular X-ray crystallography.

BC 763A-C 01(1-0-0). Advanced Molecular Genetics Topics. F, S.
Prerequisite: BC 663 or concurrent registration.
A) Chromatin and transcription. B) Transcriptional control; co-
activators and corepressors. C) Concepts and techniques of genetic
analyses.

BC 784 Var[1-3]. Supervised College Teaching.

BC 793 01(0-0-1). Seminar.

BC 795 Var. Independent Study.

BC 796 Var[1-5]. Group Study.

BC 798 Var. Research.


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blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCsubcode = All
University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
BIOLOGICAL SCIENCE COURSES
Life Sciences Committee
Provost and Executive Vice President’s Office

[Beginning in Fall Semester 2008, the BIO courses have been moved to BZ (BIO 310 and BIO 311), LIFE (BIO 320), or dropped.

BIO 220 changed to LAND 220/LIFE 220, effective FA07.

BIO 384 was dropped effective FA08.

BIO 310 and BIO 311 changed to BZ 310 and BZ 311, effective FA08.

BIO 221 dropped effective FA08.

BIO 320 changed to LIFE 320, effective FA08.]

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BIOMEDICAL ENGINEERING COURSES
Nondepartmental
College of Engineering

BIOM 101 03(3-0-0). Introduction to Biomedical Engineering. F. Prerequisite: None.
Basic principles, fundamentals in biomedical engineering including molecular, cellular and physiological principles and major areas such as biomechanics.

BIOM 300 04(1-4-1). Problem-Based Learning Biomedical Engr Lab. S. Prerequisite: BIOM 101; MATH 340.
Group problem-based learning approach to problems spanning all core areas of biomedical engineering. ($)

BIOM 306/BTEC 306 04(3-2-0). Bioprocess Engineering. S. Prerequisite: CHEM 107 or CHEM 111; PH 121 or PH 141. Credit not allowed for both BIOM 306 and BTEC 306.
Material, energy balances; fluid flow, heat exchange, mass transfer; application to operations in food, fermentation, other bioprocess industries.

BIOM 330 03(3-0-0). Transport Phenomena in Biomedical Engineering. S. Prerequisite: BIOM 300; BMS 300; CBE 332 or MECH 344.
Engineering models of active and passive mechanisms of momentum, heat, and mass transport, in mammalian cells, tissues, and organ systems.

BIOM 400 03(3-0-0). Kinetics of Biomolecular and Cellular Systems. F. Prerequisite: BIOM 330 or CBE 330.
In-depth analysis of the systems approach to biology and biological engineering at the molecular and the cellular scales.

BIOM 441 03(3-0-0). Biomechanics and Biomaterials. F. Prerequisite: BMS 300; MECH 324 or concurrent registration; MECH 331 or concurrent registration.
Principles of biomechanics, biofluids, and biomaterials.

BIOM 470/MECH 470 03(3-0-0). Biomedical Engineering. F. Prerequisite: MATH 155 or MATH 160; PH 141. Credit not allowed for both BIOM 470 and MECH 470.
Engineering application in human/animal physiology, diagnosis of disease, treatment, rehabilitation, human genome manipulation.

BIOM 476A-B. Biomedical Clinical Practicum. F, S, SS. Prerequisite: BMS 300; BIOM 470/MECH 470.
Biomedical lab work or exposure to the hospital/cclinical environment.
A) 02(1-3-0). B) 04(1-6-0).

BIOM 486A-B 04(0-0-10). Biomedical Design Practicum. F, S, SS. Prerequisite: BIOM 300; BIOM 330 or BIOM 441 or CBE 441; BIOM 486A.
A) Capstone Design I. Prerequisite: BIOM 300; BIOM 330 or BIOM 441 or CBE 441; BIOM 486A.
B) Capstone Design II. Prerequisite: BIOM 300; BIOM 432 or BIOM 441 or CBE 441; BIOM 486A.

BIOM 495 Var[1-6]. Independent Study. F, S, SS.

BIOM 504/CBE 504 03(3-0-0). Fundamentals of Biochemical Engineering. F. Prerequisite: BIOM 306/BTEC 306 or CBE 320 or concurrent registration; MATH 255 or MATH 340; MIP 300. Credit not allowed for both BIOM 504 and CBE 504.
Application of chemical engineering principles to enzyme kinetics, fermentation and cell culture, product purification, and bioprocess design.

BIOM 522/CBE 522 03(2-2-0). Bioseparation Processes. F. Prerequisite: CBE 331. Credit not allowed for both BIOM 522 and CBE 522.
Analysis of processes to recover and purify fermentation products.

*BIOM 525*/MECH 525 03(3-0-0). Cell and Tissue Engineering. S. Prerequisite: BC 351 or BMS 300 or BMS 500 or BZ 310 or NB 501.
Credit allowed for only one of the following: BIOM 525, CBE 525, and MECH 525.
Cell and tissue engineering concepts and techniques with emphasis on cellular response, cell adhesion kinetics, and tissue engineering design. (NT-0) ($)

BIOM 526/ECE 526 03(3-0-0). Biological Physics. S. Prerequisite: MATH 340 or MATH 345; PH122 or PH142. Credit not allowed for both BIOM 526 and ECE 526.

BIOM 531/MECH 531 03(3-0-0). Materials Engineering. S. Prerequisite: MECH 331 or MECH 431.
Selection of structural engineering materials by properties, processing, and economics; materials for biomedical and biotechnology applications. (NT-0)

BIOM 532/MECH 532 03(3-0-0). Material Issues in Mechanical Design. F. Prerequisite: MECH 331. Credit not allowed for both BIOM 532 and MECH 532.
Failure mechanisms from materials viewpoint with emphasis on design. Fracture, creep, fatigue and corrosion. (NT-O)

BIOM 533/CIVE 533 03(2-3-0). Biomolecular Tools for Engineers. F. Prerequisite: BMS 300 or MIP 300. Credit not allowed for BIOM 533, CIVE 533, and CBE 533.
Theoretical and practical aspects of biomolecular laboratory tools—PCR, cloning, sequencing, single-molecule optical techniques and live-cell imaging. ($)

*BIOM 537/ECE 537 03(3-0-0). Biomedical Signal Processing. S. Prerequisite: MATH 340 or ECE 311 or STAT 303. Credit not allowed for both BIOM 537 and ECE 537.
Measuring, manipulating, and interpreting biomedical signals.

BIOM 543/CBE 543 03(3-0-0). Membranes for Biotechnology and Biomedicine. F. Prerequisite: CHEM 341; CHEM 343; or CBE 310. Credit not allowed for both BIOM 543 and CBE 543.
Polymeric membrane formation, modification, module design and applications to bioseparation and biomedical separations and tissue engineering. (NT-O)

BIOM 570/MECH 570 03(3-0-0). Bioengineering. S. Prerequisite: MECH 307; MECH 324. Credit not allowed for both BIOM 570 and MECH 570.
Physiological and medical systems analysis using engineering methods including mechanics, fluid dynamics, control, electronics, and signal processing. (NT-O)

BIOM 573/MECH 573 03(3-0-0). Structure and Function of Biomaterials. S. Prerequisite: MECH 331. Credit not allowed for both BIOM 573 and MECH 573.
Structure-function relationships of natural biomaterials; application to analysis of biomimetic materials and biomaterials used in medical devices. (NT-O)

BIOM 586A-B. Biomedical Clinical Practicum. F, S, SS. Prerequisite: BIOM 570/MECH 570; BMS 300 or BMS 500. A) 02(1-3-0). B) 04(1-6-0).
Graduate-level activity, such as biomedical research or design of a new medical device, for exposure to the hospital/clinical environment.

BIOM 592 Var[1-3]. Seminar. F, S. Prerequisite: None.
Student and research faculty presentations, guest and invited extramural speakers. (NT-O)

*BIOM 671/MECH 671 03(3-0-0). Orthopedic Tissue Biomechanics. F. Prerequisite: CIVE 560. Credit not allowed for both BIOM 671 and MECH 671 or for BIOM 671/MECH 671 and BIOM 571/MECH 571.
Linear elastic, finite deformation, and viscoelastic theories applied to the mechanical behavior of orthopedic tissues (bone, tendon, cartilage).
BIOM 684 Var. Supervised College Teaching.
Maximum of 6 credits allowed in course; may not be used to satisfy degree requirements requiring bioengineering courses.

BIOM 695 Var. Independent Study.


BIOM 750 01(1-0-0). Grant Proposal Writing and Reviewing. F.
Prerequisite: Written consent of instructor.
Preparation and review of applications for fellowships and grants.

BIOM 784 Var[1-6]. Supervised College Teaching.

BIOM 786 Var. Practicum-Laboratory Rotations.

BIOM 795 Var[1-6]. Independent Study.

BIOM 798 Var[1-6]. Research-Laboratory Rotation

BIOM 799 Var. Dissertation.

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BIOMEDICAL SCIENCES
Department of Biomedical Sciences
College of Veterinary Medicine and Biomedical Sciences

BMS 192 01(0-0-1). First Year Seminar in Biomedical Sciences. F. Prerequisite: None.
The university and its resources, college survival skills, careers in the biomedical sciences; current issues in health and biotechnology.

BMS 200 01(0-0-1). Concepts in Human Anatomy and Physiology. F, S. Prerequisite: Concurrent registration in BMS 300.
Basic concepts in the anatomy and physiology of the human body.

BMS 260 03(2-0-1). Biomedical Sciences. S. Prerequisite: LIFE 102.
Opportunities and challenges in biomedical sciences; business of science, ethics, model systems, cellular and systemic physiology.

BMS 300 04(4-0-0). Principles of Human Physiology. F, S, SS. Prerequisite: BZ 101 or BZ 110 or LIFE 102; CHEM 103 or CHEM 107 or CHEM 111.
Physiology of humans. (NT-O)

BMS 301 05(3-2-1). Human Gross Anatomy. F, S, SS. Prerequisite: BZ 110 or LIFE 102.
Structure and function of the human body. Study of dissected human cadavers; clinical applications; living anatomy. ($)

BMS 302 02(1-3-0). Laboratory in Principles of Physiology. F, S. Prerequisite: BMS 300 or concurrent registration or BMS 360 or concurrent registration.
Basic physiology lab exercises. ($)

BMS 305 04(3-3-0). Domestic Animal Gross Anatomy. S. Prerequisite: BZ 110 or LIFE 102.
Comparative gross anatomy of domestic carnivores, ruminants, and horses. ($)

BMS 310 04(3-3-0). Anatomy for the Health Professions. F, S, SS. Prerequisite: One semester of college level biology. Offered as an online course only through the Division of Continuing Education.
Gross anatomy of the human body from a regional perspective, utilizing clinical applications as a basis for anatomical understanding. (NT-O)

BMS 320 02(0-4-0). Virtual Laboratory in Physiology. F, S. Prerequisite: BMS 300 or concurrent registration or BMS 360 or concurrent registration. Credit not allowed for both BMS 305 and VS 333.
Physiology lab exercises using a virtual laboratory simulation system. (NT-O)

BMS 325 03(3-0-0). Cellular Neurobiology. F. Prerequisite: BMS 300 or BMS 360.
Cellular and molecular bases of nervous system function and behavior.

BMS 326 03(3-0-0). Neural Integration and Behavior. S. Prerequisite: BMS 300; BMS 325.
Functional organization of the nervous system; cellular mechanisms of integration of information to organize simple and complex behaviors.

BMS 330 04(3-3-0). Microscopic Anatomy. S. Prerequisite: BMS 300 or BMS 360. Credit not allowed for both BMS 330 and VS 331.
Microscopic anatomy of mammalian tissue.

BMS 345 04(3-2-0). Functional Neuroanatomy. F, S. Prerequisite: BMS 300 or BMS 360.
Functional systems and circuits of the human brain and spinal cord. ($)
emphasis on how cellular functions integrate into systems behavior.

BMS 501 04(4-0-0). Mammalian Physiology II. S. Prerequisite: BMS 300 or BMS 360.
- Respiratory, renal, digestive, endocrine, metabolic, and reproductive function.

BMS 503/NB 503 03(3-0-0). Developmental Neurobiology. S. Prerequisite: One college-level course in each: biology, biochemistry, physics, calculus. Credit not allowed for both BMS 503 and NB 503.
- Molecular mechanisms involved in development of nervous system including differentiation, growth, pathfinding, and synaptogenesis.

BMS 505/NB 505 03(3-0-0). Neuronal Circuits, Systems, and Behavior. S. Prerequisite: BMS 325 or BMS 500 or NB 501. Credit not allowed for both BMS 505 and NB 505.
- Anatomical and physiological organization of the nervous system.

BMS 531 03(0-9-0). Domestic Animal Dissection. S. Prerequisite: BMS 305.
- Dissection of domestic animals. ($)

BMS 545 05(3-4-0). Neuroanatomy. S. Prerequisite: Written consent of instructor.
- Nervous system structure and function presented from a systems perspective; applied and comparative aspects are emphasized. ($)

BMS 575 04(0-8-0). Human Anatomy Dissection. F. Prerequisite: None.
- Regional approach to human gross anatomy through laboratory dissection of human cadaver. ($)

BMS 610A-B 01(1-0-0). Managing a Career in Science. F.
- A) Survival skills for coursework (M.S.). Prerequisite: Written consent of instructor.
- B) Survival skills for research (M.S. and Ph.D.).

BMS 619 02(0-0-2). Advanced Human Gross Anatomy. F. Prerequisite: Written consent of instructor.
- Clinical application of human anatomy through case-based study.

*BMS 631 02(2-0-0). Mechanisms of Hormone Action. F. Prerequisite: BMS 430 or BMS 501.
- Synthesis, secretion, and mechanisms of action of hormones.

*BMS 632 02(2-0-0). Metabolic Endocrinology. F. Prerequisite: BMS 631.
- Endocrine regulation of metabolic homeostasis; effects of exercise or pregnancy.

BMS 633 02(0-0-2). Domestic Animal Anatomy-Case Discussions. S. Prerequisite: Concurrent registration in BMS 531.
- Clinical case discussions utilized in advanced understanding of domestic animal anatomy and physiology.

*BMS 640 04(4-0-0). Reproductive Physiology and Endocrinology. F. Prerequisite: BMS 501.
- Reproductive physiology and endocrinology of vertebrate animals.

BMS 642 01(0-3-0). Research Techniques for Gametes and Embryos. F. Prerequisite: Admission to a Biomedical Sciences graduate program.
- Collection, storage, evaluation, in vitro manipulation, and replacement of sperm, oocytes, embryos, and other reproductive tissues.

BMS 684 Var. Supervised College Teaching.

BMS 692 01(0-0-1). Seminar- Classics in Neurosciences. Prerequisite: Admission to graduate program.
- Review of classic papers in the neurosciences.

*BMS 695A-F Var. Independent Study.
- A) Developmental anatomy.
- B) Microscopic anatomy.
- C) Neuroanatomy.
- D) Radiographic anatomy.
- E) Surgical anatomy.
- F) Gross anatomy.

BMS 696 Var[1-3]. Group Study-Neurosciences. F. Prerequisite: None.
- Current topics in neuroscience; how to evaluate scientific presentations.


BMS 784 Var. Supervised College Teaching.

BMS 792A-C Var[1-5]. Seminar.
- A) Biomedical sciences.
- B) Neurophysiology.
- C) Reproductive physiology.

BMS 795A-E Var. Independent Study.
- A) Endocrinology.
- B) Neurophysiology.
- C) Cell physiology.
- D) Cardiopulmonary physiology.
- E) Reproductive physiology.

BMS 796A-C Var. Group Study.
- A) Neurophysiology.
- B) Cardiopulmonary physiology.
- C) Reproductive physiology.


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BIOAGRICULTURAL SCIENCES AND PEST MANAGEMENT COURSES

Department of Bioagricultural Sciences and Pest Management
College of Agricultural Sciences

BSPM 102 03(3-0-0). Insects, Science, and Society. (GT-SC2, AUCC 3A). F, S. Prerequisite: None.

How insects develop, behave, and affect human activity. What every student should know about the most diverse life form on Earth.

BSPM 201 03(3-0-0). Weed Management and Control. F, S. Offered only through the Division of Continuing Education.

Basic overview of weeds and weed control. (NT-O)

BSPM 300/ANEQ 300B 01(1-0-0). Topics in Livestock Entomology. S. Prerequisite: 3 credits of BZ or LIFE at the 100-level. Credit not allowed for both BSPM 300 and ANEQ 300B.

Identification, biology, and management of insect, tick, and mite pests.

BSPM 302 02(2-0-0). Applied and General Entomology. F. Prerequisite: None.

Biology and management of insects.

BSPM 303A-C. Entomology Laboratory. F. Prerequisite: BSPM 302 or concurrent registration.

Biology and recognition of insects. A) General 02(0-4-0). ($) B) Horticultural 01(0-2-0). *C) Agricultural 01(0-2-0).

+BSPM 308 03(2-3-0). Ecology and Management of Weeds. F. Prerequisite: BZ 120 or LIFE 103; CHEM 107 or CHEM 111. Required field trips.

Classification, characteristics; weed biology and ecology; control by cultural, mechanical, chemical, and biological means; successional management. ($)

*BSPM 310 03(3-0-0). Understanding Pesticides. S. Prerequisite: Three credits 100-level BZ or CHEM.

Identification, properties, use, labeling, environmental interactions, and application of major classes of pesticides.

BSPM 350 02(1-2-0). Science Illustration. S. Prerequisite: None.

Fundamentals of science illustration emphasizing observational and drawing skills.

BSPM 361 03(2-2-0). Elements of Plant Pathology. S. Prerequisite: BZ 104 or BZ 120 or HORT 100 or LIFE 102.

Diseases of economic plants. ($)

+BSPM 365 04(3-3-0). Integrated Tree Health Management. F. Prerequisite: BZ 120 or LIFE 102. Required field trips.

Insects and diseases in forest and urban ecosystems. Effects, diagnosis, prevention, and control. ($)

BSPM 384 Var[1-3]. Supervised College Teaching. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

*BSPM 423 03(1-4-0). Evolution and Classification of Insects. F. Credit not allowed for both BSPM 423 and BSPM 523.

Major groups of insects, living and fossil; major evolutionary trends in structure and behavior.

*BSPM 424*/BZ 424 03(3-0-0). Principles of Systematic Zoology. S. Prerequisite: BZ 110 and BZ 111 or LIFE 103. Credit not allowed for both BSPM 424 and BZ 424.

Principles and methods of classification, zoological nomenclature, taxonomic decisions regarding species and higher categories.

BSPM 445 04(2-4-0). Aquatic Insects. F. Prerequisite: BZ 111 or LIFE 103.

Biology and recognition of major orders and families of aquatic insects; a collection is required. ($)

*BSPM 450 03(3-0-0). Molecular Plant-Microbe Interactions. S. Prerequisite: Three credits BZ, BZ 346 or SOCR 330. Credit not allowed for both BSPM 450 and BSPM 550.

Principles of plant-microbe/insect interactions, physiological and molecular aspects of plant defense, genomics approaches to study plant defense.

*BSPM 451 03(3-0-0). Integrated Pest Management. S. Prerequisite: BSPM 302 or BSPM 308 or BSPM 361.

Concepts of integrated pest management and the strategies and tactics employed in the application of these concepts.

BSPM 462/MIP 462/BZ 462 05(3-4-0). Parasitology and Vector Biology. F. Prerequisite: BZ 110 or LIFE 103; BZ 212 or LIFE 206 or MIP 302. Credit allowed for only one of the following: BSPM 462, MIP 462, BZ 462.

Protozoa, helminthes, and insects and related arthropods of medical importance; systematic, epidemiology, host damage and control.

BSPM 487 Var. Internship.

BSPM 492 Var[1-3]. Seminar.

BSPM 495 Var[1-3]. Independent Study.

BSPM 496 Var[1-3]. Group Study.

BSPM 502A-G 01. Topics in Plant Pathology.

*A) Plant viruses 01(1-0-0). F. Prerequisite: Three credits 300- or 400-level BIO or BSPM or BZ or LIFE. *B) Plant bacteriology 01(1-0-0). F. Prerequisite: Three credits 300- or 400-level BIO or BSPM or BZ or LIFE. *F) Plant disease epidemiology 01(1-0-0). F. Prerequisite BSPM 361.

*BSPM 507 03(3-0-0). Insect Behavior. S. Prerequisite: None.

Behavior of insects and related arthropods with special attention to social behavior.

BSPM 508 03(3-0-0). Environmental Fate of Pesticides. S. Prerequisite: BZ 440 or CHEM 245 or SOCR 240.

Processes that affect fate of pesticides and their metabolites in the environment with emphasis on soil and water.

*BSPM 509 03(3-0-0). Herbicide Selectivity and Action. F. Prerequisite: BSPM 308; BZ 440.

Selectivity of major photosynthetic and growth inhibitor herbicides based on herbicide transport, metabolism, and mode of action.

*BSPM 510 03(3-0-0). Insect-Plant Disease Relationships. F. Prerequisite: BSPM 302 or BSPM 361.

Relationships between insects and various plant pathogens as they affect survival and transmissions of pathogens.

*BSPM 520*/BZ 520 03 (3-0-0). Advanced Systematics. S. Prerequisite: BSPM 424/BZ 424 or BZ 325. Credit not allowed for both BSPM 520 and BZ 520.

Theory and practice of modern systematics.

*BSPM 521 03(3-0-0). Forest Health Issues. F. Prerequisite: None.

Current topics related to forest and shade tree health from ecosystems to tree defense physiology.

*BSPM 523 04(1-4-1). Advanced Evolution/Classification of Insects. F. Credit not allowed for both BSPM 523 and BSPM 423.

Major groups of insects, living and fossil; major evolutionary trends in structure and behavior.

* Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guaranteed Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
*BSPM 525 03(3-0-0). Insect Physiology. S. Prerequisite: BSPM 302. Principles of insect function.

*BSPM 526/BZ 526 03(3-0-0). Evolutionary Ecology. F. Prerequisite BZ 320 or LAND 220/LIFE 220. Credit not allowed for both BSPM 526 and BZ 526. Adaptation to abiotic and biotic environments; how current ecological processes interact with evolutionary history.

*BSPM 528 03(3-0-0). Invasive Plants/Weeds: Ecosystems to Molecules. S. Prerequisite: BZ 120; LAND 220/LIFE 220 or LIFE 320; LIFE 102 or LIFE 103. Contributions of disciplines of weed science and invasion ecology to understanding the biology, ecology and management of "problem plants."

BSPM 530/SOCR 530 01(1-0-0). Scientific Writing. S. Prerequisite: None. Credit not allowed for both BSPM 530 and SOCR 530. Skills necessary to prepare complete scientific journal articles including writing, editing, and literature searching and assessment.

BSPM 540 03(3-0-0). Understanding Genomes. F. Prerequisite: None. Harnessing genome information and related –omics level technologies for use in answering biological questions.

*BSPM 550 03(3-0-0). Molecular Plant-Microbe Interactions. S. Prerequisite: Three credits BZ; BZ 346 or SOCR 330. Credit not allowed for both BSPM 550 and BSPM 450. Principles of plant-microbe interactions, physiological and molecular aspects of plant defense, genomic approaches to study plant defense.

*BSPM 551 04(3-0-1). Advanced Integrated Pest Management. S. Prerequisite: BSPM 302 or BSPM 308 or BSPM 361. Concepts of integrated pest management and the strategies and tactics employed in the practical application of these concepts.

*BSPM 555 03(1-4-0). Immature Insects. S. Prerequisite: BSPM 303A or BSPM 303B or BSPM 303C. Characteristics of immature forms of orders and families of insects emphasizing those important to humans.

*BSPM 556 03(3-0-0). Biological Control of Plant and Insects. F. Prerequisite: BZ 120 or LIFE 103; LIFE 320 or LAND 220/LIFE 220. Management of insect pests of plants and weeds using biological control agents such as insects, bacteria, viruses, and fungi.

*BSPM 570 03(3-0-0). Chemical Ecology. S. Prerequisite: None. Chemical interactions among animals, plants, fungi, and microorganisms.

*BSPM 571 01(0-2-0). Techniques in Chemical Ecology. S. Prerequisite: None. Practical experience with chemical techniques for separation, analysis, and synthesis of natural products together with biological assays for activity.

*BSPM 575/BZ 575 03(3-0-0). Molecular and Genomic Evolution. S. Prerequisite: BZ 220; BZ 350. Credit not allowed for both BSPM 575 and BZ 575. Molecular biological mechanisms of evolutionary change: mutation; selection; gene expression/regulation; changes in whole-genome architecture.

BSPM 576/MIP 576 03(3-0-0). Bioinformatics. F. S. Prerequisite: BC 463 or BZ 310 or BZ 350 or CM 501 or CS 155 or ERHS 332 or MIP 275 or MIP 300 or MIP 450 or STAT 307. Credit not allowed for both BSPM 576 and MIP 576. Technical computing across platforms using bioinformatics tools in molecular analyses.

BSPM 584 Var[1-3]. Supervised College Teaching.
BTEC 306/Biom 306 04(3-2-0). Bioprocess Engineering. S. Prerequisite: CHEM 107 or CHEM 111; PH 121 or PH 141. Credit not allowed for both BTEC 306 and BIOM 306. Material, energy balances; fluid flow, heat exchange, mass transfer; application to operations in food, fermentation, other bioprocess industries.

BTEC 499 Var[1-3]. Biotechnology Thesis. Prerequisite: Twelve credits from biotechnology core; approval of program coordinator.
BUSINESS COURSES – GENERAL
Nondepartmental
College of Business

BUS 100 01(1-0-0). Introduction to Business. F, S. Prerequisite: None. 
Overview of functional areas of business: accounting, finance, 
information systems, management, marketing, and international 
business.

F, S, SS. Prerequisite: None. Credit not allowed for both CS 110 and 
BUS 150. 
System hardware, operating environments, and software applications. 
(NT-O)

BUS 201 01(1-0-0). Foundations of Sustainable Enterprise. F, S. 
Prerequisite: None. 
Basics of sustainability in business and implications for business 
decision making.

BUS 205 03(3-0-0). Legal and Ethical Issues in Business. F, S, SS. 
Prerequisite: None. Credit not allowed for both BUS 205 and BUS 260. 
Ethical, legal and regulatory issues in the U.S. business environment. 
(NT-O)

BUS 220 03(3-0-0). Ethics in Contemporary Organizations. (GT-AH3, 
AUCC 3B). F, S. Prerequisite: None. 
Examination and application of the ethical principles that are 
fundamental to managing a successful, high-integrity business or 
an organization.

BUS 222 02(2-0-0). Interpersonal and Professional Skills. F, S. Pre- 
requisite: None. 
Development of effective interpersonal leadership skills built on self- 
awareness, understanding of others, and life experiences.

BUS 260 03(3-0-0). Social-Ethical-Regulatory Issues in Business. F, 
S, SS. Prerequisite: None. Credit not allowed for both BUS 260 and 
BUS 205. 
Legal issues, business ethics, corporate responsibility, and the 
business interface within the U.S. regulatory and business environment.

BUS 300 03(3-0-0). Business Writing and Communication. (GT-CO3, 
AUCC 2B) F, S, SS. Prerequisite: CO 150 or HONR 193. 
Advanced writing for business using recursive process and 
appropriate means given audience and message purpose. Preparation, 
presentation of reports.

BUS 350 03(3-0-0). Travel Abroad – International Comparative 
Management. SS. Prerequisite: Six credits of business courses. 
Travel tour of European business to compare and contrast their 
business strategies to those of U.S. firms.

BUS 405A-D 03(3-0-0). Contemporary Business Topics. F, S. 
Prerequisite: Any 2 of FIN 305, MGT 305, MKT 305. For non-business 
majors only. 
information management. D) Real Estate. (NT-O)

BUS 425 03(3-0-0). Starting and Managing Your Own Business. F. 
Prerequisite: Written consent of instructor. 
Business aspects of starting and managing your own small enterprise.

BUS 479 03(3-0-0). Strategic Management. F, S, SS. Prerequisite: 
FIN 300 or FIN 305; MGT 301; MGT 305 or MGT 320; MKT 300 or 
MKT 305. 
An integration of various business subject areas in terms of top-level 
policy and decision making.

BUS 495 Var. Independent Study.

BUS 496 Var. Group Study.

BUS 500 02(2-0-0). Business Systems and Processes. F, S, SS. Prereq- 
uisite: Admission to a master’s program in business. 
Introduction to core concepts from Business Process Management 
(BPM) and Operations Management (OM).

BUS 505 03(3-0-0). Legal and Ethical Environment of Business. S. 
Prerequisite: Admission to a master’s program in business. 
Legal and regulatory issues impacting business operation. Ethical and 
social responsibility concepts applied to business setting.

BUS 510 01(1-0-0). Career Assessment and Development. F, S, SS. 
Prerequisite: Admission to a master’s program in Business. 
Identify career goals based on personal skills, interests and values and 
understand how to compete in the global job market.

BUS 515 01(1-0-0). Career Management and Placement Strategy. F, 
S, SS. Prerequisite: Admission to a master’s program in Business. 
Tools to create a career strategy and personal brand.

BUS 601 02(2-0-0). Quantitative Business Analysis. S. Prerequisite: 
Admission to a master’s program in business. 
Uses and management of information; decision tools and concepts; 
quality control. (NT-V)

BUS 604/STAT 604 02(2-0-0). Managerial Statistics. F. Prerequisite: 
Admission to the MBA Program. Credit not allowed for both BUS 604 
and STAT 604. 
Introduction to statistical thinking and methods used to support 
managerial-decision making. (NT-V)

BUS 615 04(4-0-0). Accounting Systems. F. Prerequisite: None. 
Financial, managerial accounting information systems. Use of 
accounting information for purposes of management decision making, 
planning, and control. (NT-V)

BUS 616 02(2-0-0). Financial Reporting and Analysis. S, SS. 
Prerequisite: BUS 615 or ACT 600. 
Tools and techniques for analysis of financial reports of public 
companies. (NT-V)

BUS 620 02(2-0-0). Leadership and Teams. F. Prerequisite: Admis- 
sion to a master’s program in business. 
Ethical leadership and team dynamics; basic models of motivation 
utilized by leaders. (NT-V)

BUS 621 02(2-0-0). Strategic Decision Making. F. Prerequisite: None. 
Key decision concepts, processes and tools that help managers formulate 
and implement competitive strategy. (NT-V)

BUS 625 02(2-0-0). Organizational Communication. S. Prerequisite: 
None. 
Improving understanding and application of managerial 
communication skills and negotiation tools and their implications for 
effective management. (NT-V)

BUS 630 02(2-0-0). Information Management. S. Prerequisite: BUS 
615 or ACT 600. 
Role and value of information in business functions; risks and 
rewards of enterprise information; fundamentals of information storage 
and retrieval. (NT-V)

BUS 631 02(2-0-0). Strategic Uses of Information Technology. F, S. 
Prerequisite: BUS 630 or concurrent registration. 
Strategic and tactical uses of information technology in the global 
business environment. (NT-V)

BUS 635 02(2-0-0). Business Economics for the World Market. F, S. 
Prerequisite: BUS 601 or BUS 604/STAT 604; BUS 615.
Application of economic principles to current business problems within context of global marketplace. (NT-V)

**BUS 640 02(2-0-0). Financial Principles and Practice.** F, S. Prerequisite: BUS 601 or BUS 604/STAT 604.
Financial environment; tools and techniques of corporate financial decision making. (NT-V)

**BUS 641 02(2-0-0). Financial Markets and Investments.** F, S. Prerequisite: BUS 640 or concurrent registration.
Operating of financial markets, techniques for security valuation, and portfolio management. (NT-V)

**BUS 645 02(2-0-0). Enterprise Electronic Business Strategies.** S. Prerequisite: BUS 630.
Technology for electronic commerce; regulation and strategies for competitive usage. (NT-V)

**BUS 650 02(2-0-0). Supply Chain Management.** S. Prerequisite: Admission to a master’s program in Business.
Value-driven supply chain principles, design and management of supply chains, and supply chain management software and applications. (NT-V)

**BUS 655 02(2-0-0). Marketing Management.** F. Prerequisite: BUS 635.
Examines processes of customer value creation (e.g., product development, communications, distribution) and value capture (e.g., pricing). (NT-V)

**BUS 656 02(2-0-0). Marketing Strategy and Planning.** F. Prerequisite: BUS 616; BUS 640; BUS 655.
Basic marketing strategy analysis, formulation, evaluation and implementation concepts and tools. (NT-V)

**BUS 660 02(2-0-0). Ethical, Legal, and Regulatory Issues.** S. Prerequisite: Admission to a master’s program in business.
Legal, regulatory, societal and ethical issues encountered by business professionals; analytical skills for making judgments. (NT-V)

**BUS 662 02(2-0-0). International Business.** F, S, SS. Prerequisite: BUS 625; BUS 635; BUS 641; BUS 650.
Role of government regulations and how international firms affected; cultural aspects of business, global marketing, finance, management. (NT-V)

**BUS 665 04(4-0-0). MBA Capstone.** S. Prerequisite: BUS 641; BUS 650; BUS 656.
To integrate business disciplines through strategic thinking and experiential learning. (NT-V)

**BUS 678 03(3-0-0). Business Research.** F. Prerequisite: QNT 270.
Techniques for designing, conducting, and evaluating business research.

**BUS 686 Var. Practicum.** F, S, SS. Prerequisite: Written consent of instructor. (NT-O)

**BUS 687 Var. Internship.** Prerequisite: Written consent of instructor.

**BUS 690A-H Var[1-6]. Contemporary Issues in Business.** F, S, SS. Prerequisite: Admission to a College of Business graduate program.
Current issues in business, featuring business and community leaders.

**BUS 695 Var. Independent Study.**

**BUS 696 Var. Group Study.** Prerequisite: Written consent of instructor.

**BUS 699 Var. Thesis.**
**BOTANY/ZOOLOGY COURSES**

**Department of Biology**

**College of Natural Sciences**

**BZ 100 03. Introduction to Biology.** F, S, SS. Prerequisite: None. Offered as telecourse only.

Basic concepts in biology, including genetics, the human body, and interactions with their environment. (NT-T)

**BZ 101 03(3-0-0). Humans and Other Animals.** (GT-SC2, AUCC 3A). F, S. Prerequisite: None. Credit not allowed for students who have already taken BZ 110 or LIFE 102 or LIFE 103.

Characteristics of animals, their evolution and diversity; humans considered as an animal. (NT-O)

**BZ 104 03(3-0-0). Basic Concepts of Plant Life.** (GT-SC2, AUCC 3A). F, S. Prerequisite: For non-science and physical science majors. Credit not allowed for students who have already taken BZ 120 or LIFE 102 or LIFE 103.

Broad concepts of biology with major emphasis on plant life.

**BZ 105 01(0-2-0). Basic Concepts of Plant Life Laboratory.** (GT-SC1, AUCC 3A). F, S, SS. Prerequisite: BZ 104 or concurrent registration.

Modern biology exercises including viruses, Monera, Protista, fungi, plants, genetics, physiology, and ecology. ($)

**BZ 110 03(3-0-0). Principles of Animal Biology.** (GT-SC1, AUCC 3A). F, S, SS. Prerequisite: None.

General features (body form, physiology, life history, ecology) and evolutionary relationships of major phyla of animals.

**BZ 111 01(0-3-0). Animal Biology Laboratory.** (GT-SC2, AUCC 3A). F, S, SS. Prerequisite: BZ 110 or concurrent registration.

Laboratory exercises demonstrating major features of animal biology and major phyla of animals. ($)

**BZ 120 04(3-3-0). Principles of Plant Biology.** (GT-SC2, AUCC 3A). F, S. Prerequisite: None.

Diversity of relationships of plants and their structural and functional characteristics. ($)

**BZ 212 04(3-3-0). Animal Biology-Invertebrates.** F. Prerequisite: BZ 110; BZ 111 or LIFE 103.

General biology of invertebrates; their characteristics, classification, and adaptations. ($)

**B+Z 214 04(3-3-0). Animal Biology - Vertebrates.** S. Prerequisite: BZ 110; BZ 111 or LIFE 103. Required field trips.

General biology of vertebrates; their characteristics, classification, and adaptations. ($)

**BZ 220 03(3-0-0). Introduction to Evolution.** F, S, SS. Prerequisite: BZ 110; BZ 111 or BZ 120 or LIFE 103.

Fundamental concepts in evolutionary biology.

**BZ 223 03(2-2-0). Plant Identification.** F, SS. Prerequisite: BZ 120 or LIFE 103.

Relationships and identification of flowering plants.

**BZ 300 03(3-0-0). Animal Behavior.** S, SS. Prerequisite: BZ 110 and (BZ 111 or LIFE 103).

Principles of ethology, behaviors of nonhuman animals emphasizing their adaptive significance and phylogenetic relationships.

**BZ 301 02(0-4-0). Animal Behavior Laboratory.** S. Prerequisite: BZ 300 or concurrent registration.

Laboratory experiments in animal behavior; demonstrations and independent investigations.

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* Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
BZ 349 03(3-0-0). Tropical Ecology and Evolution. F. Prerequisite: BZ 220.
Broad introduction to terrestrial and aquatic tropical biodiversity and the ecological and evolutionary processes that generate and maintain it.

BZ 350 04(3-0-1). Molecular and General Genetics. F, S, SS. Prerequisite: BZ 110 or BZ 120 or LIFE 102; STAT 201 or concurrent registration or STAT 301 or concurrent registration or STAT 307 or concurrent registration. Primarily for students in biological sciences.
Mendelian, molecular, and population genetics emphasizing the molecular basis of genetics.

BZ 353/NR 353 03(3-0-0). Global Change Ecology, Impacts and Mitigation. S. Prerequisite: LAND 220/LIFE 220 or LIFE 320. Credit not allowed for both BZ 353 and NR 353.
Ecological impacts of human-induced global change, and the strategies that can/are being used to adapt to and mitigate these impacts.

BZ 384 Var[1-5]. Supervised College Teaching. F, S. Prerequisite: 3.00 overall GPA; written consent of instructor; grade of A in course with which student assists. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

BZ 401 03(3-0-0). Comparative Animal Physiology. S. Prerequisite: BZ 214.
Physiological mechanisms of digestion, metabolism, osmoregulation, excretion, circulation, and respiration in vertebrate and invertebrate animals.

BZ 402 04(3-3-0). Molecular Cytogenics. S. Prerequisite: BZ 310 or concurrent registration or LIFE 210 or concurrent registration; BZ 350 or concurrent registration or LIFE 201A or concurrent registration or LIFE 201B or concurrent registration or SOCR 330 or concurrent registration.
Structure, function, and behavior of chromosomes during interphase, mitosis, and meiosis.

*BZ 403 03(3-0-0). Comparative Endocrinology. F. Prerequisite: BZ 310.
Comparison of endocrine molecules, responses, and control mechanisms in vertebrates and invertebrates emphasizing molecular aspects.

*BZ 420 03(3-0-0). Evolutionary Medicine. F. Prerequisite: BZ 220.
Integration of evolutionary biology with behavior, genetics, and ecology to understand health and disease.

*BZ 424/*BSPM 424 03(3-0-0). Principles of Systematic Zoology. S. Prerequisite: BZ 110; BZ 111 or LIFE 103. Credit not allowed for both BZ 424 and BSPM 424.
Principles and methods of classification, zoological nomenclature, taxonomic decisions regarding species and higher categories.

*BZ 425 03(3-0-0). Molecular Ecology. F. Prerequisite: BZ 220; BZ 350; STAT 301 or STAT 307. Credit not allowed for both BZ 425 and BZ 525.
Introduction to molecular genetic markers for questions in ecology, evolution, behavior and conservation.

+BZ 433 04(3-0-1). Behavioral Genetics. F. Prerequisite: BZ 310. Required field trips.
An integrative view of genetic basis of animal behavior, with emphasis on complex behaviors and societal implications of genetics research.

BZ 440 03(3-0-0). Plant Physiology. S. Prerequisite: BZ 120 or LIFE 103.
Functions and activities of plants. (NT-O)

BZ 441 02(0-2-1). Plant Physiology Laboratory. S. Prerequisite: BZ 440 or concurrent registration.
Laboratory applications of plant physiology principles.

BZ 450 04(3-2-0). Plant Ecology. S. Prerequisite: LIFE 103 or BZ 120.
Relation of plants to their environment.

BZ 455 03(3-0-0). Human Heredity and Birth Defects. S. Prerequisite: BZ 110 and BZ 111 or LIFE 103.
Human heredity and its individual and social implications; causes of congenital defects.

BZ 460 04(3-0-1). Genome Evolution. S. Prerequisite: BZ 220; BZ 350.
Evolution of DNA, RNA, and proteins; use of genomic data to infer evolutionary history and processes.

BZ 462/MIP 462/BSPM 462 05(3-4-0). Parasitology and Vector Biology. F. Prerequisite: BZ 110 or LIFE 103; BZ 212 or LIFE 206 or MIP 502. Credit allowed for only one of the following: BZ 462, BSPM 462, MIP 462.
Protozoa, helminths, and insects and related arthropods of medical importance; systematics, epidemiology, host damage and control.

*BZ 471 03(3-0-0). Stream Biology and Ecology. F. Prerequisite: LAND 220/LIFE 220 or LIFE 320.
Biology and ecology of running waters.

*BZ 472 01(0-3-0). Stream Biology and Ecology Laboratory. F. Prerequisite: BZ 471 or concurrent registration. Required field trips.
Field sampling and laboratory analysis of habitats, biota, and ecological relationships in running waters. ($)

*BZ 474 03(2-2-0). Limnology. F. Prerequisite: LAND 220/LIFE 220 or LIFE 320. Required field trips.
Biology, chemistry, and physics of lakes including limnological methods. ($)

*BZ 476/BZ 576 03(3-0-0). Genetics of Model Organisms. F. Prerequisite: BZ 350 or LIFE 201A or LIFE 201B or SOCR 330; junior standing.
Advanced topics in model genetic systems including molecular and developmental genetics.

BZ 479/VS 479 03(3-0-0). Biology and Behavior of Dogs. F, S. Prerequisite: BZ 110 or LIFE 103. Credit not allowed for both BZ 479 and VS 479.
Interactions of physiology, neurobiology, and genetics on behavior of domestic dogs, and how evolution and domestication influence behavioral traits. (NT-O)

BZ 482 04(0-0-4). Ecology/Conservation: Biodiversity of Ecuador. F, S. Prerequisite: BZ 220; junior or senior standing.
Study abroad experience focused on understanding the diversity of tropical habitats and organisms in Ecuador, and how to conduct ecological research.

BZ 487 Var[1-12]. Internship.
Supervised work-related research experience in laboratory or field setting with consultation and approval of a regular faculty member.

BZ 492A-G Var[1-3]. Seminar.

BZ 495 Var[1-3]. Independent Study. Maximum of 7 credits allowed in course.

BZ 498 Var[1-6]. Laboratory or Field Research. Prerequisite: Written consent of research mentor.
Supervised lab or field research in biology, botany, or zoology.

*BZ 505 03(3-0-0). Cognitive Ecology. S. Prerequisite: BZ 300.
The evolutionary ecology of mechanisms related to information processing and decision-making in animals.

Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCsubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
Various aspects of plant development at the molecular level.

BZ 510 03(3-0-0). Zoophysiological Ecology. S. Prerequisite: BMS 300 or BMS 360 or BZ 401; LAND 220/LIFE 220 or LIFE 320.
Concepts, principles, and examples of adaptive physiological strategies used by animals.

*BZ 515 03(3-0-0). Physiological Ecology of Marine Vertebrates. S. Prerequisite: BZ 214; BZ 330; BC 351 or BC 401 or BMS 300 or BZ 401.
Physiological adaptations of vertebrates to different marine environments.

*BZ 520/*BSPM 520 03 (3-0-0). Advanced Systematics. S. Prerequisite: BSPM 424/BZ 424 or BZ 325. Credit not allowed for both BZ 520 and BSPM 520.
Theory and practice of modern systematics.

*BZ 525 04(3-0-1). Molecular Ecology. F. Prerequisite: BZ 220; BZ 350; STAT 301 or STAT 307. Credit not allowed for both BZ 525 and BZ 425.
Molecular genetic markers for questions in ecology, evolution, behavior and conservation.

*BZ 526/*BSPM 526 03(3-0-0). Evolutionary Ecology. F. Prerequisite: LAND 220/LIFE 220 or LIFE 320. Credit not allowed for both BZ 526 and BSPM 526.
Adaptation to abiotic and biotic environments; how current ecological processes interact with evolutionary history.

*BZ 530 02(2-0-0). Ecological Plant Morphology. S. Prerequisite: BZ 220; BZ 450 or LIFE 320.
Adaptive significance and evolution of plant form and structure.

*BZ 535 03(3-0-0). Behavioral Ecology. S. Prerequisite: BZ 220; graduate standing or written consent of instructor.
Evolutionary and theoretical perspectives in animal behavior using examples from model empirical systems; emphasis on decision rules and social behavior.

*BZ 537 03(2-2-0). Topics in Mycology. S. Prerequisite: BZ 333.
Features common to all fungi; trends in structure, function, and behavior.

*BZ 540 02(2-0-0). Translocation in Plants. S. Prerequisite: BZ 331; BZ 440.
Transport of sugars, organic and inorganic ions, water, and hormones across membranes and through vascular systems of plants.

BZ 544 02(2-0-0). Presenting Research in Biology. F. Prerequisite: Written consent of instructor.
Procedures for preparing and presenting results of biological research in scientific journals and at professional meetings.

BZ 548 04(3-3-0). Theory of Population and Evolutionary Ecology. F. Prerequisite: MATH 155 or MATH 160. Credit allowed for only one of the following: BZ 548, BZ 348, MATH 348.
Principles and methods for building, analyzing, and interpreting mathematical models of ecological and evolutionary problems in biology; research module.

*BZ 555 03(3-0-0). Reproductive Biology of Higher Plants. S. Prerequisite: BZ 310 or LIFE 210; BZ 350 or LIFE 201A or LIFE 201B or SOCR 330.
Reproductive processes influencing evolution in higher plant groups.

BZ 561 03(3-0-0). Landscape Ecology. F. Prerequisite: LIFE 320; STAT 301 or STAT 307; written consent of instructor.
Concepts, methods, and models for examining spatial patterns and processes of natural and managed landscapes and their effects on ecological dynamics.

*BZ 570 03(3-0-0). Molecular Aspects of Plant Development. S. Prerequisite: BC 463 or BZ 350 or MIP 450 or SOCR 330.
Various aspects of plant development at the molecular level.

* Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
CHEMICAL AND BIOLOGICAL ENGINEERING COURSES

Department of Chemical and Biological Engineering

College of Engineering

CBE 101 03(2-2-0). Chemical and Biological Engineering I. F.
Engineering design and problem solving; technical presentation skills; basic computer programming. ($) 

CBE 102 03(2-2-0). Chemical and Biological Engineering II. S.
Prerequisite: CBE 101.
Applications of engineering design and problem solving; computer programming to solve engineering problems; team project. ($) 

CBE 201 03(3-0-0). Material and Energy Balances. F. Prerequisite: CBE 102 or MATH 151 or concurrent registration in MATH 151; CHEM 111; LIFE 102 or concurrent registration; PH 141.
Principles of chemistry, physics, and mathematics applied to development of material and energy balances; illustration of concepts.

CBE 210 03(3-0-0). Thermodynamic Process Analysis. S.
Prerequisite: CBE 201 with a C or better; MATH 261 or concurrent registration.
Thermodynamic fundamentals and applications to ideal and non-ideal mixtures, power cycles, and chemical equilibria.

CBE 310 03(3-0-0). Molecular Concepts and Applications. F.
Prerequisite: CBE 210 with a C or better; MATH 340.
Application of modern molecular theory to chemical and biological engineering programs in thermodynamics, chemical kinetics, and transport phenomena.

CBE 320 03(3-0-0). Chemical and Biological Reactor Design. S.
Prerequisite: CBE 310 with a C or better; CBE 330 with a C or better.
Mechanisms and rates of chemical reactions; design of homogeneous and heterogeneous reactors; biological reactions and reactors.

CBE 330 03(3-0-0). Process Simulation. F. Prerequisite: CBE 210 with a C or better; MATH 340.
Analysis of chemical and biological engineering problems by numerical simulation.

CBE 331 03(3-0-0). Momentum Transfer and Mechanical Separations. F.
Prerequisite: CBE 210 with a C or better; MATH 340.
Fluid properties; conservation equations; compressible and incompressible flow; pumping and metering; mixing; separation of fluid-solid mixtures.

CBE 332 03(3-0-0). Heat and Mass Transfer Fundamentals. F.
Prerequisite: CBE 310 with a C or better; CBE 330 with a C or better; CBE 331 with a C or better.
Thermal processes; steady and unsteady conduction; convective heat transfer; radiation; heat exchanger design; mass transfer by diffusion and convection.

CBE 333 02(0-5-0). Chemical and Biological Engineering Lab I. S.
Prerequisite: CBE 332 or concurrent registration.
Laboratory experiments involving material balances, thermodynamics, and momentum and heat transfer. Data analysis; written and oral reports. ($)

CBE 406 03(3-0-0). Introduction to Transport Phenomena. F.
Prerequisite: CBE 332.
Fundamental treatment of momentum and mass transport processes; dimensional analysis for parameter identification and order of magnitude estimation.

CBE 430 03(3-0-0). Process Control and Instrumentation. S.
Prerequisite: CBE 320 with a C or better; CBE 442 with a C or better.
Measurement and control of process variables; transient chemical and biological processes; feedback, feedforward, and computer control concepts.

CBE 439/CIVE 439 03(2-3-0). Environmental Engineering Chemical Concepts. F. Prerequisite: CHEM 113; MATH 340. Credit not allowed for both CBE 439 and CIVE 439.
Application of chemical principles to environmental engineering problems.

CBE 442 04(4-0-0). Separation Processes. F. Prerequisite: CBE 332 with a C or better.
Analysis of chemical and biological separations based on thermodynamics, diffusion, and convective mass transfer; design of separations equipment.

CBE 443 02(0-5-0). Chemical and Biological Engineering Lab II. F.
Prerequisite: CBE 442 or concurrent registration.
Laboratory experiments involving advanced chemical and biological engineering concepts. Data analysis; written and oral reports. ($) 

CBE 451 03(3-0-0). Chemical and Biological Engineering Design I. F.
Prerequisite: CBE 320 with a C or better; CBE 442 or concurrent registration.
Chemical and biological process synthesis and simulation; engineering economics principles.

CBE 453 03(2-2-0). Chemical and Biological Engineering Design II. S.
Prerequisite: CBE 451 with a C or better.
Projects requiring students to design a chemical and/or biological process with cost estimation and constraint analysis; written and oral reports.

CBE 493 01(0-0-1). Professional Development Seminar. F.
Topics in engineering professional development, including ethics, role of engineers in society, and life-long learning.

CBE 495 Var. Independent Study.

CBE 496 Var. Group Study.

CBE 501 03(3-0-0). Chemical Engineering Thermodynamics. F.
Prerequisite: CBE 210; MATH 340.
Definition, correlation, and estimation of thermodynamic properties; nonideal chemical and physical equilibria.

CBE 502 03(3-0-0). Advanced Reactor Design. F.
Prerequisite: CBE 330; CBE 332.

CBE 503 03(3-0-0). Transport Phenomena Fundamentals. S.
Prerequisite: CBE 406.
General topics in transport phenomena; analytical and numerical solutions of laminar flows; perturbation techniques; coupled transport.

CBE 504/BIOM 504 03(3-0-0). Fundamentals of Biochemical Engineering. F.
Prerequisite: BIOM 306/BTEC 306 or concurrent registration or CBE 320 or concurrent registration; MATH 255 or MATH 340; MIP 300. Credit not allowed for both CBE 504 and BIOM 504.
Application of chemical engineering principles to enzyme kinetics, fermentation and cell culture, product purification, and bioprocess design.

CBE 505 01(0-3-0). Biochemical Engineering Laboratory. F.
Prerequisite: CBE 504/BIOM 504 or concurrent registration.
Fermentation technology, bioprocess control, and protein purification.

CBE 514 03(3-0-0). Polymer Science and Engineering. S.
Prerequisite: CHEM 343 or CHEM 346; or CHEM 474 or CBE 310.

*Alternate year offering (odd); * Alternate year offering (even); + Field trips; S Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCSubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)

CBE 521 03(3-0-0). Mathematical Modeling for Chemical Engineers. 
F. Prerequisite: MATH 340. 
Application of mathematical models to analysis and design of chemical reactors and separation processes.

CBE 522/BIOM 522 03(2-2-0). Bioseparation Processes. F. 
Prerequisite: CBE 331. Credit not allowed for both CBE 522 and BIOM 522. 
Analysis of processes used to recover and purify fermentation products.

°CBE 524 01(1-0-0). Bioremediation. F. Prerequisite: CBE 540/CIVE 540. 
Use of biotechnology for site remediation. Biodegradation, bioreactor design, and in situ bioremediation. (NT-V)

CBE 540/CIVE 540 03(3-0-0). Advanced Biological Wastewater Processing. S. Prerequisite: CHEM 343; CBE 310. Credit not allowed for both CBE 540 and CIVE 540. 
Fundamentals of environmental biotechnology: environmental microbiology, microbial kinetics, basic reactor design, wastewater treatment.

CBE 543/BIOM 543 03(3-0-0). Membranes for Biotechnology and Biomedicine. F. Prerequisite: CHEM 343; CBE 310. Credit not allowed for both CBE 543 and BIOM 543. 
Polymeric membrane formation, modification, module design and applications to bioseparation and biomedical separations and tissue engineering. (NT-O)

°CBE 613 03(3-0-0). Advanced Transport Phenomena. F. 
Prerequisite: ATS 601 or CBE 503 or CIVE 502; MATH 530. 
Fundamental studies of multi-component mass, energy, and momentum transport, with applications in advanced materials, biomedical and biochemical systems.

CBE 621 03(3-0-0). Advanced Process Control. F. Prerequisite: CBE 430. 
Application of modern control theory to chemical processes. Computer control aspects emphasized.

*CE 660 03(3-0-0). System and Parameter Identification. S. 
Prerequisite: Graduate standing. 
Principles and methods for selecting the most appropriate equations, and properties within those equations, to mathematically simulate physical phenomena.

CBE 693 Var. Seminar I.

CBE 695 Var. Independent Study.


CBE 707 01(1-0-0). Advanced Topics in Biochemical Engineering. 
F. 
Advanced biochemical engineering topics.

CBE 793 Var. Seminar II.

CBE 795 Var. Independent Study.

CBE 799 Var. Dissertation.
CHEMISTRY COURSES
Department of Chemistry
College of Natural Sciences

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Course Description</th>
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<tbody>
<tr>
<td>CHEM 103 03(3-0-0)</td>
<td>Chemistry in Context. (GT-SC2, AUCC 3A)</td>
<td>Math 117 or Math 124 or Math 141 or Math 155 or Math 160 or Math 161 or Math 229 or Math 261 or concurrent registration in Math 117 or Math 124 or Math 141 or Math 155 or Math 160 or Math 161 or Math 229 or Math 261. For students in science-related programs requiring one semester of general chemistry. Quantitative reasoning but with less focus on mathematical calculations than CHEM 111/CHEM 113. Credit allowed for only one of the following: CHEM 107, CHEM 111, and CHEM 117. Atomic/molecular theory, gases, liquids, solids, solutions, acids, bases, oxidation/reduction reactions, kinetics, selected topics. <strong>Placement out of MATH 118 or MATH 141 or MATH 155 or MATH 160 or MATH 161 or MATH 229 or MATH 261. Credit allowed for only one of the following: CHEM 107, CHEM 111, or CHEM 117. Fundamental aspects of chemistry and chemical principles; emphasis on structure, bonding, and stoichiometry.</strong></td>
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<tr>
<td>CHEM 108 01(0-2-0)</td>
<td>Fundamentals of Chemistry Laboratory. (GT-SC2, AUCC 3A)</td>
<td>F, SS. Prerequisite: CHEM 107 or concurrent registration. Laboratory applications of principles presented in CHEM 107. <strong>Placement out of MATH 118 or MATH 141 or MATH 155 or MATH 160 or MATH 161 or MATH 229 or MATH 261. For students in science-related programs requiring one semester of general chemistry. Quantitative reasoning but with less focus on mathematical calculations than CHEM 111/CHEM 113. Credit allowed for only one of the following: CHEM 107, CHEM 111, and CHEM 117. Atomic/molecular theory, gases, liquids, solids, solutions, acids, bases, oxidation/reduction reactions, kinetics, selected topics.</strong></td>
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<tr>
<td>CHEM 110 04(4-0-0)</td>
<td>Fundamentals of Chemistry. (GT-SC2, AUCC 3A)</td>
<td>F, SS. Prerequisite: (MATH 117 or placement out of MATH 117) or MATH 141 or MATH 155 or MATH 160 or MATH 161 or MATH 229 or MATH 261 or concurrent registration in MATH 141 or MATH 155 or MATH 160 or MATH 161 or MATH 229 or MATH 261. For students in science-related programs requiring one semester of general chemistry. Quantitative reasoning but with less focus on mathematical calculations than CHEM 111/CHEM 113. Credit allowed for only one of the following: CHEM 107, CHEM 111, and CHEM 117. Atomic/molecular theory, gases, liquids, solids, solutions, acids, bases, oxidation/reduction reactions, kinetics, selected topics. <strong>Placement out of MATH 118 or MATH 141 or MATH 155 or MATH 160 or MATH 161 or MATH 229 or MATH 261. Credit allowed for only one of the following: CHEM 107, CHEM 111, or CHEM 117. Fundamental aspects of chemistry and chemical principles; emphasis on structure, bonding, and stoichiometry.</strong></td>
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<tr>
<td>CHEM 112 01(0-3-0)</td>
<td>General Chemistry Laboratory I. (GT-SC1, AUCC 3A)</td>
<td>F, SS. Prerequisite: CHEM 110 or concurrent registration or CHEM 111 or concurrent registration. Credit not allowed for both CHEM 112 and CHEM 108. Laboratory applications of principles covered in CHEM 110. <strong>Placement out of MATH 118 or MATH 141 or MATH 155 or MATH 160 or MATH 161 or MATH 229 or MATH 261. For students in science-related programs requiring one semester of general chemistry. Quantitative reasoning but with less focus on mathematical calculations than CHEM 111/CHEM 113. Credit allowed for only one of the following: CHEM 107, CHEM 111, and CHEM 117. Atomic/molecular theory, gases, liquids, solids, solutions, acids, bases, oxidation/reduction reactions, kinetics, selected topics.</strong></td>
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<tr>
<td>CHEM 113 03(3-0-0)</td>
<td>General Chemistry II. F, SS.</td>
<td>Prerequisite: CHEM 107 or CHEM 111 or CHEM 117; (MATH 124 or placement out of MATH 124) or MATH 141 or MATH 155 or MATH 160 or MATH 161 or MATH 229 or MATH 261 or concurrent registration in MATH 141 or MATH 155 or MATH 160 or MATH 161 or MATH 229 or MATH 261. Acid/base equilibria, kinetics, thermodynamics, solubility, oxidation-reduction reactions, electrochemistry, selected topics. <strong>Placement out of MATH 118 or MATH 141 or MATH 155 or MATH 160 or MATH 161 or MATH 229 or MATH 261. Credit allowed for only one of the following: CHEM 107, CHEM 111, or CHEM 117. Fundamental aspects of chemistry and chemical principles; emphasis on structure, bonding, and stoichiometry.</strong></td>
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<tr>
<td>CHEM 114 01(0-3-0)</td>
<td>General Chemistry Laboratory II. F, SS.</td>
<td>Prerequisite: CHEM 112; CHEM 113 or concurrent registration. Laboratory applications of principles covered in CHEM 113. <strong>Placement out of MATH 118 or MATH 141 or MATH 155 or MATH 160 or MATH 161 or MATH 229 or MATH 261. Credit allowed for only one of the following: CHEM 107, CHEM 111, or CHEM 117. Fundamental aspects of chemistry and chemical principles; emphasis on structure, bonding, and stoichiometry.</strong></td>
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<tr>
<td>CHEM 115 01(0-0-1)</td>
<td>General Chemistry II Recitation.</td>
<td>S. Prerequisite: Concurrent registration in CHEM 113. Problem solving applied to topics in e.g., acid/base equilibria, kinetics, thermodynamics, solubility, oxidation-reduction reactions, electrochemistry.</td>
</tr>
<tr>
<td>CHEM 117 03(3-0-0)</td>
<td>General Chemistry I for Chemistry Majors. F.</td>
<td>Prerequisite: Concurrent registration in CHEM 192; (MATH 118 or placement out of MATH 118) or MATH 141 or MATH 155 or MATH 160 or MATH 161 or MATH 229 or MATH 261. Credit allowed for only one of the following: CHEM 107, CHEM 111, or CHEM 117. Fundamental aspects of chemistry and chemical principles with an emphasis placed on atomic and molecular structure, bonding, and stoichiometry.</td>
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<tr>
<td>CHEM 192 01(0-0-1)</td>
<td>Introductory Seminar in Chemistry. F.</td>
<td>Prerequisite: Concurrent registration in CHEM 117. Small group discussions of aspects of chemistry.</td>
</tr>
<tr>
<td>CHEM 245 04(4-0-0)</td>
<td>Fundamentals of Organic Chemistry. F, S, SS.</td>
<td>Prerequisite: CHEM 107 or CHEM 113. Credit allowed for only one of the following: CHEM 245, CHEM 341, and CHEM 345. Intended for students in science-related programs requiring one semester of organic chemistry. Nomenclature, structure, bonding, reactions, mechanisms, synthesis, stereochemistry of organic compounds.</td>
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<tr>
<td>CHEM 246 01(0-3-0)</td>
<td>Fundamentals of Organic Chemistry Laboratory. F, S, SS.</td>
<td>Prerequisite: CHEM 108 or CHEM 112 or CHEM 114; CHEM 245 or concurrent registration. Credit not allowed for students who have already taken CHEM 344. Laboratory applications of principles presented in CHEM 245.</td>
</tr>
<tr>
<td>CHEM 261 03(3-0-0)</td>
<td>Fundamentals of Inorganic Chemistry. S.</td>
<td>Prerequisite: CHEM 113 or concurrent registration. Preparation, structures, properties, and reactions of chemical elements and inorganic compounds; periodic trends, organizing principles; applications.</td>
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<tr>
<td>CHEM 301 03(1-4-0)</td>
<td>Advanced Scientific Writing—Chemistry. (AUCC 2B).</td>
<td>S. Prerequisite: CO 150; CHEM 334 or CHEM 345 or a 300-level science laboratory course with written approval of instructor. Advanced scientific writing using the read-analyze-write approach and scientific poster preparation and presentation.</td>
</tr>
<tr>
<td>*CHEM 311 03(3-0-0), Introduction to Nanoscale Science. S.</td>
<td>Prerequisite: CHEM 113; CHEM 343 or CHEM 346. Synthesis, characterization, and applications of nanoscale materials.</td>
<td></td>
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<tr>
<td>CHEM 320 03(3-0-0)</td>
<td>Chemistry of Addictions. S.</td>
<td>Prerequisite: CHEM 103 or CHEM 107 or CHEM 111. Chemical processes of addiction; receptor binding, molecular deactivation, and feedback in the context of protein-substrate molecular interactions.</td>
</tr>
<tr>
<td>CHEM 334 01(0-3-0). Quantitative Analysis Laboratory. F, SS.</td>
<td>Prerequisite: CHEM 114; CHEM 335 or concurrent registration. Credit not allowed for both CHEM 334 and CHEM 332. Laboratory applications of principles presented in CHEM 335.</td>
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<tr>
<td>CHEM 335 03(3-0-0). Introduction to Analytical Chemistry. F, SS.</td>
<td>Prerequisite: CHEM 113 with a C or better; CHEM 334 or concurrent registration. Credit not allowed for both CHEM 335 and CHEM 331. Modern and classical applications and methods in analytical chemistry including statistical, kinetic, spectroscopic, and chromatographic analysis.</td>
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<tr>
<td>CHEM 341 03(3-0-0). Modern Organic Chemistry I. F, S, SS.</td>
<td>Prerequisite: CHEM 113. Credit allowed for only one of the following: CHEM 245, CHEM 341, and CHEM 345. Structures, nomenclature, dynamics, spectroscopy, and reactions of organic molecules.</td>
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<tr>
<td>CHEM 343 03(3-0-0). Modern Organic Chemistry II. F, S, SS.</td>
<td>Prerequisite: CHEM 245 or CHEM 341 or CHEM 345. Credit not allowed for both CHEM 343 and CHEM 346. Continued studies of reactions and mechanisms of organic molecules and biological chemistry.</td>
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</tbody>
</table>

*Alternate year offering (odd); * Alternate year offering (even); + Field trips; S Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
CHEM 344 02(0-6-0). Modern Organic Chemistry Laboratory. F, S. Prerequisite: CHEM 113; CHEM 114. Intended for science majors. Credit not allowed for both CHEM 344 and CHEM 246. Laboratory applications of modern organic chemistry. (§)

CHEM 345 04(3-3-0). Organic Chemistry I. F, S. Prerequisite: CHEM 113; CHEM 114. Intended for science majors. Students should plan to complete the sequence CHEM 345, CHEM 346. Credit allowed for only one of the following: CHEM 245, CHEM 341, and CHEM 345. Structure, nomenclature, dynamics, spectroscopy, reactions of organic molecules. Laboratory applications of principles presented in lecture. (§)

CHEM 346 04(3-3-0). Organic Chemistry II. F, S. Prerequisite: CHEM 345. Credit not allowed for both CHEM 343 and CHEM 346. Intended for science majors. Students should plan to complete the sequence CHEM 345, CHEM 346. Continue studies of reactions and mechanisms of organic molecules. Laboratory applications of principles presented in lecture. (§)

CHEM 384 Var[1-3]. Supervised College Teaching. Prerequisite: Twenty credits in chemistry; written consent of department head. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements. Maximum of 12 credits for any combination of CHEM 384, CHEM 487, CHEM 495, CHEM 498.

CHEM 431 04(3-3-0). Instrumental Analysis. F. Prerequisite: CHEM 334; CBE 310 or concurrent registration or CHEM 474 or concurrent registration. Instrumental methods of chemical analysis. (§)

*CHEM 433 03(2-3-0). Clinical Chemistry. S. Prerequisite: CHEM 334; BC 351 or BC 401. Principles and methodology of clinical chemistry. Laboratory experience in methodology and method development. (§)

CHEM 440 02(0-6-0). Advanced Organic Chemistry Laboratory. F. Prerequisite: CHEM 344 or CHEM 346. Advanced techniques in organic synthesis, mechanisms of reactions, structure determination. (§)

CHEM 461 03(3-0-0). Inorganic Chemistry. S. Prerequisite: CHEM 261; CHEM 472 or CHEM 474. Concepts, models to explain structural, spectroscopic, magnetic, thermodynamic, and kinetic properties of inorganic compounds; symmetry, group theory.

CHEM 462 02(0-6-0). Inorganic Chemistry Laboratory. S. Prerequisite: CHEM 461 or concurrent registration. Synthetic techniques and instrumental methods in inorganic chemistry. (§)

CHEM 4704(4-0-0). Foundations of Physical Chemistry. S. Prerequisite: CHEM 113; MATH 161 or MATH 255; PH 122 or PH 142. Quantum chemistry, molecular structure and spectroscopy; equilibrium thermodynamics; kinetics.

CHEM 474 03(3-0-0). Physical Chemistry I. F. Prerequisite: CHEM 113; MATH 261; PH 142; concurrent registration in CHEM 475. Credit allowed for only one of the following: CHEM 471, CHEM 472, or CHEM 474. Quantum chemistry; applications to bonding, molecular structure, and spectroscopy.

CHEM 475 01(0-3-0). Physical Chemistry Laboratory I. F, S. Prerequisite: CBE 310 or concurrent registration or CHEM 473 or concurrent registration or CHEM 474 or concurrent registration. Physicochemical experiments; emphasis on quantum mechanics/spectroscopy; interpretation/presentation of data; formal lab reports. (§)

CHEM 476 03(3-0-0). Physical Chemistry II. S. Prerequisite: CHEM 474. Statistical thermodynamics; applications to phase and chemical equilibria; kinetics.

CHEM 477 01(0-3-0). Physical Chemistry Laboratory II. S. Prerequisite: CHEM 475. Physicochemical experiments; emphasis on thermodynamics/statistical mechanics; kinetics; interpretation/presentation of data; formal lab reports. (§)

CHEM 487 Var. Internship. Prerequisite: CHEM 476. Maximum of 12 credits allowed for any combination of CHEM 384, CHEM 487, CHEM 495, CHEM 498. Supervised work experience in approved off-campus chemical laboratory setting. Consultation with faculty adviser/instructor.

CHEM 493 02(0-0-2). Seminar. S. Prerequisite: CHEM 474. Critical analyses of selected literature; develop presentation of technical topic; required oral presentation.

CHEM 495 Var[1-3]. Independent Study. Prerequisite: Nine credits in chemistry; written consent of laboratory mentor and department chair. Maximum of 12 credits for any combination of CHEM 384, CHEM 487, CHEM 495, CHEM 498. Satisfactory completion of course requires a written report, an oral presentation at a research group meeting, or a poster presentation.

CHEM 498 Var[1-3]. Research. Prerequisite: Twenty credits in chemistry; written consent of research mentor and department chair. Maximum of 12 credits for any combination of CHEM 384, CHEM 487, CHEM 495, CHEM 498. Supervised laboratory research in chemistry; written report consistent with ACS guidelines required.

CHEM 511 03(3-0-0). Solid State Chemistry. F. Prerequisite: CHEM 461; CHEM 476. Physical and descriptive chemistry of solids including characterization and synthetic methods. *CHEM 515 03(3-0-0). Polymer Chemistry. F. Prerequisite: CHEM 436; CHEM 476. Fundamentals of polymer chemistry; synthesis, characterization, physical properties.


CHEM 521/BC 521 03(3-0-0). Principles of Chemical Biology. F. Prerequisite: CHEM 245 or CHEM 343 or CHEM 346. Credit not allowed for both CHEM 521 and BC 521. Principles of chemical biology. Chemical methods for understanding and controlling the structure and function of biopolymers.


CHEM 532 03(3-0-0). Advanced Chemical Analysis II. S. Prerequisite: CHEM 431. Advanced optics; instrumentation and methodology for analytical spectroscopy; computer applications.

*CHEM 533 03(3-0-0). Chemical Separations. F, S. Prerequisite: CHEM 335; CHEM 431. Fundamentals and applications of chemical separations.

*CHEM 537 03(3-0-0). Electrochemical Methods. S. Prerequisite: CHEM 431. Theory and methods of electrochemistry; applications of modern electrochemical techniques.
CHEM 539A-C 01(1-0-0). Principles of NMR and MRI. S. Prerequisite: CHEM 474.
Modern experimental methods in inorganic chemistry. A) Basic NMR principles. B) NMR diffusion measurements-2D NMR and MRI. C) Advanced NMR and MRI techniques.

CHEM 541 03(3-0-0). Organic Spectroscopy. SS. Prerequisite: CHEM 440.
Organic structure determination by spectroscopic methods.

CHEM 543 03(3-0-0). Structure/Mechanisms in Organic Chemistry. F. Prerequisite: CHEM 346.
Structure including stereochemistry and conformational isomerism; reactivity and mechanisms in organic chemistry.

CHEM 545 03(3-0-0). Synthetic Organic Chemistry I. S. Prerequisite: CHEM 543.
Reactions and synthesis in organic chemistry.

CHEM 547 03(3-0-0). Physical Organic Chemistry. S. Prerequisite: CHEM 543.
Mechanisms, theory, kinetics, and thermodynamics.

CHEM 549 03(3-0-0). Synthetic Organic Chemistry II. F. Prerequisite: CHEM 545.
Modern synthetic methods. Strategies for total synthesis of natural products.

CHEM 550A 01(1-0-0). Materials Chemistry—Hard Materials. F. Prerequisite: CHEM 343 or CHEM 346; CHEM 461; CHEM 476.
Structure and bonding; crystallography; properties; synthesis; characterization of metals, semiconductors, and network solids.

CHEM 550B 01(1-0-0). Materials Chemistry—Soft Materials. F. Prerequisite: CHEM 343 or CHEM 346; CHEM 461; CHEM 476.
Structure and bonding, mechanisms, properties, applications, synthesis, characterization of polymers, complex fluids, and biomaterials.

CHEM 550C 01(1-0-0). Materials Chemistry—Nanomaterials. F. Prerequisite: CHEM 343 or CHEM 346; CHEM 461; CHEM 476.
Structure and bonding, synthesis, properties, characterization of carbon nanotubes, metal and semiconductor nanocrystals, and nanocomposites.

CHEM 551 03(3-0-0). Organometallic Chemistry. F. S. Prerequisite: CHEM 346.
Descriptive and mechanistic organometallic chemistry applied to homogeneous catalysis and organic synthesis.

CHEM 555 03(3-0-0). Chemistry of Sustainability. F. Prerequisite: BC 411 or CBE 310 or CHEM 476; CHEM 343 or CHEM 346.
The central role of chemistry for achieving sustainability in key areas including chemicals and materials, energy, and environment.

CHEM 560 01(1-0-0). Foundations of Inorganic Synthesis. F. Prerequisite: CHEM 461.
Preparation for advanced studies in metal-mediated chemistry; essential aspects of inorganic structure, thermodynamics and reactivity.

CHEM 561 02(2-0-0). Inorganic Synthesis. F. Prerequisite: CHEM 560.
Chemistry of compounds of representative elements and transition metals.

CHEM 563A-F 01(1-0-0) Physical Methods in Inorganic Chemistry. F. S. Prerequisite: CHEM 461.

*CHEM 565 03(3-0-0). Inorganic Mechanisms. F. Prerequisite: CHEM 476.
Fundamental tools, key principles, selected classic case histories of inorganic and organometallic mechanistic chemistry, emphasizing kinetic methods.

*CHEM 566 03(3-0-0). Bioinorganic Chemistry. S. Prerequisite: CHEM 461.
Biological-inorganic chemistry, including key principles, prototype systems, classic papers, and problems.

CHEM 567 01(1-0-0). Crystallographic Computation. F, S. SS. Prerequisite: CHEM 474.
Theory and practice of structural computations using single crystal X-ray diffraction data.

*CHEM 569 03(3-0-0). Chemical Crystallography. S. Prerequisite: CHEM 474.
Theory and practice of determination of crystal and molecular structure by single crystal X-ray and neutron diffraction.

*CHEM 570 03(3-0-0). Chemical Bonding. F. Prerequisite: CHEM 474 or CBE 310.
Electronic structure methods; chemical bonding models; intermolecular interactions.

*CHEM 571 03(3-0-0). Quantum Chemistry. F. Prerequisite: CHEM 474 or CBE 310.
Simple systems; symmetry; approximate methods; time dependent methods; molecular structures.

*CHEM 575 03(3-0-0). Chemical Thermodynamics. F. Prerequisite: CHEM 476 or CBE 310.
Thermodynamic concepts and their applications to chemical problems.

*CHEM 576 03(3-0-0). Statistical Mechanics. S. Prerequisite: CHEM 476 or CBE 310.
Principles of statistical mechanics with application in the chemical sciences.

*CHEM 577 03(3-0-0). Surface Chemistry. S. Prerequisite: CHEM 476 or CBE 310.
Capillarity; interfacial thermodynamics; electrical aspects of surface chemistry; adsorbed layers.

*CHEM 579 03(3-0-0). Chemical Kinetics. F. Prerequisite: CHEM 476 CBE 310.
Elementary reactions, unimolecular reactions, reactions in solution, gas phase ion chemistry; photochemistry; and kinetic modeling.

*CHEM 601 01(1-0-0). Responsible Conduct in Chemistry Research. S. Prerequisite: None.
Appropriate conduct in research, publishing, intellectual property decisions, job hunting, and negotiating; social responsibilities of scientists.

CHEM 641 02(2-0-0). Organic Reaction Mechanisms. S. Prerequisite: CHEM 545.
Organic reaction mechanisms, including using arrows to show electron movement; heterolytic, radical, and pericyclic reactions.

CHEM 651A-D Var[1-4]. Special Topics in Chemistry. F, S. Prerequisite: Written consent of instructor.

CHEM 695 Var[1-3]. Independent Study.

CHEM 698 Var[1-9]. Research. F, S, SS. Prerequisite: Graduate standing in chemistry.
Graduate research in chemistry for students who do not plan to write an M.S. thesis.

CHEM 702 01(0-0-1). Independent Research Proposal. F, S.
Prerequisite: Admission to Ph.D. candidacy.
Preparation, submission, and defense of an independent research proposal; creative and original thinking about research problems in modern chemistry.

CHEM 751 01(1-0-0). Methods of Chemistry Laboratory Instruction. F. Prerequisite: None.
Basic materials, methods, and skill development related to teaching undergraduate chemistry laboratory courses.

CHEM 752 01(0-0-1). Advanced Methods of Chemistry Instruction. S. Prerequisite: CHEM 751.
Advanced materials, methods, and presentation skills development related to teaching undergraduate chemistry courses.

*CHEM 773 03(3-0-0). Atomic and Molecular Spectroscopy. S. Prerequisite: CHEM 571.
Time-dependent methods; multiphoton and nonlinear spectroscopy; fundamentals of rotational, vibrational, electronic and magnetic resonance spectroscopy.

CHEM 784 Var[1-2]. Supervised College Teaching.

CHEM 793 01(0-0-1). Seminar.

CHEM 795A-D Var[1-5]. Independent Study.


°Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
CIS 120 03(3-0-0). Business Programming Fundamentals. F, S.  
Prerequisite: None. Credit not allowed for both CIS 120 and CIS 210.  
File and operating systems for business application development. Business program development using a high-level programming language.

CIS 200 03(3-0-0). Business Information Systems. F, S, SS. 
Prerequisite: BUS 150 or CS 110.  
Use of information technology (IT) to enable knowledge workers, support business processes, and grow the business.

CIS 210 03(3-0-0). Information Technology in Business. F, S, SS. 
Prerequisite: CIS 200 or concurrent registration. Credit not allowed for both CIS 210 and CIS 120.  
Introduction to information systems: the IS profession; hardware, software, and programming; web and database applications; data analysis tools.

CIS 220 03(3-0-0). Object-Oriented Information Design. F, S, SS. 
Prerequisite: CIS 120. Credit not allowed for both CIS 220 and CIS 340.  
Object-oriented information design and programming; design and manipulation of data structures.

CIS 240 03(3-0-0). Application Design and Development. F, S, SS. 
Prerequisite: CIS 210.  
Software engineering methods including design, implementation, and testing using structured and event-driven techniques, logic, and data structures. (NT-O)

CIS 301 03(3-0-0). End User Computing. F, S, SS. Prerequisite: None.  
End user applications in a Graphical User Interface environment including spreadsheet, word processing, and presentation graphics; Internet concepts. (NT-O)

CIS 320 03(3-0-0). Project Management for Information Systems. F, S. Prerequisite: CIS 120 or CIS 210.  
Project management concepts including work breakdown structure, estimating, scheduling, tools, and reports.

CIS 340 03(3-0-0). Advanced Application Design and Development. F, S. Prerequisite: CIS 240. Credit not allowed for both CIS 340 and CIS 220.  
Design and construction of business applications using object-orientation and advanced data structures.

CIS 350 03(3-0-0). Operating Systems and Networks. F, S. Prerequisite: CIS 210.  
Multituser and network operating systems; basic networking concepts including security, transmission, performance, and topologies.

CIS 355 03(3-0-0). Business Database Systems. F, S. Prerequisite: CIS 120 or CIS 210.  
Physical and logical design, implementation, and administration of databases. (NT-O)

CIS 360 03(3-0-0). Systems Analysis and Design. F, S. Prerequisite: CIS 240.  
Traditional and cutting-edge systems analysis and design techniques, with emphasis on object-oriented approaches.

CIS 370 03(3-0-0). Business Intelligence. SS. Prerequisite: CIS 200; MKT 300.  
Techniques and technologies for deriving business value from the integration, analysis, mining, and transformation of data.

CIS 390 03(3-0-0). Information Management in the Enterprise. F, S. Prerequisite: Any two of FIN 300, MGT 301, MGT 320, MKT 300.  
Role of information in business functional areas; value of information in business; risks and rewards of enterprise information.

CIS 410 03(3-0-0). Web Application Development. F. Prerequisite: CIS 240; CIS 355.  
Web development techniques and strategies including Active Server Pages using VBScript, JavaScript, ColdFusion; security, web design.

CIS 411 03(3-0-0). Enterprise Resource Planning Systems. S. Prerequisite: ACT 220; FIN 300 or FIN 305; MGT 305 or MGT 320; MKT 300 or MKT 305.  
Introduction to enterprise resource planning (ERP) systems concepts, business processes impacted by ERP, systems and software integration.

CIS 412 03(3-0-0). Issues and Cases in Electronic Commerce. S. Prerequisite: CIS 355.  
Business models for B2B or B2C e-commerce, technology infrastructure, electronic payment mechanisms, information privacy.

CIS 413 03(3-0-0). Advanced Networking and Security. F. Prerequisite: CIS 240; CIS 350.  
Modern communication standards, protocol systems; network security, security policies, attack and protection mechanisms, legal and ethical issues.

CIS 455 03(3-0-0). Advanced Database Management. S. Prerequisite: CIS 355.  
Advanced data management topics including performance tuning, concurrency control, security, object-oriented databases, and data warehousing.

CIS 460 03(3-0-0). Object-Oriented Systems. F. Prerequisite: CIS 355; CIS 360.  
Object-oriented concepts, development methodologies, techniques, and languages.

CIS 462 03(3-0-0). Systems Development Project. F, S. Prerequisite: CIS 320; CIS 360.  
Application of concepts, techniques, and tools used in analysis, design, and implementation of computer-based information systems in applied setting.

CIS 487 03(0-9-0). Internship.  
Supervised and planned work experience paralleling concentration in industry.

CIS 492 03(3-0-0). Seminar. Prerequisite: CIS 460.  
Current topics in computer-based information systems.

CIS 495 Var. Independent Study.

CIS 496B-E Var. Group Study.  

CIS 498 Var[1-3]. Research.

CIS 570 03(3-0-0). Business Intelligence. F, S, SS. Prerequisite: Admission to the M.B.A., M.C.I.S., M.S.B.A., or M.E. program.  
Harnessing vast data stores to solve problems, enhance decision-making, discover new business opportunities, and to derive additional benefits. (NT-O)

CIS 575 03(3-0-0). Applied Data Mining and Analytics in Business. F, S, SS. Prerequisite: STAT 204.  
Data mining is a process of selecting, exploring and modeling large amounts of data to identify patterns and relationships among key variables. (NT-O)

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCsubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
CIS 600 03(3-0-0). Information Technology and Project Management. F, SS. Prerequisite: Admission to the M.B.A., M.C.I.S., M.S.B.A., or M.E. program
   Strategic role and management of information technology and software development projects. (NT-O/T/V)

CIS 601/MGT 601 03(3-0-0). Enterprise Computing and Systems Integration. F. Prerequisite: Admission to the M.B.A., M.C.I.S., M.S.B.A., or M.E. program. Credit not allowed for both CIS 601 and MGT 601.
   Integrated extended enterprise planning and execution systems concepts including ERP, CRM, SCM, MRPII, business processes, front/back office systems. (NT-O)

CIS 605 03(3-0-0). Business Visual Application Development. F. Prerequisite: Admission to the M.B.A., M.C.I.S., M.S.B.A. or M.E. program
   Design, construction, and testing of business application systems including leading-edge visual, E-commerce languages and tools. (NT-O)

CIS 606 03(3-0-0). Application Software Infrastructure. F. Prerequisite: Admission to the M.B.A., M.C.I.S., M.S.B.A., or M.E. program
   Design, construction, and testing of business application software infrastructure including hardware, operating software, and communications network. (NT-O)

CIS 610 03(3-0-0). Software Development Methodology. F. Prerequisite: Admission to the M.B.A., M.C.I.S., M.S.B.A., or M.E. program
   Methods for all phases of software development focusing upon the establishment of economical software that is reliable and cross platform. (NT-O/T/V)

CIS 611 03(3-0-0). Object-Oriented Systems. S. Prerequisite: CIS 610; Admission to the M.B.A., M.C.I.S., M.S.B.A., or M.E. program.
   Object-oriented and web-based software; object model describing classes; relationships to other objects, attributes, and operations. (NT-O)

CIS 620 03(3-0-0). IT Communications Infrastructure. S. Prerequisite: Admission to the M.B.A., M.C.I.S., M.S.B.A., or M.E. program.
   Technical aspects of information communications, business considerations; wireless technology, architecture, and applications. (NT-O)

CIS 655 03(3-0-0). Business Database Systems. S. Prerequisite: Admission to the M.B.A., M.C.I.S., M.S.B.A., or M.E. program.
   Database analysis, design, administration; data modeling; data sublanguages, query facilities; distributed database systems. (NT-O)

CIS 665 03(3-0-0). E-Business Application Technologies. S. Prerequisite: CIS 605; CIS 606; CIS 610; admission to the M.B.A., M.C.I.S., M.S.B.A., or M.E. program.
   Developing E-business (B2B and B2C) through construction and deployment. (NT-O)

CIS 670 03(3-0-0). Advanced IT Project Management. F, S, SS. Prerequisite: CIS 600.
   Advanced tools, techniques and skills for advanced risk management, change movement, and performance/control measures in cross-functional projects. (NT-O)

CIS 695 Var. Independent Study.

CIS 696 Var. Group Study.


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CIVIL ENGINEERING COURSES

Department of Civil and Environmental Engineering

College of Engineering

CIVE 102 03(2-3-0). Introduction: Civil/Environmental Engineering. F. Prerequisite: None.
Civil engineering profession, computer applications and programming related to civil engineering; introduction to surveying.

CIVE 103 03(2-2-0). Engineering Graphics and Computing. S. Prerequisite: CIVE 102 or ENGR 101.
Introduction to the profession and academia; principles of civil engineering design; graphical, oral, and written communication; team projects. ($)

CIVE 202 03(2-2-0). Numerical Modeling and Risk Analysis. F. Prerequisite: CIVE 103; MATH 160 or concurrent registration.
Civil engineering systems, simulation and optimization techniques, statistical tools and their use in civil engineering, risk analysis.

CIVE 203 03(2-2-0). Engineering Systems and Decision Analysis. S. Prerequisite: CIVE 202.
Civil engineering infrastructure systems, numerical and decision analysis techniques, applications of risk analysis.

CIVE 260 03(3-0-0). Engineering Mechanics-Statics. F, S. SS. Prerequisite: MATH 160; PH 141 or concurrent registration.
Forces using vector notation; static equilibrium of rigid bodies; friction, virtual work, centroids, and moments of inertia. (NT-O)

Kinematics and kinetics of particles and rigid bodies; concepts of work-energy and impulse-momentum; computer applications; vector notation. (NT-O)

CIVE 300 03(3-0-0). Fluid Mechanics. F, S. Prerequisite: CIVE 261; MATH 340 or concurrent registration; MECH 237 or concurrent registration or MECH 337 or concurrent registration.
Fluid properties; statics, kinematics, and dynamics of fluid motion including viscous and gravitational effects. (NT-O)

CIVE 301 01(0-3-0). Fluid Mechanics Laboratory. F, S. Prerequisite: CIVE 300 or concurrent registration.
Fluid properties; statics, kinematics, and dynamics of fluid motion including viscous and gravitational effects.

CIVE 302 03(2-3-0). Evaluation of Civil Engineering Materials. F. Prerequisite: CHEM 111; CIVE 360.
Behavior and properties of construction materials, instrumentation, use of statistical tools, material standards, material selection, quality control. ($)

CIVE 303 03(3-0-0). Infrastructure and Transportation Systems. S. Prerequisite: CIVE 260.
Principles of infrastructure systems, transportation systems, applications of spatial data and GIS, project management and engineering economy.

CIVE 305 03(2-2-0). Intermediate AutoCAD. F. Prerequisite: CIVE 103.
Creating layouts and templates, objects, graphic patterns and symbols, inserting and managing external references, and creating isometric drawings.

CIVE 322 03(3-0-0). Basic Hydrology. F, S. Prerequisite: CBE 331 or CIVE 300 or WR 416; CIVE 202 or STAT 301 or STAT 315. Credit not allowed for both CIVE 322 and ENVE 322.
Hydrologic cycle, soil moisture, groundwater, runoff processes, applications in water resources and environmental engineering. (NT-O)

CIVE 330 03(3-0-0). Ecological Engineering. S. Prerequisite: (BZ 110; BZ 111) or BZ 120 or LIFE 102; CHEM 113; CIVE 300 or LIFE 320.
Principles of ecological engineering and design of sustainable ecosystems.

CIVE 355 03(3-0-0). Introduction to Geotechnical Engineering. F, S. Prerequisite: CIVE 360.
Soil behavior, stress-strain and strength properties, application to earth pressure, slope and foundation problems.

CIVE 356 01(0-3-0). Geotechnical Engineering Laboratory. F, S. Prerequisite: CIVE 355 or concurrent registration.
Laboratory to demonstrate standard methods of soils testing, methods of data collection, analysis of results. ($)

CIVE 360 03(3-0-0). Mechanics of Solids. F, S. Prerequisite: CIVE 260 or MECH 262.
Stresses and deformations in structural members and machine elements, combined stresses, stress transformation.

CIVE 363 01(0-3-0). Material Properties. F, S. Prerequisite: CIVE 360.
Mechanical properties of metals, woods, and plastics; testing techniques and standards.

CIVE 367 03(3-0-0). Structural Analysis. F, S. Prerequisite: CIVE 360.
Determination of actions in and deformations of determinate and indeterminate structures.

CIVE 390 Var[1-3]. Civil Engineering Student Projects Workshop. F, S. Prerequisite: None.

CIVE 401 03(3-0-0). Hydraulic Engineering. S. Prerequisite: CIVE 300.
Basic principles of fluid mechanics applied to practical problems in hydraulic engineering.

CIVE 402 03(2-2-0). Senior Design Principles. F. Prerequisite: CIVE 300; CIVE 303 or CHEM 245.
Design of civil engineering systems, nontechnical and economic design considerations, project organization, design project development and presentation.

CIVE 403 03(2-2-0). Senior Project Design. S. Prerequisite: CIVE 402.
Design of civil engineering systems, nontechnical and economic design considerations; project organization, design project development and presentation.

CIVE 413 03(3-0-0). Environmental River Mechanics. F. Prerequisite: CIVE 300 or WR 416.
Fluvial geomorphology, river hydraulics, sediment transport, and river response with special emphasis on environmental aspects. (NT-O/V)

CIVE 423 03(2-0-0). Groundwater Engineering. S. Prerequisite: CBE 331 or CIVE 300 or WR 416.
Development of groundwater resources; origin, movement, distribution of water below ground surface.

CIVE 425 03(2-3-0). Soil and Water Engineering. S. Prerequisite: CBE 331 or CIVE 300 or SOCR 240.
Control of the soil-water-plant medium for optimum plant growth and environmental protection.

CIVE 437 03(3-0-0). Wastewater Treatment Facility Design. S. Prerequisite: CIVE 300; CIVE 438/ENVE 438 or concurrent registration. Credit not allowed for both CIVE 437 and ENVE 437.
Design concepts and principles for wastewater treatment systems and unit processes, principles of treatment plant operation.
CIVE 438 03(3-0-0). Environmental Engineering Concepts. F. S. 
Prerequisite: CBE 331 or CIVE 300 or MECH 342; CHEM 113. Credit not allowed for both CIVE 438 and ENVE 438.
Environmental engineering approaches to designing water supply, wastewater removal, and pollution control systems.

CIVE 439/CBE 439 03(2-3-0). Environmental Engineering Chemical Concepts. F. Prerequisite: CHEM 113; MATH 340. Credit not allowed for both CIVE 439 and CBE 439.
Application of chemical principles to environmental engineering problems.

CIVE 440 03(3-0-0). Nonpoint Source Pollution. F. Prerequisite: CIVE 300 or CIVE 322/ENVE 322 or SOCR 240 or WR 416.
Principles, processes, impacts, and control of nonpoint source pollution of surface and groundwater. (NT-O)

CIVE 441 03(2-3-0). Water Quality Analysis and Treatment. S. Prerequisite: CIVE 438/ENVE 438 or concurrent registration or CIVE 440 or concurrent registration. Credit not allowed for both CIVE 441 and ENVE 441.
Physical, chemical and biological methods for the characterization of waters and wastewaters. ($)

CIVE 455 03(3-0-0). Applications in Geotechnical Engineering. S. Prerequisite: CIVE 355.
Geotechnical engineering applications of earth retaining structures, foundations, dams and embankments, geosynthetics, waste containment systems.

CIVE 466 03(3-0-0). Design and Behavior of Steel Structures. S. Prerequisite: CIVE 367.
Loads acting on a structure; behavior and design of steel members, connections, and systems.

CIVE 467 03(3-0-0). Design of Reinforced Concrete Structures. F. Prerequisite: CIVE 367.
Design and behavior of reinforced concrete structural members.

CIVE 495 Var[1-3]. Independent Study.

CIVE 496 Var. Group Study.

CIVE 502 03(3-0-0). Fluid Mechanics. F. Prerequisite: CIVE 300.
Fundamental physical concepts of fluid mechanics; ideal and viscous fluid flows; boundary-layer concepts. (NT-V)

CIVE 504 03(3-0-0). Wind Engineering. F. Prerequisite: CIVE 300.
Influence of wind on humanity. Applications to structures, air pollution, wind energy, agricultural aerodynamics, snow movement, human comfort. (NT-O)

CIVE 506 03(3-0-0). Wind Effects on Structures. S. Prerequisite: CIVE 504.
Analysis of wind effects on buildings and structures; deterministic and probabilistic methods; aerodynamic loading and response; codes and standards.

CIVE 507 03(3-0-0). Transportation Engineering. F. Prerequisite: CIVE 261; CIVE 303; CIVE 367. Credit not allowed for both CIVE 478 and CIVE 507.
Principles of highway engineering, transportation engineering, and bridge engineering with a focus on design.

CIVE 510 03(3-0-0). Applied Hydraulic System Design. F. Prerequisite: CIVE 401.
Operational management systems, data collection, real-time control, management modeling, rehabilitation and retrofit, maintenance.

CIVE 512 03(3-0-0). Irrigation Systems Design. F. Prerequisite: CIVE 322/ENVE 322 or CIVE 425.
Irrigation systems principles and design procedures for operation of sprinkler, trickle, and surface irrigation systems. (NT-O)

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CIVE 537 03(3-0-0). Residuals Management. S. Prerequisite: CIVE 300.
Planning and design for processing and disposal of residuals including solid wastes, sludges, hazardous wastes.

CIVE 538 03(3-0-0). Aqueous Chemistry. S. Prerequisite: CHEM 113; MATH 340.
Principles of solution chemistry applied to aquatic systems.

CIVE 539 03(2-3-0). Water and Wastewater Analysis. F. Prerequisite: CHEM 113; MATH 340.
Chemical and biological methods of assessing water quality; significance of chemicals in aquatic systems.

CIVE 540/CBE 540 03(3-0-0). Advanced Biological Wastewater Processing. S. Prerequisite: CIVE 438/ENVE 438 or CBE 320. Credit not allowed for both CIVE 540 and CBE 540.
Fundamentals of environmental biotechnology: environmental microbiology, microbial kinetics, basic reactor design, wastewater treatment.

CIVE 541 04(3-3-0). Environmental Unit Operations-Treatment-Design. S. Prerequisite: CIVE 439/CBE 439.
Reactor theory, filtration, adsorption, ion exchange, gas transfer, oxidation, membranes, biological reactors, disinfection.

CIVE 542 03(3-0-0). Water Quality Modeling. S. Prerequisite: Two semesters of chemistry; one course in hydrology or water quality.
Chemical, physical, and biological processes defining surface water quality, construction and application of computer models for rivers and streams.

CIVE 543 03(2-3-0). Instrumental Environmental Analysis. F. Prerequisite: CHEM 113; MATH 340.
Environmental sampling and preservation techniques followed by the instrumental analysis of the samples.

CIVE 544 03(3-0-0). Water Resources Planning and Management. F. Prerequisite: CIVE 322/ENVE 322.
Management and planning of natural and constructed water systems. Integrated management and case studies of water use and environmental resources. (NT-O)

CIVE 546 03(2-2-0). Water Resource Systems Analysis. S. Prerequisite: CIVE 322/ENVE 322 or concurrent registration; ENGR 510 or concurrent registration or MATH 510 or concurrent registration.
Applications of systems analysis and optimization techniques in water resources planning and management. (NT-O)

CIVE 547/STAT 547 03(3-0-0). Statistics for Environmental Monitoring. S. Prerequisite: STAT 301. Credit not allowed for both CIVE 547 and STAT 547.
Applications of statistics in environmental pollution studies involving air, water, or soil monitoring; sampling designs; trend analysis; censored data. (NT-O)

CIVE 549 03(3-0-0). Drainage and Wetlands Engineering. S. Prerequisite: CIVE 425 or CIVE 322/ENVE 322.
Drainage and wetlands design for agricultural and natural resource applications. Water table modification for nonpoint sources pollution control. (NT-O)

CIVE 550 03(3-0-0). Foundation Engineering. F. Prerequisite: CIVE 355.
Mechanics and methodology of foundation engineering; selection and design of foundation systems on soft, firm, and expansive soils; special problems. (NT-O)

CIVE 553 03(3-0-0). Slope Stability and Retaining Structures. S. Prerequisite: CIVE 355.
Slope stability theory and application, retaining walls, sheet-pile walls, braced excavations, geosynthetic uses. (NT-O)

*CIVE 556 03(3-0-0). Seepage and Earth Dams. S. Prerequisite: CIVE 355.
Hydraulic conductivity measurements; seepage analysis and control; earth dam and embankment design; computer applications.

*CIVE 558 03(3-0-0). Containment Systems for Waste Disposal F. Prerequisite: CIVE 355.
Basic principles governing the design of containment systems used in waste disposal applications. (NT-O)

*CIVE 559 03(3-0-0). Special Topics in Geotechnical Engineering. S. Prerequisite: CIVE 355.
Advanced topics in geotechnical engineering including expansive soils, unsaturated soil mechanics, soil-structure interaction and mining geotechnics.

CIVE 560 03(3-0-0). Advanced Mechanics of Materials. F. Prerequisite: CIVE 360.
Analysis of stress and strain failure theory; selected topics in solid mechanics, plate analysis; introduction to elastic stability. (NT-O)

CIVE 561 03(3-0-0). Advanced Steel Behavior and Design. S. Prerequisite: CIVE 466.
Behavior of steel components and systems. Design of composite members, plate girders, and bolted and welded connections. (NT-O)

CIVE 562 03(3-0-0). Fundamentals of Vibrations. S. Prerequisite: CIVE 261; CIVE 360.
Free and forced vibrations of single, two, and multiple degree of freedom systems. Closed-form and numerical solutions. (NT-O)

CIVE 563 03(3-0-0). Structural Reliability Theory. S. Prerequisite: CIVE 203 or STAT 315.
Theory of structural reliability as it relates to analysis, design, construction, and maintenance of structural and mechanical systems. (NT-O)

CIVE 565 03(3-0-0). Finite Element Method. S. Prerequisite: MATH 340.
Theory and application in elasticity, porous flow, heat conduction, and other engineering problems. (NT-O)

CIVE 566 03(3-0-0). Intermediate Structural Analysis. F. Prerequisite: CIVE 367.
Work and energy concepts, curved members and arches, matrix analysis of linear systems, numerical techniques. (NT-O)

CIVE 567 03(3-0-0). Advanced Concrete Design. S. Prerequisite: CIVE 467.
Behavior of reinforced and prestressed concrete members; development of design methods; behavior and design of slabs, shearwalls, and buildings. (NT-O)

CIVE 568 03(3-0-0). Design of Masonry and Wood Structures. S. Prerequisite: CIVE 466 or CIVE 467.
Behavior and design of structures and structural components constructed of masonry or engineered wood. (NT-O)

CIVE 571 03(3-0-0). Pipeline Engineering and Hydraulics. S. Prerequisite: CIVE 300.
Water supply, wastewater, stormwater, oil and gas, and industrial applications. Emphasis on pressurized water pipelines. (NT-O)

Behavior and interaction of urban water distribution and collection systems; how system state and driving variables affect system performance.

*CIVE 573 03(3-0-0). Urban Stormwater Management. S. Prerequisite: CIVE 322/ENVE 322; CIVE 401.
Effects of urbanization on watershed hydrology and receiving waters; control practices to mitigate effects using mathematical models. (NT-O).

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CIVE 574 03(3-0-0). Civil Engineering Project Management. F. Prerequisite: None.
Principles of civil engineering project management including proposals, contracts, scheduling, quality assurance, budgeting, and risk management.

CIVE 575 03(3-0-0). Sustainable Water and Waste Management. S. Prerequisite: CIVE 322/ENVE 322. Credit not allowed for CIVE 445 and CIVE 575.
The science, engineering, and policy behind sustainable water and waste practices. Sustainable urban water and wastewater management. (NT-O)

CIVE 576 03(2-2-0). Engineering Applications of GIS and GPS. F. Prerequisite: None.
Integration of GPS and GIS in the planning and decision making process, application to case study. (NT-O)

CIVE 577 03(2-2-0). GIS in Civil and Environmental Engineering. S. Prerequisite: CIVE 300; CIVE 322/ENVE 322.
GIS technology for spatial design/analysis; applications in facilities management, urban infrastructure, water resources, environmental engineering. (NT-O)

CIVE 578 03(3-0-0). Infrastructure and Utility Management. S. Prerequisite: Ten credits of engineering, economics, public administration, or planning courses.
Infrastructure and utility planning, management, and security. Systems approach to life cycle management. Problems, analysis, decision support systems. (NT-O/V)

CIVE 579 03(3-0-0). Risk and Security of the Built Environment. F. Prerequisite: None.
Infrastructure security and safety to prepare the built environment against natural and human-caused threats. (NT-O)

CIVE 584 Var. Supervised College Teaching.

CIVE 592A-L 01(0-0-1). Seminar.

CIVE 595A-J Var. Independent Study. F, S, SS. Prerequisite: None.
(All subtopics: NT-O)

CIVE 596A-J Var. Group Study. F, S, SS. Prerequisite: None.

CIVE 604 03(3-0-0). Fluid Turbulence and Modeling. S. Prerequisite: CIVE 502 or CIVE 504.
Engineering concepts for transport of pollutants, toxic and flammable species, sand, and snow. Fluid modeling, numerical and analytical approaches.

CIVE 607 03(3-0-0). Computational Fluid Dynamics. S. Prerequisite: CIVE 300.
Numerical methods used in computational solutions of hydraulics, environmental and wind engineering problems.

CIVE 610 03(3-0-0). Special Topics in Hydraulics. S. Prerequisite: CIVE 502.
Advanced topics in hydraulics, hydromechanics, environmental hydraulics, and computational hydraulics.

CIVE 612 04(4-0-0). Open Channel Flow. S. Prerequisite: CIVE 502.
Steady, uniform, and non-uniform flow; backwater curves; flow through bridge piers, transitions, and culverts; spatially varied and unsteady flow.

CIVE 613 03(3-0-0). Stream Rehabilitation Design. S. Prerequisite: CIVE 401.
Analysis and design of streams and channels in harmony with the environment.

CIVE 622 03(3-0-0). Risk Analysis of Water/Environmental Systems. F. Prerequisite: CIVE 322/ENVE 322; STAT 315.
Risk and uncertainty analysis applied to hydrology, hydraulics, groundwater, water resources, and environmental engineering systems.

*CIVE 624 03(3-0-0). Control of Floods and Droughts. S. Prerequisite: CIVE 522.
Flood and drought characteristics, impacts; structural, nonstructural flood control measures; drought prediction, drought control, drought response.

CIVE 625 03(3-0-0). Quantitative Eco-Hydrology. F. Prerequisite: CIVE 322 or WR 416.
Quantitative examination of the hydrologic and ecological mechanisms underlying climate-soil-vegetation and soil moisture dynamics.

CIVE 626 03(3-0-0). Integrated Analysis of Coupled Water Issues. F. Prerequisite: GR 304/WR 304.
Integrative systems and policy analysis applied to coupled human-water systems from interdisciplinary technical and institutional perspectives.

CIVE 631 03(3-0-0). Computational Methods in Subsurface Systems. F. Prerequisite: CIVE 531; MATH 340.
Numerical flow models; finite difference and finite element methods; parameter identification, stochastic modeling and advanced analytical solutions.

CIVE 638 03(3-0-0). Groundwater Quality and Contaminant Transport. S. Prerequisite: CIVE 531.

*CIVE 645 03(2-2-0). Computer-Aided Water Management and Control. F. Prerequisite: CIVE 546 or CIVE 577.
Real-time management and control of water resource systems; applications of computer control concepts to improve system performance.

*CIVE 654 03(2-3-0). Experimental Soil Mechanics. F. Prerequisite: CIVE 355.
Experimental design; data acquisition; soil fabric; isotropic/Ko condensation; swelling; stiffness; shear wave velocity; triaxial; hollow cylinder; partial saturation.

CIVE 655 03(3-0-0). Advanced Soil Mechanics. F. Prerequisite: CIVE 355.
Advanced topics in shear strength and consolidation of soils; stress paths; anisotropy; submergence; partial and radial drainage; numerical methods. (NT-O)

CIVE 658 03(3-0-0). Remediation Systems-Subsurface Contamination. F. Prerequisite: None.
Applications in geoenvironmental engineering practice involving design of in situ containment and remediation systems. (NT-O)

CIVE 662 03(3-0-0). Foundations of Solid Mechanics. F. Prerequisite: CIVE 560.
Analysis of stress and strain in solids emphasizing linear elasticity and plasticity; introductions to creep, viscoelasticity, and finite deformations.

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CIVE 664 03(3-0-0), Mechanics of Fatigue and Fracture. S. Prerequisite: CIVE 560.
Fracture mechanics including linear elastic, elastic-plastic, and dynamic fracture; on ductile and cleavage fracture in metals. (NT-O)

CIVE 667 03(3-0-0), Advanced Structural Analysis. S. Prerequisite: CIVE 566.
Analysis program development, application of finite element analysis, computer-assisted analysis, introduction to nonlinear analysis.

CIVE 684 Var. Supervised College Teaching.

CIVE 695A-K Var. Independent Study. F, S, SS. Prerequisite: None.


CIVE 699A-K Var. Thesis. F, S, SS. Prerequisite: None.

*CIVE 703 03(3-0-0), Special Topics in Fluid Mechanics. F. Prerequisite: CIVE 502.
Advanced topics in fluid mechanics; associated experimental and numerical techniques.

CIVE 716 03(3-0-0), Erosion and Sedimentation. F. Prerequisite: CIVE 502.
Sediment properties; resistance to flow; incipient motion and bedforms; sediment transport, reservoir sedimentation.

CIVE 717 03(3-0-0), River Mechanics. S. Prerequisite: CIVE 716.
Characteristics of rivers, mechanics of sediment and water discharge emphasizing alluvial systems, channel stabilization, control, response.

*CIVE 721 03(3-0-0), Stochastic Water and Environmental Systems. S. Prerequisite: CIVE 622.
Stochastic analysis of water and environmental systems. Simulation, forecasting, spatial analysis, modeling changes, stochastic differential equations.

*CIVE 722 03(3-0-0), Large Scale Hydrology. F. Prerequisite: CIVE 520.
Global and regional scale hydrologic processes; land/atmosphere interaction; scaling in hydrology, geomorphoclimatic structure of hydrologic response.

*CIVE 724 03(3-0-0), River Basin Morphology. S. Prerequisite: Written consent of instructor.
Analysis of river basin properties including their connections to statistical theories and erosion processes and their hydrologic implications.

*CIVE 742 03(2-3-0), Advanced Topics in Environmental Engineering. S. Prerequisite: CIVE 540/CBE 540.
Selected topics from current environmental engineering research including molecular methods, water/wastewater treatment, hazardous waste remediation.

*CIVE 751 03(3-0-0), Soil Dynamics. S. Prerequisite: CIVE 355.
Soil behavior under dynamic loading; stress wave propagation; foundation response to vibratory and transient loading; elements of earthquake effects.

*CIVE 766 03(3-0-0), Theory of Plates and Shells. F. Prerequisite: CIVE 560.
Classical plate, shell and membrane theory for isotropic and layered anisotropic media. Analytic and computational solution techniques.

*CIVE 767 03(3-0-0), Structural Dynamics and Earthquake Engineering. F. Prerequisite: CIVE 562; CIVE 667.
Analysis, behavior, and design of structural systems subjected to dynamic loads, including earthquakes, wind, and ocean waves.

CIVE 799A-K Var. Dissertation. F, S, SS. Prerequisite: None.

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°Alternate year offering (odd); * Alternate year offering (even); + Field trips; S Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCSubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
CM 501 04(4-0-0). Advanced Cell Biology. F. Prerequisite: BZ 310.
Cell structure and organelle function.

CM 502/NB 502 02(1-3-0). Techniques in Molecular & Cellular Biology. F. Prerequisite: One college-level course with laboratory in each: biology, biochemistry, physics; written consent of instructor. Credit not allowed for both CM 502 and NB 502.
Current methods in molecular and cellular neurobiology.

CM 510 01(1-0-0). Introduction to Cell and Molecular Biology. F. Prerequisite: None.
Overview of CMB program and research opportunities; enhances writing and oral communication skills.

*CM 520 03(2-0-1). Proteolytic Regulation of Cellular Processes. S. Prerequisite: CM 501.
Functions of proteolytic pathways in the regulation of eukaryotic cellular processes, such as mitosis, apoptosis, signal transduction and gene regulation.

CM 595 Var. Independent Study.

CM 601 01(0-0-1). Responsible Conduct of Research in CMB. S. Prerequisite: Enrollment in the CMB graduate program.
Key aspects of responsible conduct of research and ethical considerations in cell and molecular biology.

CM 640 03(3-0-0). Creative Science Writing. S. Prerequisite: None.
Consideration of creative writing techniques and their relevance to traditional science/nature writing.

°CM 666/°PHIL 666 03(3-0-0). Science and Ethics. S. Prerequisite: None. Credit not allowed for both CM 666 and PHIL 666.
Ethical issues of research on humans and animals; biosafety; fraud and deception in science; genetic engineering.


CM 700 01(0-0-1). Critical Analysis of Scientific Literature. F, S. Prerequisite: BC 565; CM 510. May be repeated for a maximum of 4 credits.
Presentation and discussion of current literature of cell and molecular biology. Content varies each semester to include the major focus groups.

CM 701D-I. Topics in Cell and Molecular Biology. F, S. Prerequisite: BC 403; CM 501; MATH 255.
D) Radiation cytogenetics 01(1-0-0).
I) Planning research and grant proposals 02(2-0-0).

CM 702B-E Methods in Cell and Molecular Biology. F, S.
B) Mammalian cell culture techniques 01(0-3-0). Prerequisite: BC 403; CM 501.
C) Immunochemical techniques 01(0-3-0). Prerequisite: BC 403; CM 501; MATH 255.
D) Radiation cytogenetics 01(0-3-0). Prerequisite: BC 403; CM 501.
E) Flow cytometry and cell sorting 02(0-4-0). Prerequisite: BC 403; CM 501.

CM 710/BSPM 710 03(0-4-1). Techniques in Molecular Biology and Genetics. S. Prerequisite: BC 463 or BZ 346 or BZ 350 or MIP 450 or SOCR 330. Credit not allowed for both CM 710 and BSPM 710.
Genetic manipulation of bacteria, bacteriophage, and yeast including experiments in molecular cloning and gene expression.

CM 784 Var. Supervised College Teaching.

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COMPOSITION COURSES  
Department of English  
College of Liberal Arts

CO 130 03(3-0-0). Academic Writing. (GT-CO1). F, S. Prerequisite: composition challenge/placement exam.  
Academic writing, critical thinking, and critical reading through study of a key academic issue.

CO 150 03(3-0-0). College Composition. (GT-CO2, AUCC 1A). F, S, SS. Prerequisite: SAT critical reading score of 600 or above or ACT English score of 26 or above or composition placement/challenge exam (score of 3, 4, or 5) or CO 130. (For students registered at CSU prior to Fall 2008, SAT verbal score of 500 or above or ACT English score of 20 or above.)  
Understanding and writing for rhetorical situations; critical reading and response; writing source-based argument for academic and public audiences. (NT-O)

CO 300 03(3-0-0). Writing Arguments. (AUCC 2). F, S, SS. Prerequisite: CO 150 or HONR 193.  
Reading, analyzing, researching, and writing arguments. (NT-O)

CO 301A-D 03(3-0-0). Writing in the Disciplines. (AUCC 2). F, S, SS. Prerequisite: CO 150 or HONR 193.  

CO 302 03(3-0-0). Writing Online. (AUCC 2). F, S. Prerequisite: CO 150 or HONR 193.  
Writing and analysis of electronic texts.

CO 401 03(3-0-0). Writing and Style. F, S. Prerequisite: CO 300 or CO 301A or CO 301B or CO 301C or CO 301D or CO 302.  
Advanced expository and persuasive writing emphasizing modes, strategies, and styles for a variety of audiences and purposes.

CO 402 03(3-0-0) Advanced Writing Online. F, S. Prerequisite: CO 302 or JTC 372 or SPCM 346.  
Advanced study of rhetorical contexts shaping online texts. Builds on fluency in coding and familiarity with online document design.

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CONSTRUCTION MANAGEMENT COURSES
Department of Construction Management
College of Health and Human Sciences

CON 101 03(3-0-0). Introduction to Construction Management. F, S.
Prerequisite: None.
- Identify and understand relationships among participants in the construction process and its history.

CON 131 02(0-4-0). Graphic Communications/CAD. F, S, SS.
Prerequisite: None.
- Reading technical drawings, manual drafting techniques, reprographic technologies. CAD applications are introduced.

CON 151 03(3-0-0). Construction Materials and Methods. F, S.
Prerequisite: None.
- Materials and methods utilized in the design and construction of buildings.

Prerequisite: CON 151.
- Testing of construction materials for standards and quality. Conduct common quality tests and document the results.

CON 261 03(2-3-0). Construction Surveying. F, S, SS.
Prerequisite: CON 131 or INTD 166; MATH 125 or MATH 160.
- Surveying fundamentals of field of construction, building layout, measurement procedures, vertical controls, line and grade, surveying, instrument operation.

CON 265 03(2-2-0). Construction Estimating I. F, S.
Prerequisite: CON 131; CON 151.
- Integration of construction materials and methods into construction systems that will be incorporated in projects.

CON 267 01(0-0-1). Construction Management Pre-Internship. F,
S, SS.
- Prerequisite: Construction management majors only.
- Skills and concepts related to successful internships within the construction management industry.

CON 270 03(3-0-0). Introduction to Road Construction. F.
Prerequisite: None.
- Steps necessary to construct a paved roadway from conception, land acquisition and finance through paving operations and trafficking.

CON 317 02(2-0-0). Safety Management. F, S.
Prerequisite: None.
- Safety management in construction, corporate, and institutional environments.

CON 351 02(1-2-0). Construction Field Management. F, S.
Prerequisite: CON 251 or concurrent registration; CON 317 or concurrent registration.
- Materials and methods used in construction, administrative and organizational planning used to complete a project. ($)

CON 352 02(1-2-0). Metal Fabrication for Construction. F, S.
Prerequisite: CON 251.
- Shaping, cutting, and joining of structural and non-structural metal. Emphasis on jobsite safety, economics, and efficiency.

CON 359 04(4-0-0). Structures I. F, S.
Prerequisite: MATH 125; junior or senior standing.
- Behavior of structural components and systems, overview of structural engineering analysis/design process.

CON 360 03(2-2-0). Electrical and Control Systems. F, S.
Prerequisite: CON 265.
- Electrical and control systems and their application in the construction industry. ($)

CON 365 03(2-2-0). Construction Estimating II. F, S.
Prerequisite: CON 265.
- Industry-recognized methods for work item analysis, quantity surveying, resource estimating, and bid development using work breakdown structures.

CON 366 03(2-2-0). Construction Equipment and Methods. F, S.
Prerequisite: CON 261.
- Equipment/methods in heavy and highway construction; equipment selection, productivity, and costs. Infrastructure, tunneling, and trenchless technology.

CON 367 03(3-0-0). Construction Contracts/Project Administration. F, S.
Prerequisite: CON 265; CON 351 or concurrent registration.
- Construction management majors and minors only.
- Utilization of field engineering systems and procedures to effectively meet project objectives.

CON 370 03(2-2-0). Asphalt Pavement Materials and Construction. F.
Prerequisite: None.
- Constituents of asphalt pavements; manufacture of asphalt cement, emulsions, and cutbacks; material properties and behavior. ($)

CON 371 03(3-0-0). Mechanical and Plumbing Systems. F.
Prerequisite: CON 360 or concurrent registration or INTD 276 or concurrent registration.
- Heating, ventilation, air conditioning, plumbing, and fire suppression with emphasis on design, operation, and interaction.

CON 384 Var[1-5]. Supervised College Teaching. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

CON 450/INTD 450 03(3-0-0). Travel Abroad-Sustainable Building. SS.
- Credit not allowed for both CON 450 and INTD 450.
- Major components of sustainable design and construction, energy, healthy buildings, natural resources, and other environmental issues.

CON 459 04(4-0-0). Structures II. F, S.
Prerequisite: CON 359.
- Design of formwork, falsework, and shoring.

CON 461 03(2-2-4). Construction Project Scheduling and Cost Control. F, S.
Prerequisite: CON 365 or concurrent registration.
- Construction management majors and minors only.
- Strategies and techniques for efficient scheduling of project activities and control of project costs; emphasis on Critical Path Method.

CON 462 03(3-0-0). Financial Management for Construction. F, S.
Prerequisite: ACT 205 or ACT 210; MGT 305 or MGT 320.
- Financial statements, financial ratios, applications of engineering economy, cash flow analysis, construction financing, and cost information systems.

CON 464 03(1-0-2). Construction Leadership. S.
Prerequisite: CON 365; CON 367 or concurrent registration; written consent of instructor.
- Leading projects and people in a construction business and application of skills in a construction-based community service learning project.

CON 465 03(1-0-2). Construction Management Professional Practice. F, S.
Prerequisite: CON 461 or concurrent registration; CON 487A or CON 487B. Construction management majors only.
- Professional practice using an understanding of the contractual and working relationships among all participants in the design/construction process.

CON 469 03(2-0-1). Soils Engineering for Construction Managers. F.
Prerequisite: CON 359.
- Soil mechanics, foundation engineering, and foundation construction.

CON 471 03(3-0-0). Project Management for Mechanical Systems. F.
Prerequisite: CON 371; CON 365 or concurrent registration.
- Fundamental principles of mechanical systems. Presentation and practice of management principles relevant to mechanical projects.

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CON 476 03(3-0-0). Sustainable Practices-Design and Construction.
F. Prerequisite: None.
Major components of sustainable design/construction: energy, healthy buildings, cultural, natural resources, use, other environmental/economic issues.

CON 477 03(3-0-0). Residential Aging-in-Place and Green Building.
S. Prerequisite: CON 265.
Aging-in-place and green building aspects of the residential construction market.

CON 487A-B Var[3-6]. Internship. F, S, SS.
A) Construction Management I. (06(0-0-18). Prerequisite: CON 267; CON 367. B) Construction Management II. Prerequisite: CON 267; CON 367; 500 hours of documented work experience.

CON 495 Var. Independent Study-Construction.

CON 496 Var. Group Study-Construction.

CON 500 03(3-0-0). Models of Disciplined Inquiry. F. Prerequisite: Admission to master’s program.
Models and methods of disciplined inquiry used in diverse organizations; applying disciplined inquiry methods to solve problems.

CON 560 03(3-0-0). Applied Project Management. F. Prerequisite: Admission to master’s program.
Project development, planning, and control relevant to construction, manufacturing and technology education professionals.

CON 561 03(3-0-0). Applied Productivity Improvement. S. Prerequisite: Admission to master’s program.
Existing and emerging tools for productivity enhancement in project and production environment.

CON 562 03(3-0-0). Issues and Trends in Construction Management. F. Prerequisite: Admission to master’s program.
Current issues and trends related to management of technology in fields associated with manufacturing and construction industries.

CON 565 03(3-0-0). Legal Aspects of Construction Process. S. Prerequisite: Admission to master’s program.
Common points of dispute; methods of avoiding disputes among owner, architect, engineer, and contractor.

CON 566 03(3-0-0). Advanced Construction Estimating. F. Prerequisite: Admission to master’s program.
Advanced estimating procedures dealing with special application and techniques in construction.

CON 567 03(3-0-0). Preservation and Rehabilitation of Buildings. F. Prerequisite: Admission to master’s program.
Theory and applications of preservation technology used in the management and rehabilitation of historic and archaic buildings.

CON 568 03(3-0-0). Construction Industry Institute Practices. F. Prerequisite: CON 367.
Senior executives from the Construction Industry Institute (CII) present best practices developed by CII over the last 25 years.

CON 569 03(3-0-0). Managerial Decision Making for Constructors. F. Prerequisite: Admission to master’s program.
Construction and real estate development applications of multi-disciplinary managerial analysis and decision-making techniques.

CON 576 03(2-0-1). Sustainable Technology in Built Environments. S. Prerequisite: CON 450/INTD 450 or CON 476.
Major components of creating environmentally sustainable built environments.

CON 577 03(2-0-1). Leadership of Sustainable Community Projects. S. Prerequisite: CON 450/INTD 450 or CON 476. Required background check.
Learn and apply principles of sustainable construction management through leading and building service-learning projects.

CON 587 Var. Workshop.

CON 592 Var. Seminar.

CON 684 Var. Supervised College Teaching.

CON 687 Var[1-6]. Internship. Maximum of 6 credits allowed in course.

CON 695 Var. Independent Study.

CON 696 Var. Group Study. Prerequisite: Admission to master’s program.

CON 698 Var. Research.

CON 699 Var[1-6]. Thesis.
COMPUTER SCIENCE COURSES
Department of Computer Science
College of Natural Sciences

CS 110 04(3-3-0). Personal Computing. F., S., SS. Prerequisite: None. Credit not allowed for both CS 110 and BUS 150.

Software/hardware concepts, Internet services, OS commands, electronic presentations, spreadsheets, databases, programming concepts. (NT-O)

CS 122/MATH 122 01(0-0-1). Theory for Introductory Programming. F., S. Prerequisite: MATH 118; concurrent registration in CS 161. Credit not allowed for both CS 122 and MATH 122. Credit not allowed for students who have completed CS 160.

Set theory, definitions operations, Venn diagrams, power sets, propositional logic and proofs. Functions; loop invariants. (NT-O)

CS 150 04(3-0-1). Interactive Programming with Java. F., S. Prerequisite: Placement into MATH 117 or MATH 130.

Introduction to object-oriented programming with Java; problem solving, creating applets for Web pages, and graphical user interfaces. (NT-O)

CS 155 01(1-0-0). Introduction to Unix. F., S., SS. Prerequisite: None.

Unix shell commands, utilities (editors, sorting, file management), shell scripting.

CS 156 01(1-0-0). Introduction to C Programming I. F., S., SS. Prerequisite: CS 155 or concurrent registration; MATH 118.

Basic elements of language structure, data types, expressions, program control flow and modularity.

CS 157 01(1-0-0). Introduction to C Programming II. F., S., SS. Prerequisite: CS 156 or concurrent registration; MATH 118.

More basic design types, function usage and strings. Arrays, user-defined types and structures, enumerated types, recursion, dynamic storage allocation.

CS 158/MATH 158 01(0-2-0). Mathematical Algorithms in C. S. Prerequisite: CS 156; MATH 151; MATH 160. Credit not allowed for both CS 158 and MATH 158.

Compilers, expressions, variable types, control statements, pointers, logical statements, plotting, secant method, trapezoidal rule, recursion.

CS 160 04(3-2-0). Foundations in Programming. F., S., SS. Prerequisite: CS 158/MATH 158 with a C or better.

Introduction to computer theory, programming and systems. Sets, functions, logic. Procedural programming in Java. Computer and data models.

CS 161 04(3-2-0). Object-Oriented Problem Solving. F., S. Prerequisite: CS 160 with a C or better; MATH 141 or concurrent registration or MATH 155 or concurrent registration or MATH 160 or concurrent registration.

Fundamental object oriented concepts, inheritance, polymorphism, basic algorithms, linked lists, assertions, recursion, induction, counting.

CS 192 02(1-0-1). First Year Seminar in Computer Science. F., S. Prerequisite: Computer science majors only.

Introduction to the computer science major; basic computer skills; campus resources, and various subject-specific topics.

CS 200 04(3-2-0). Algorithms and Data Structures. F., S. Prerequisite: CS 161 with a C or better; MATH 141 with a C or better or MATH 155 with a C or better or MATH 160 with a C or better.

Data structures; abstract data types; algorithm correctness; complexity analysis; sorting, searching, hashing. (NT-V)

CS 253 04(3-0-1). Problem Solving with C++. F., S. Prerequisite: CS 200 with a C or better; CS 270 with a C or better or ECE 251 with a C or better.

C++ programming techniques for experienced programmers. UNIX tools for editing, compiling, debugging, and testing C++ programs. (NT-V)

CS 270 04(3-2-0). Computer Organization. F., S. Prerequisite: CS 161 with a C or better; CS 200 or concurrent registration; MATH 141 with a C or better or MATH 155 with a C or better or MATH 160 with a C or better.

Data representation, arithmetic, assembly and C language, digital logic and systems, Boolean algebra, circuits, CPU and memory models, state machines. (NT-V)

CS 295 Var[1-4]. Independent Study.

Investigation of special topics under direction of computer science faculty.

CS 314 03(3-0-0). Software Engineering. F., S. Prerequisite: CS 253 with a C or better.

Methods used to develop large-scale software projects in industry emphasizing design, implementation, and testing. (NT-V)

CS 320 03(3-0-0). Algorithms—Theory and Practice. F., S. Prerequisite: CS 200 with a C or better; MATH 161 with a C or better; MATH 229 with a C or better or MATH 369 with a C or better.

Analysis, design, implementation and applications of algorithms.

CS 356 03(3-0-0). Systems Security. F., S. Prerequisite: CS 253 with a C or better; CS 270 with a C or better or ECE 251 with a C or better; MATH 229 with a C or better or MATH 369 with a C or better.

Computer and system security, authentication, access control, malicious software, and software security.

CS 370 03(3-0-0). Operating Systems. F., S. Prerequisite: CS 200 with a C or better; CS 270 with a C or better or ECE 251 with a C or better.

Introduction to operating systems including memory organization, I/O control, multitasking, process control, coordination, and resource management. (NT-V)

CS 410 04(3-2-0). Introduction to Computer Graphics. F., S. Prerequisite: CS 253 with a C or better; MATH 229 with a C or better or MATH 369 with a C or better.

Graphics hardware and software; drawing simple objects; coordinate transformations in 2D and 3D; modeling and viewing complex 2D and 3D objects. (NT-O)

CS 414 04(3-3-0). Object-Oriented Design. F. Prerequisite: CS 314 with a C or better.

Object-oriented methods for large-scale software systems. Software design for reuse using patterns. Development of WWW applications in languages, e.g., Java. (NT-O)

CS 420 04(3-0-1). Introduction to Analysis of Algorithms. F. Prerequisite: CS 320 with a C or better.

Efficiency analysis, correctness proofs, design strategies, illustrations from domains such as graph theory, scheduling and optimization, geometry. (NT-O)

CS 425 04(3-2-0). Introduction to Bioinformatics Algorithms. F. Prerequisite: CS 320 with a C or better.

Algorithms for analysis of large scale biological data.

CS 430 04(3-2-0). Database Systems. S. Prerequisite: CS 314 with a C or better or CS 370 with a C or better.

Database analysis, design, administration, implementation, hierarchical, network relational models; data sublanguages; query facilities. (NT-O)

CS 440 04(3-2-0). Introduction to Artificial Intelligence. F. Prerequisite: CS 253 with a C or better; CS 320 with a C or better.

Concepts, representations, and algorithms for applications of problem solving search, logical reasoning and machine learning. (NT-O)

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CS 451 04(3-3-0). Operating Systems. S. Prerequisite: CS 370 with a C or better.
Operating system design and implementation, file systems, distributed operating systems, case studies.

CS 453 04(3-0-1). Introduction to Compiler Construction. S. Prerequisite: CS 314 with a C or better.
Functional components of a compiler: modules, interfaces, lexical and syntax analysis, error recovery, resource allocation, code generation. (NT-O)

CS 454 04(3-3-0). Principles of Programming Languages. S. Prerequisite: CS 253 with a C or better; CS 320 with a C or better.
Language design concepts; functional programming; interpreter support for environments, procedures, recursion, types, objects; language paradigms.

CS 455 04(3-2-0). Introduction to Distributed Systems. S. Prerequisite: CS 370 with a C or better.
Fundamentals of distributed systems: concurrency, thread pools, scalable servers, graphs, data formats, transactions, secure systems, and overlays.

CS 470 04(3-2-0). Computer Networks and the Internet. F, S. Prerequisite: CS 253 with a C or better; CS 370 with a C or better; STAT 301 with a C or better or STAT 303/ECE 303 with a C or better or STAT 307 with a C or better or STAT 311 with a C or better or STAT 315 with a C or better.
Principles of communications, local area networks, communication protocols, TCP/IP, and the Internet. (NT-O/V)

CS 464 04(3-2-0). Principles of Human-Computer Interaction. S. Prerequisite: CS 253 with a C or better.
History and trends in human-computer interaction; user-centered design techniques; prototyping; experimental methods for the evaluation of technology.

CS 475 04(3-3-0). Parallel Programming. F. Prerequisite: CS 370 with a C or better.
Parallel programming techniques for shared-memory and message-passing systems; process synchronization, communication; example languages. (NT-O)

Supervised work experience in approved computer science setting with periodic consultation of faculty.

CS 495 Var. Independent Study. Maximum of 12 credits allowed for any combination of CS 466, CS 495.

CS 498 Var[1-4]. Research. F, S. SS. Prerequisite: Written consent of instructor; computer science majors only.
Supervised research in computer science.

CS 510 04(3-3-0). Image Computation. S. Prerequisite: CS 410.
Image generation theory and implementation, image manipulation/interpretation. Ray tracing, geometric and photometric manipulation, image matching.

CS 514 04(3-3-0). Software Product and Process Evaluation. F. Prerequisite: CS 414.
Software development process modeling and evaluation; software metrics, testing verification, validation; experimental methods in software engineering. (NT-O)

CS 517 04(3-3-0). Software Specification and Design. S. Prerequisite: CS 414.
Rigorous techniques for modeling, specifying, and analyzing software requirements and designs; reusable software development. (NT-O)

CS 518 04(3-2-0). Distributed Software System Development. S. Prerequisite: CS 414.
Principles of developing distributed systems; middleware technologies and techniques for building complex distributed component-based systems.

CS 520 04(3-3-0). Analysis of Algorithms. S. Prerequisite: CS 420.
Asymptotic complexity, algorithm complexity, and problem complexity; the Master Method; parallel algorithms; algorithm design.

CS 530 04(3-3-0). Fault-Tolerant Computing. S. Prerequisite: CS 370.
Achieving high reliability and fault tolerance. Fault modeling, testing, reliability evaluation, redundancy, fault tolerance. (NT-O)

CS 533 04(3-2-0). Database Management Systems. F. Prerequisite: CS 430.
Theory and implementation of concurrency control, recovery, and query processing as it applies to centralized and distributed systems. (NT-O)

CS 540 04(3-3-0). Artificial Intelligence. S. Prerequisite: CS 440.
Knowledge representation and reasoning, search, planning, evolutionary computation, data mining, information retrieval, intelligent Web, agent systems. (NT-V)

CS 545 04(3-3-0). Machine Learning. F. Prerequisite: CS 440.
Computational methods that allow computers to learn; neural networks, decision trees, genetic algorithms, bagging and boosting. (NT-O)

CS 548/STAT 548 04(3-2-0). Bioinformatics Algorithms. F. Prerequisite: STAT 301 or STAT 307 or STAT 315; knowledge of a contemporary programming language.
Computational methods for analysis of DNA/protein sequences and other biological data.

CS 551 04(3-3-0). Distributed Operating Systems. F, SS. Prerequisite: CS 370 with a C or better or CS 451 with a C or better.
Distributed operating systems, memory management, computer security, client-server computing, distributed resource management failure recovery. (NT-O)

CS 553 04(3-3-0). Algorithmic Language Compilers. F. Prerequisite: CS 453.
Compiler construction; lexical scanner generators, parser generators, dataflow analysis, optimization.

CS 555 04(3-3-0). Distributed Systems. F. Prerequisite: CS 455.
Principles, paradigms, protocols and algorithms underlying modern distributed systems.

CS 556 04(3-2-0). Computer Security. F. Prerequisite: CS 356 or CS 455.
Topics in computer security: Concepts, threats, risks, access control models, trusted systems, cryptography, authentication. (NT-O)

CS 557 04(3-3-0). Advanced Networking. S. Prerequisite: CS 457.
Core internet protocols including transport, routing, and security protocols. Protocol design principles. Network measurements and assessment. (NT-O)

CS 560/ECE 560 04(3-2-0). Foundations of Fine-Grain Parallelism. S. Prerequisite: CS 475. Credit not allowed for both CS 560 and ECE 560.
Programming novel architectures; performance tuning; automatic parallelization; program transformation; polyhedral model; equational programming. (NT-O, CS 560 only)

CS 561/ECE 561 04(3-3-0). Hardware/Software Design of Embedded Systems. S. Prerequisite: CS 270 or CS 470 or ECE 251 or ECE 452. Credit not allowed for both CS 561 and ECE 561.
Embedded systems design including system level modeling, design space exploration, hardware-software partitioning, high-level synthesis.
CS 570 04(3-3-0). Advanced Computer Architecture. F. Prerequisite: CS 470.
Pipelined CPU design. Superscalar architectures and instruction-level parallelism. Cache and memory hierarchy design. Storage systems.

CS 575 04(3-3-0). Parallel Processing. F. Prerequisite: CS 475.
Parallel and distributed computing models, algorithms, mapping and performance evaluations, parallel computing tools and applications. (NT-O)

CS 612 04(3-2-0). Topics in Computer Graphics. F. Prerequisite: CS 510.
Computer graphics research topics.

CS 614-E 04(3-3-0). Advanced Topics in Software Engineering. F, S. Prerequisite: CS 514 or CS 517 or CS 518.

*CS 620 04(3-2-0). Advanced Topics in Algorithms. F. Prerequisite: CS 520.
Designing and analyzing algorithms and data structures; illustrations from variety of problem domains.

CS 635 04(3-3-0). Advanced Fault-Tolerant Computing. F. Prerequisite: CS 530.
Advanced topics and recent developments in high reliability and fault-tolerant systems.

CS 640 02(2-0-0). Advanced Artificial Intelligence I. F. Prerequisite: CS 540.
Research topics in artificial intelligence: genetic algorithms, neural networks, connectionist models; machine learning; planning, automated reasoning.

CS 641 02(2-0-0). Advanced Artificial Intelligence II. S. Prerequisite: CS 640.
Advanced research topics in artificial intelligence.

CS 645 04(3-2-0). Advanced Machine Learning: Neural Networks. S. Prerequisite: CS 545 with a C or better.
Study of machine learning research literature and implementations of algorithms for neural networks and reinforcement learning.

CS 646 04(3-2-0). Machine Learning in Bioinformatics. S. Prerequisite: CS 545 or STAT 560.
Recent research on the suplications of machine learning in bioinformatics.

CS 653 04(3-3-0). Topics in Programming-Language Implementation. S. Prerequisite: CS 553.
Data dependence analysis; code generation.

CS 655 04(3-2-0). Advanced Topics in Distributed Systems. F. Prerequisite: CS 555.
Issues related to robustness, replication, consistency, scalability, isolation and privacy in large-scale distributed systems.

CS 656A-C 04(3-3-0). Advanced Topics in Computer Security. F, S. Prerequisite: CS 556.

CS 657 04(3-2-0). Advanced Topics in Computer Networking. F. Prerequisite: CS 557.
Advanced research topics in computer networks.

CS 658/ECE 658 04(3-3-0). Internet Engineering. F. Prerequisite: CS 457 or ECE 456. Credit not allowed for both CS 658 and ECE 658.
Link technologies, multiple access, hardware and software for internetworks routing, switching flow control, multicast, performance, and applications. (NT-O)

CS 670 B-D/ECE 670B-D Var[1-4]. Topics in Architecture/Systems. F, S. Prerequisite: CS 570 or ECE 554. Credit not allowed for both CS 670B-D and ECE 670B-D.

*CS 674/ECE 674 03(3-0-0). Heterogeneous Computing. S. Prerequisite: CS 551 or CS 570 or CS 575 or ECE 550 or ECE 554. Credit not allowed for both CS 674 and ECE 674.
Allocation of resources to tasks in parallel and distributed heterogeneous computing systems. A variety of computational environments are considered.

CS 675 04(3-3-0). Advanced Parallel Computing. S. Prerequisite: Written consent of instructor.
Parallel computing, computational models, parallel languages and algorithms, distributed simulation, Internet and mobile computing, parallel search.

CS 692 Var. Seminar.

CS 695 Var. Independent Study.

CS 696 Var. Group Study.


CS 787 01(0-3-0). Internship. SS.

CS 793 04(0-0-4). Research Seminar in Computer Science. F, S. Prerequisite: Graduate standing in computer science.
Research methods in specific areas of computer science.

COMPUTING TECHNOLOGY COURSES

Department of Computer Science
College of Natural Sciences

CT 310 04(3-3-0), Web Development. S. Prerequisite: CS 200.
Web development languages used to create fully functional
dynamic web sites; server and client scripting, database access and
security issues.

CT 320 04(3-3-0), Network and System Administration. F.
Prerequisite: (CS 155 and CS 156) or CS 253.
Installation of network and operating systems services,
management and support; upgrades, security, backups.

*Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course
offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and
AUCSubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for
more information.)
DANCE COURSES

Department of Music, Theatre, and Dance
College of Liberal Arts

D 110 03(3-0-0). Understanding Dance. (GT-AH1, AUCC 3B). F, S. SS. Prerequisite: None. For non-dance majors. Previous dance experience not necessary.

Broad examination of dance.

D 120A-C 02(0-4-0). Dance Techniques I. F, S. Prerequisite: None.

A) Modern. (S) B) Ballet. (S) C) Jazz.

D 121A-C. Dance Techniques II. F, S.

A) Modern 02(0-4-0). Prerequisite: Written consent of instructor. (S)

B) Ballet 03(0-6-0). Prerequisite: Written consent of instructor. (S) C) Jazz 02(0-4-0). Prerequisite: D 120C.

D 126 02(1-2-0). Dance Improvisation. F, S. Prerequisite: Written consent of instructor.

Organic movement and inventive dance movement through improvisational skills, body, physicality, space/direction/level imagery and partnering.

*D 160 02(0-4-0). Musical Tap Forms. S. Prerequisite: None.

Basic tap dance forms with emphasis on terminology, study of rhythm, and tap styles; historical development of tap in American culture.

D 220A-C. Dance Techniques III. F.

A) Modern 02(0-4-0). Prerequisite: Written consent of instructor. (S)

B) Ballet 03(0-6-0). Prerequisite: Written consent of instructor. (S) C) Jazz 02(0-4-0). Prerequisite: D 121C.

D 221A-C. Dance Techniques IV. S.

A) Modern 02(0-4-0). Prerequisite: Written consent of instructor. (S)

B) Ballet 03(0-6-0). Prerequisite: Written consent of instructor. (S) C) Jazz 02(0-4-0). Prerequisite: D 220C.

D 226 02(1-2-0). Dance Choreography I. F. Prerequisite: D 121A; D 121B; D 126.

Elements of dance composition including space, levels, rhythm, dynamics, qualities of movement, form, style.

D 286 Var[1-3]. Practicum. F, S. Prerequisite: None.

Dance performance and production experience.

D 320A-C. Dance Techniques V. F.

A) Modern 03(0-6-0). Prerequisite: Written consent of instructor. (S)

B) Ballet 05(0-10-0). Prerequisite: D 221B; written consent of instructor. (S) C) Jazz 02(0-4-0). Prerequisite: D 221C.

D 321A-C. Dance Techniques VI. S.

A) Modern 03(0-6-0). Prerequisite: Written consent of instructor. (S)

B) Ballet 05(0-10-0). Prerequisite: D 320B written consent of instructor. (S) C) Jazz 02(0-4-0). Prerequisite: D 320C.

D 324 02(1-2-0). Teaching Creative Movement for Children. S. Prerequisite: None.

Theoretical and practical experience in teaching creative movement.

D 326 03(1-4-0). Dance Choreography II. F. Prerequisite: D 226.

Advanced choreographic elements: group work, music influence, and nontraditional performance venues.

D 330 02(0-4-0). Ballet Repertory Ensemble. F, S. Prerequisite: Written consent of dance faculty.

Classical ballet repertory performance for the stage.

+D 340 02 (0-4-0). Tour Dance Company. F, S. Prerequisite: Written consent of instructor. Required field trips.

Development of touring dance lecture-demonstrations and selected choreographic performances throughout Colorado.

D 420A-C 02(0-4-0). Dance Techniques VII. F.

A) Modern. Prerequisite: D 321A. B) Ballet. Prerequisite: D 321B. (S) C) Jazz. Prerequisite: D 321C.

D 421A-C 02(0-4-0). Dance Techniques VIII. S.

A) Modern. Prerequisite: D 420A. B) Ballet. Prerequisite: D 420B. (S) C) Jazz. Prerequisite: D 420C.

+D 424 03(2-3-0). Ballet Technique Pedagogy. S. Prerequisite: D 324. Required Field Trips

Theory and practice of ballet technique teaching methods.

D 426 02(1-2-0). Dance Choreography III. F, S. Prerequisite: D 321A or D 321B or D 321C.

Studies in 20th-century dance composition forms.

*D 427 03(3-0-0). Dance History I. S. Prerequisite: None.

History of classical ballet to modern times from its origins in folk dance of Middle Ages and social dance of Renaissance.

*D 428 03(3-0-0). Dance History II. S. Prerequisite: Dance major; junior or senior standing.

History and examination of modern and contemporary dance from United States foundation and diverse global influences.

D 432 03(2-2-0). Dance Therapy. SS. Prerequisite: None.

Use of dance forms in therapy for mentally and physically handicapped.

+D 434 03 (2-3-0). Modern Technique Pedagogy. S. Prerequisite: D 324. Required field trips.

Theory and practice of modern dance technique teaching methods.

D 471 03(0-6-0). Dance Concert. F, S. Prerequisite: D 326; written consent of faculty.

Demonstration of individual performance and choreographic proficiency in a public performance. Supporting paper and video documentation required.

D 484 Var[1-3]. Supervised College Teaching. F, S. Prerequisite: D 324 or D 424 or D 434. Student must have taken the course they would be assisting. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

D 486 Var[1-3]. Practicum. F.S. Prerequisite: Written instructor of instructor. Practicum in dance topics.

D 491 Var[1-3]. Workshop.

D 495 Var. Independent Study.

D 496 Var. Group Study.

D 527 02(0-4-0). Contemporary Dance. S.

Techniques of dance movement and choreography.

*Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCsubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
DM 120 03(2-2-0). Textiles. F, S, SS. Prerequisite: None. Fibers, fabrics, and finishes basic to selection, use, and care. (NT-O)

DM 272 03(3-0-0). Consumers in the Marketplace. F, S. Prerequisite: None. Analysis and evaluation of consumers in the marketplace as applied to merchandising. (NT-O)

DM 300 03(3-0-0). Retail Sales and Customer Strategies. F, S, SS. Prerequisite: None. Examine selling practices and their impact on business and consumers in the global marketplace. (NT-O)

DM 360/MKT 360 03(3-0-0). Retailing. F, S, SS. Prerequisite: MKT 300 or MKT 365. Credit not allowed for both DM 360 and MKT 360. Retail markets, institutions, operations, and problems. (NT-O)

DM 400 03(1-2-1). U.S. Travel-New York City. S. Prerequisite: Six credits in AM, DM, and/or INTD courses. Interview/analyze designers, manufacturers, buying offices, retail stores, and architecture firms. (S)

DM 470A-B 02(1-0-1). International Design and Merchandising. F, S. SS. Historical, cultural, and business aspects of international design and merchandising in selected countries. A) Apparel Merchandising. Prerequisite: AM101; AM130; DM 120; concurrent registration in DM482A. B) Interior Design. Prerequisite: ART 100; INTD 129; INTD 166; concurrent registration in DM 482B.

DM 474 03(1-0-2). Fashion Show Production and Event Planning. S. Prerequisite: AM 101 or INTD 129; written consent of instructor. Planning and implementing full production fashion show of student-designed collections, including promotions and fund-raising activities.

DM 482 01(0-0-1). Travel Abroad. F, S, SS. Prerequisite: AM 101; AM130; DM 120; concurrent registration in DM 470A. Historical, cultural, aesthetic, and business aspects of design and merchandising in the selected country(ies).


DM 492 02(1-0-1). Preinternship Seminar. F, S. Prerequisite: Minimum GPA of 2.50; minimum of 60 credits completed. Professional standards/corporate structure of apparel and merchandising companies in apparel design, product development, and/or merchandising.

DM 495 Var. Independent Study. Maximum of ten credits allowed in course.

DM 496 Var. Group Study. Maximum of ten credits allowed in course.

DM 501 03(0-0-3). Research and Theory—Design and Merchandising. F, SS. Prerequisite: None. Theory and various approaches and philosophies of research in design and merchandising. Critical evaluation and synthesis of scholarly literature. (NT-O)

DM 510 03(3-0-0). Consumer Behavior. F. Prerequisite: None. Evaluation of psychological, sociological, and cultural theories of consumer behavior through examination of factors that influence decision making.

DM 518 03(3-0-0). Consumer Issues-Global Perspectives. F. Prerequisite: None. Understanding and analysis of consumer well-being and issues from global perspective.

DM 540 03(3-0-0). Promotional Strategies in Merchandising. F. Prerequisite: None. Integrated marketing communications while fostering cultural and global awareness, social responsibility and ethical decision-making.

DM 542 03(1-4-0). Advanced Computer-Aided Textile Design. S. Prerequisite: None. Use of computer-aided design system to produce fabric designs for apparel or interior professional end use. (S)

DM 551 03(3-0-0). Research Methods. S. Prerequisite: None. Design and methods of research applicable to design and merchandising. (NT-O)

DM 563 03(1-2-1). Care and Exhibit of Museum Collections. S. Prerequisite: Three credits of ART or HIST or AM or DM. Required field trips. Hands-on experience in management, care, exhibition, and interpretation of museum collections.

DM 570 03(0-0-3). Creativity in Design. S. Prerequisite: DM 501. Multiple perspectives in creativity integrating theory and research impacting design.

DM 575 03(3-0-0). Human Factors in Design — Softlines. F. Prerequisite: DM 501 or concurrent registration. Theories and contemporary issues related to human factors in design with a specific focus on interior, apparel, and footwear products.

DM 578 03(2-0-1). Trends-Consumer Issues. F, S, SS. Prerequisite: None. Developments and projections of consumer issues.


DM 592 Var[1-3]. Seminar.

DM 596 Var. Group Study.

DM 684 Var[1-6]. Supervised College Teaching. F, S.

DM 687 Var. Internship.

DM 695 Var. Independent Study. (NT-B)

DM 698 03(0-0-3). Research. F, S. SS. Prerequisite: Written consent of instructor. (NT-O)

DM 699 Var. Thesis. (NT-O)
ENGLISH COURSES
Department of English
College of Liberal Arts

E 140 03(3-0-0). The Study of Literature. (GT-AH2, AUCC 3B). F, S, SS. Prerequisite: None.
   Basic principles of reading literary texts.

E 142 03(3-0-0). Reading Without Borders. (GT-AH2, AUCC 3E). F, S, SS. Prerequisite: none.
   Authors from a range of international, cross-national, cultural, and ethnic backgrounds focusing on themes of immigration, exile, or education.

E 179 03(3-0-0). Western American Literature. F, S, SS. Prerequisite: None.
   Trans-Mississippi West in fiction and other literary forms.

E 210 03(3-0-0). Beginning Creative Writing. F, S. Prerequisite: Any lower-level E prefix course.
   Basic techniques of writing fiction and poetry; may include some elements of drama.

E 232 03(3-0-0). Introduction to Humanities. (GT-AH2, AUCC 3B).
   F, S. Prerequisite: None.
   Great literature of Western cultural tradition from ancient times to present.

E 234/ETST 234 03(3-0-0). Introduction to Native American Literature. S. Prerequisite: None. Credit not allowed for both E 234 and ETST 234.
   Native American writings and their significance in American culture.

E 237 03(3-0-0). Introduction to Science Fiction. F, S. Prerequisite: None.
   Historical development and major themes of science fiction, featuring writers such as Wells, Huxley, Bradbury, and LeGuin.

E 238 03(3-0-0). 20th-Century Fiction. (GT-AH2, AUCC 3E). F, S.
   Prerequisite: None.
   20th-century fiction chosen for its relevance to global and cultural awareness. (NT-O)

E 239/ETST 239 03(3-0-0). Introduction to Chicano Literature. F, S.
   Prerequisite: None. Credit not allowed for both E 239 and ETST 239.
   Chicano fiction and poetry with consideration of historical roots and influences.

E 240 03(3-0-0). Introduction to Poetry. F, S, SS. Prerequisite: None.
   Development of critical skills necessary to understand and enjoy poetry.

E 242 03(3-0-0). Reading Shakespeare. (GT-AH2, AUCC 3B). F, S.
   Prerequisite: None.
   Reading of Shakespeare texts, using various approaches of interpretation for understanding and relation to our contemporary cultural situation.

E 245 03(3-0-0). World Drama. (GT-AH2, AUCC 3E). F, S.
   Prerequisite: None.
   World drama in cultural contexts.

E 270 03(3-0-0). Introduction to American Literature. (GT-AH2, AUCC 3B). F, S, SS. Prerequisite: None.
   History and development of American writings from 16th-century travel narratives through early 20th-century modernism.

E 276 03(3-0-0). Survey of British Literature I. (GT-AH2, AUCC 3B). F. Prerequisite: None.
   British literature from Beowulf through the 18th century in relation to its historical contexts.

E 277 03(3-0-0). Survey of British Literature II. (GT-AH2, AUCC 3B). S. Prerequisite: None.
   British literature from the Romantics to the present in relation to its historical contexts.

E 300/AMST 300 03(3-0-0). American Lives-Methods in American Studies. F, S. Prerequisite: AMST 100; AMST 101. Credit not allowed for both E 300 and AMST 300.
   Methods and changing approaches of American studies since 1950s using autobiography as organizing theme.

E 302 03(3-0-0). Reading and the Web. F, S. Prerequisite: CO 150 or HONR 193.
   Critical examination of reading processes, as well as the rhetorical and cultural contexts of readers on the web.

E 305 03(3-0-0). Principles of Writing and Rhetoric. F, S.
   Prerequisite: CO 300 or CO 301A or CO 301B or CO 301C or CO 301D.
   Humanities-based exploration of central principles of rhetoric in written communication.

E 311A-C 03(3-0-0). Intermediate Creative Writing. F.
   Group discussion of student writing, literary models, and theory; emphasis on developing individual style. A) Fiction. Prerequisite: E 210 with a B or better. B) Poetry. Prerequisite: E 210 with a B or better. C) Nonfiction. Prerequisite: CO 150; E 210 with a B or better or JTC 210.

E 320 03(3-0-0). Introduction to the Study of Language. F, S, SS.
   Prerequisite: None.
   Varied topics covering general linguistics or the relationships between language and literature or society and science.

E 322 03(3-0-0). English Language for Teachers I. F. Prerequisite: None.
   Foundations of language structure, emphasizing grammar, sounds, spelling, word structure, linguistic variation, usage, acquisition, and pedagogy.

E 323 03(3-0-0). English Language for Teachers II. S. Prerequisite: E 322.
   Advanced grammar; language history; meaning; applications to teaching composition, reading, and literature.

E 324 03(3-0-0). Teaching English as a Second Language. F, S.
   Prerequisite: E 320 or E 322.
   Introduction to teaching English to speakers of other languages for teacher certification candidates and for those wanting to teach abroad.

E 326 03(3-0-0). Development of the English Language. S. Prerequisite: None.
   Chronological study of four historical stages of English (Old, Middle, Early Modern, Modern) with emphasis on grammar, vocabulary, and phonology.

E 327 03(3-0-0). Syntax and Semantics. S. Prerequisite: None.
   Linguistic study of sentence structure and grammatical relations, semantic roles and representation.

E 328 03(3-0-0). Phonology, Morphology, and Lexis. S. Prerequisite: None.
   Linguistic study of pronunciation, word-formation, and vocabulary.

E 329 03(3-0-0). Pragmatics and Discourse Analysis. S. Prerequisite: None.
   Linguistic study of general principles of interpretation and textual patterns.

E 330 03(3-0-0). Gender in World Literature. F. S. Prerequisite: None.
   Selected world literature ranging from ancient world to present, considered in light of various complexities of gender relations.

* Alternate year offering (odd); ° Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
**E 331 03(3-0-0). Early Women Writers.** F, S. Prerequisite: E 276 or E 277.
Selected women writers from any period before the 20th century.

**E 332 03(3-0-0). Modern Women Writers.** S. Prerequisite: None.
Selected 20th-century women writers in variety of genres emphasizing relationships between gender, writing, and reading.

**E 333 03(3-0-0). Critical Studies of Popular Texts.** F, S. Prerequisite: CO 150.
Texts representing one or more popular modes focusing on issues of gender, sexuality, racial or ethnic identity, technology, and colonialism.

**E 334 03(3-0-0). Gay and Lesbian Literature.** S. Prerequisite: None.
Literature by gay and lesbian authors on gay and lesbian themes.

**E 337 03(3-0-0). Western Mythology.** S. Prerequisite: One course in literature.
Major themes in western myth: classical, Biblical, and Germanic.

**E 338 03(3-0-0). Ethnic Literature in the United States.** F, S, SS.
Prerequisite: One literature course or one ETST course.
Comparative study of literatures from a range of U.S. ethnic experiences and perspectives.

**E 339 03(3-0-0). Literature of the Earth.** F, S. Prerequisite: CO 150.
Non-fiction, fiction, and poetry on landscape, climate, animality, ecology, place.

**E 341 03(3-0-0). Literary Criticism and Theory.** F, S. Prerequisite: One course in literature.
Theory and practice of modern literary analysis and evaluation; writing about literature.

**E 342 03(3-0-0). Shakespeare I.** F, S, SS.
Prerequisite: E 240 or E 276.
Shakespeare’s development as a poet and dramatist from the early plays through *Hamlet*.

**E 343 03(3-0-0). Shakespeare II.** F, S, SS.
Prerequisite: E 240 or E 276.
Shakespeare’s development as a poet and dramatist after *Hamlet*.

**E 345 03(3-0-0). American Drama.** F. Prerequisite: One course in literature.
Representative examples from mainstream and alternative drama.

**E 350 03(3-0-0). The Gothic in Literature and Film.** S. Prerequisite: One course in literature.
Interdisciplinary, cross-cultural approach to gothic works from the 18th to the 20th centuries.

**E 356 03(3-0-0). Asian Literature.** F. Prerequisite: None.
Masterpieces of classical and contemporary literature of China, India, and Japan.

**E 370 03(3-0-0). American Literature in Cultural Contexts.** F, S, SS.
Prerequisite: E 270.
American literature in social, political, economic, aesthetic, intellectual, and multimedia contexts.

**E 384A-B Var[1-3]. Supervised College Teaching.** F, S.
Prerequisite: Written consent of department chair. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

**E 401 03(3-0-0). Teaching Reading.** F, S. Prerequisite: CO 301D.
Theory and pedagogy for understanding, interpreting, and evaluating print and visual texts.

**E 402 03(3-0-0). Teaching Composition.** F, S. Prerequisite: CO 301A or CO 301B or CO 301C or CO 301D.
Theory and practice of the analysis and the teaching of writing.

**E 403 03(3-0-0). Writing the Environment.** S. Prerequisite: One course in literature or CO 301A-D or E 311A-C.
Creative writing in conjunction with study of recent American literature on nature and landscape.

**E 405 03(3-0-0). Adolescents’ Literature.** F, S. Prerequisite: None.
Survey of literature for adolescents emphasizing development of critical ability, appreciation, and taste.

**E 406 03(3-0-0). Topics in Literacy.** F, S. Prerequisite: None.
Maximum of 6 credits allowed in course.
Exploring literacy through written theory: specific issues of cultural difference, gender, technology, acquisition, and workplace.

**E 412A-C 03(3-0-0). Creative Writing Workshop.** S. Maximum of 6 credits allowed per subtopic.
Individual projects with group discussion and analysis. A) Fiction. Prerequisite: E 311A with a B or better. B) Poetry. Prerequisite: E 311B with a B or better. C) Nonfiction. Prerequisite: E 311C with a B or better.

**E 420 03(3-0-0). Beat Generation Writing.** S. Prerequisite: One course in literature.
Shared experiences and historical pressures that made Beat Generation writers, including Kerouac, Ginsberg, Burroughs, and Waldman, a countercultural movement.

**E 421 03(3-0-0). Asian American Literature.** F, S. Prerequisite: CO 150; E 270.
Asian American writing on immigration, exile, exclusion, detainment, neocolonialism, resistance, hybridity, and transnationalism.

**E 422/ETST 422 03(3-0-0). African-American Literature.** F.
Prerequisite: CO 150; E 270. Credit not allowed for both E 422 and ETST 422.
African-American literature as a distinct tradition of writing and protest.

**E 423 03(3-0-0). Latino/a Literature.** F, S. Prerequisite: CO 150; E 270.
Latino/a writing on themes of settlement, expropriation, resistance, conquest, immigration, exile, hybridity and transnationalism.

**E 424 03(3-0-0). English Renaissance.** F.
Prerequisite: E 276 or E 342 or E 343.
English Renaissance literature (1500-1670), covering a range of poetry, drama, and prose.

**E 425 03(3-0-0). Restoration and 18th Century Literature** S.
Prerequisite: One course in literature.
Poetry, drama, and prose, 1600-1789.

**E 426 03(3-0-0). British Romanticism.** F.
Prerequisite: E 276 or E 277 or E 341.
British Romantic era literature (1780-1830) with emphasis on the social and cultural context.

**E 427 03(3-0-0). Victorian Age.** F.
Prerequisite: E 276 or E 277 or E 341.
Victorian era literature (1830-1900) in social and cultural context, with attention to multiple genres (poetry, fiction, drama, and essay).

**E 428 03(3-0-0). Postcolonial Literature.** F, S. Prerequisite: One course in literature.
Selected readings in postcolonial literatures and theory.

**E 430 03(3-0-0). 18th-Century English Fiction.** F.
Prerequisite: One course in literature.
English fiction from Defoe to Austen stressing Richardson, Fielding, Smollett, and Sterne.
E 431 03(3-0-0). 19th-Century English Fiction. S. Prerequisite: E 276 or E 277 or E 341. English fiction in Victorian and Edwardian eras emphasizing Dickens, the Brontes, Thackeray, George Eliot, and Hardy.

E 432 03(3-0-0). 20th-Century British Fiction. F. Prerequisite: One course in literature. British fiction from Conrad to the present emphasizing Joyce, Lawrence, Forster, Woolf, and Beckett.

E 433 03(3-0-0). Literatures of the American West. F, S, SS. Prerequisite: One course in literature or HIST 351 or HIST 352 or HIST 353. Relationships between places, environments, cultures, and literature in the American West.

E 436 03(3-0-0). American Fiction, 1945-Present. S. Prerequisite: One course in literature. Offered only as an online course through the Division of Continuing Education. Form, content, and context of American fiction from 1945 to present: Kesey, Updike, Heller, Pynchon, Barthelme, Vonnegut, and others. (NT-O)

E 438/ETST 438 03(3-0-0). Native American Literature. F. Credit not allowed for both E 438 and ETST 438. Literature of Native Americans emphasized as distinct tradition in American literature and cultural expression of indigenous peoples.

E 440 03(3-0-0). American Prose Before 1900. F, S, SS. Prerequisite: One course in literature. Novels, stories, and/or literary non-fiction prose written in the U.S. before 1900.

E 441 03(3-0-0). American Prose Since 1900. F, S, SS. Prerequisite: One course in literature. Novels, stories, and/or literary non-fiction prose written in the U.S. from 1900 to the present.

E 443 03(3-0-0). English Renaissance Drama. F. Prerequisite: E 276 or E 342 or E 343. Interplay between dramatic form and cultural context in the plays of Marlowe, Jonson, Cary, Middleton, Heywood, Dekker, Webster.

E 444 03(3-0-0). Restoration and 18th-Century Drama. S. Prerequisite: One course in literature. Major plays and dramatic issues from 1660 to 1780 including Dryden, Etherege, Congreve, Sheridan, and others.

E 445 03(3-0-0). Modern British and European Drama. S. Prerequisite: One course in literature. Realism and anti-realism in modern British and European drama.

E 451 03(3-0-0). Medieval Literature. F, S. Prerequisite: One course in literature. Genres, themes, and authors of the Middle Ages.

E 452 03(3-0-0). Masterpieces of European Literature. S. Prerequisite: One course in literature. Selected works of European literature through the 19th century.

E 453 03(3-0-0). European Literature after 1900. S. Prerequisite: Two courses in literature. Continental European texts in translation since 1900.

E 456 03(3-0-0). Topics in Critical Theory. F, S. Prerequisite: E 341; may be repeated for one credit. Advanced study of literary can cultural theory. Chaucer’s works in medieval context.

E 460 03(3-0-0). Chaucer. S. Prerequisite: E 341; one other upper-division E prefix course. Chaucer’s works in medieval context.

E 463 03(3-0-0). Milton. F. Prerequisite: E 276 and E 341. Milton’s poetry and prose emphasizing Paradise Lost.

E 465 03(3-0-0). Topics in Literature and Language. F, S. Prerequisite: E 341; one other upper-division E prefix course. Maximum of 6 credits allowed in course.

E 470 03(3-0-0). Individual Author. F, S, SS. Prerequisite: E 341; one other upper-division E prefix course. Maximum of 6 credits allowed in course.

E 475 03(3-0-0). American Poetry Before 1900. F. Prerequisite: E 276 or E 342 or E 343. Major American poets through the 19th century including Whitman, Dickinson, and Frost.

E 478 03(3-0-0). Modern Poetry. F. Prerequisite: E 276 or E 342 or E 343. Major British and American poets from late 19th century to World War II.

E 479 03(3-0-0). Recent Poetry of the United States. F, S, SS. Prerequisite: E 276 or E 342 or E 343. U.S. poetry since World War II, emphasis on the 1980s through the present.

E 487A-D. Internship. Maximum of 4 credits allowed in E 487A and E 487B.

A) Supervised work experience. Var[1-3]. Maximum of 3 credits allowed in course. Prerequisite: 2.500 GPA; CO 150; written consent of department head or director. B) Literary editing. 01(0-0-1). Prerequisite: 2.500 GPA; CO 150; written consent of department head or director. C) Community literacy center. Var[1-3]. Prerequisite: 2.500 GPA; CO 150; written consent of CLC director. D) CSU writing center. Var[1-3]. Prerequisite: 2.500 GPA; CO 300 or CO 301A-D; written consent of Writing Center director.


E 501 03(3-0-0). Theories of Writing. F. Prerequisite: E 402. Theoretical approaches to the nature of the composing process.

E 502 03(3-0-0). Language, Literacy, and Learning. F. Prerequisite: Teaching experience or 3 credits in upper-division English or education courses. Theoretical and practical perspectives on language and learning skills necessary for basic academic reading and writing.

E 503 03(3-0-0). Investigating Classroom Literacies. F, S, SS. Prerequisite: None. Research methods and ethical issues in classroom-based inquiry into oral and written literacy practices.

E 504 03(3-0-0). Situating Composition Studies. F, S. Prerequisite: E 501. Contexts for composition programs, roles for program administrators, and professional opportunities for teachers and scholars.


E 507 03(3-0-0). Special Topics in Linguistics. F, S. Prerequisite: Written consent of instructor.

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E 513A-C 03(3-0-0). Form and Technique in Modern Literature. F, S. Prerequisite: None.
Selected readings in and discussions of modern literature and criticism from the writer's point of view with emphasis on form and technique. A) Fiction. B) Poetry. C) Essay.

E 514 03(3-0-0). Phonology/Morphology-ESL/EFL. F. Prerequisite: None.
English sound system and word formation in relation to second language acquisition and teaching.

E 515 03(3-0-0). Syntax for ESL/EFL. F. Prerequisite: None.
Major grammatical structures of English in relation to second language acquisition and teaching.

E 520 03(3-0-0). English Phonetics and Phonology. S. Prerequisite: None.
Articulatory phonetics, phonological theory and analysis with principal applications to American English and to pedagogy.

E 522 03(3-0-0). Semantics, Pragmatics, and Discourse. F. Prerequisite: None.
Linguistic study of literal and nonliteral meaning, including role of textual and situational context.

E 526 03(3-0-0). Teaching English as Foreign/Second Language. F. Prerequisite: None.
Principles of teaching English as a foreign/second language. Development of a coherent method, including activities, materials, and course design.

E 527 03(3-0-0). Theories of Foreign/Second Language Learning. S. Prerequisite: E 526.
Theories of second language learning/acquisition; emphasis on psycholinguistic processes of language learning.

E 590 Var[1-3]. Workshop in TESOL. F, S. Prerequisite: E 526.
Methodology/linguistic theory designed to solve practical problems in teaching, testing, and materials development.

E 600A-B 03(3-0-0). Research Methods and Theory. Prerequisite: None.
Research methods in English studies. A) Literary scholarship. B) Research design with quantitative and qualitative methods.

Evaluation and design of research in language acquisition.

E 603 03(3-0-0). Computers and Composition. S. Prerequisite: None.
Relationship of computer-assisted instruction to rhetoric and composition.

E 605 03(3-0-0). Reading/Writing Connection. S. Prerequisite: None.
Theoretical understanding of reading and writing processes; practical implications for professional writers and teachers of writing.

E 607A-B 03(3-0-0). Teaching Writing. F, S. Prerequisite: None.
A) Composition and rhetoric. B) Creative writing.

E 608 01(0-0-1). Integrating Writing in the Academic Core. F. Prerequisite: None.
Theories and best practices associated with writing integration in the academic core.

E 615 03(3-0-0). Reading Literature-Recent Theories. F, S, SS.
Prerequisite: None.
Recent developments in critical and cultural theories of discourse.

E 620 03(3-0-0). Special Topics in Literature. F. Prerequisite: None.

E 631 03(3-0-0). Crossing Boundaries. F, S. Prerequisite: None.
Cross-topical studies of literature.

E 632 Var[1-3]. Professional Concerns in English. F, S. Prerequisite: None.
Professional concerns of secondary school teachers of English.

E 633 03(3-0-0). Special Topics in Discourse Studies. F, S, SS.
Prerequisite: None.
Varied topics covering cultural or historical areas, or literary and discourse theory and practice, or professional pedagogical issues.

E 634 03(3-0-0). Special Topics in TEFL/TESL. F, S. Prerequisite: None.
Theory, practice, and professional conduct of teaching English as a foreign or second language.

E 635 03(3-0-0). Critical Studies in Literature and Culture. F, S.
Prerequisite: E 615.
Advanced interpretation in contemporary literary and critical studies.

E 636 03(3-0-0). Environmental Literature and Criticism. F, S.
Prerequisite: None.
Literary, critical, and theoretical representations of nature, animals, human-environment relations.

E 637 03(3-0-0). History of Writing. F, S. Prerequisite: None.
Writing systems and practices across time, cultures, and varied constructions of author, text, audience, social context, technology.

E 638 03(3-0-0). Assessment of English Language Learners. F, S.
Prerequisite: E 514; E 527.
Theory, practice, and professional conduct in the assessment of English language learners.

E 640A-C Var[1-5]. Graduate Writing Workshop. F, S. Prerequisite: None.
Maximum of 11 credits allowed per subtopic.

E 641 Var[1-5]. Nonfiction Workshop. F, S. Prerequisite: E 640C.
Writing workshop exploring various areas within literary nonfiction.

E 642 Var[1-5]. Writing Hypertexts. F, S. Prerequisite: None.
Writing workshop exploring development of texts in electronic formats.

E 679 01(1-0-0). Community Service Learning. F, S. Prerequisite: None.
Opportunities to learn, practice, and develop skills by serving the community.

E 684A-E Var[1-5]. Supervised College Teaching. F, S.

E 687A-M Var[1-5]. Internship. Prerequisite: B) E 501; E 684A.

E 692 01(0-0-1). Rhetoric and Composition Seminar. S.
Forum for faculty and student work in progress.

E 694 Var[1-3]. Independent Study: Portfolio. F, S, SS.

E 695 Var. Independent Study.

E 698 Var[1-2]. Research: Project. F, S, SS.

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E 700 03(0-0-3). Introduction to Doctoral Studies in English. F.
Prerequisite: Admission to the doctoral program.
Disciplinary approaches to the study of written discourse.

E 710 03(3-0-0). Writing for Publication. F, S.
Shaping research questions, determining publication venues, writing
and revising for publication.

E 792A-C 03(0-0-3). Seminar. F, S.
A) New Literacies. B) Writing about Science and the
Environment. C) Writing and Cultural Contexts.

E 795 Var. Independent Study. F, S, SS.
Individually guided study in doctoral topic.

E 799 Var[1-12]. Dissertation. F, S, SS.
ENGLISH FOR ACADEMIC PURPOSES COURSES

Department of English
College of Liberal Arts
CSU-INTO

EAP 150 06(0-0-0). English for International Students I. F, S, SS.
Prerequisite: Admission to Pathways program.
Academic English for international students, emphasizing analysis and integration of text and lecture-based information and its application.

EAP 151 03(3-0-0). English for International Students II. F, S, SS.
Prerequisite: EAP 150.
Academic English for international students, emphasizing research and writing papers in various academic genres using appropriate academic language.

EAP 152 06(0-0-0). English for International Graduate Students. F, S, SS. Prerequisite: EAP 150; Admission to graduate INTO CSU Pathway Program.
Academic English for international graduate students with emphasis on both academic reading and research.

EAP 153 03(3-0-0). Writing for International Graduate Students. F, S. Prerequisite: Admission to an accelerated graduate INTO CSU Pathway Program.
Development of academic English for international graduate students with an emphasis on academic research writing.

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ECE 102 04(3-2-0). Digital Circuit Logic. F. Prerequisite: None.
Boolean algebra; Karnaugh maps; multiplexers, decoders, ROMs, PLAs, flip-flops, counters; sequential networks; state tables. ($)

ECE 103 03(2-2-0). DC Circuit Analysis. S. Prerequisite: MATH 160.
Basic DC circuit analysis. Use of scientific-oriented software to solve problems and analyze small projects. ($)

ECE 202 04(3-3-0). Circuit Theory Applications. S, SS. Prerequisite: ECE 103.
Basic circuit analysis techniques and applications to engineering design problems. ($)

ECE 204 03(3-0-0). Introduction to Electrical Engineering. S. Prerequisite: MATH 161; PH 142.
Basic analog and digital circuits and systems; introduction to electromechanical devices.

ECE 251 04(3-3-0). Introduction to Microprocessors. F. Prerequisite: ECE 102 with a C- or better.
Microprocessor organization, assembly language, I/O techniques, real-time interfaces, applications, hardware/software. ($)

ECE 303/STAT 303 03(3-0-0). Introduction to Communications Principles. F. Prerequisite: ECE 311 or concurrent registration; MATH 261. Credit not allowed for both ECE 303 and STAT 303.
Basic concepts in design and analysis of communication systems.

ECE 311 03(3-0-0). Linear System Analysis I. F. Prerequisite: ECE 202 with a C- or better; MATH 340 or MATH 345.
Continuous and discrete time signals and systems representations in time and frequency domain; time convolution.

ECE 312 03(3-0-0). Linear System Analysis II. S. Prerequisite: ECE 311 with a C- or better.
Laplace and Z transforms, applications to modulation, filtering and sampling, state space representation.

ECE 325 03(3-0-0). Telecommunication Networks. S. Prerequisite: MATH 141 or MATH 155 or MATH 160.
Principle technologies that support data and voice communications. (NT-O)

ECE 331 04(3-3-0). Electronics Principles I. F. Prerequisite: ECE 202 with a C- or better; MATH 340 or MATH 345; PH 142.
Discrete component semiconductor devices, characteristics and applications. Rectifier circuits, single-stage and multi-stage amplifiers. ($)

ECE 332 04(3-3-0). Electronics Principles II. S. Prerequisite: ECE 331 with a C- or better.
Discrete and integrated-circuit amplifiers-frequency response, negative feedback; digital logic circuits. ($)

ECE 341 03(3-0-0). Electromagnetic Fields and Devices I. F. Prerequisite: ECE 202; MATH 340 with a C- or better; MATH 345 with a C- or better; PH 142 with a C- or better.
Basic concepts of electrostatic and magnetostatic fields.

ECE 342 03(3-0-0). Electromagnetic Fields and Devices II. S. Prerequisite: ECE 341 with a C- or better.
Basic concepts of time varying electromagnetic fields and transmission lines.

ECE 395 Var. Independent Study.
ECE 401 03(1-4-0). Senior Design Project I. F, S, SS.
Prerequisite: CS 320 or (ECE 332 with a C- or better); ECE 312 with a C- or better; ECE 342 with a C- or better or ECE 452 with a C- or better.
Advanced project, seminar series, formal written report, and oral presentation. ($)

ECE 402 03(1-4-0). Senior Design Project II. F, S, SS. Prerequisite: ECE 401.
Advanced project, formal report, and oral presentation. ($)

ECE 404 02(1-3-0). Experiments in Optical Electronics. F. Prerequisite: Concurrent registration in ECE 441.
Experiments in optical electronics and lasers.

ECE 411 04(3-3-0). Control Systems. F. Prerequisite: ECE 312 with a C- or better.
Control system analysis and design for linear systems: stability and performance; time and frequency domain techniques.

ECE 412 03(3-0-0). Digital Control and Digital Filters. S. Prerequisite: ECE 411.
FIR and IIR digital filter design, analog and digital invariance and direct digital control algorithms, hybrid systems analysis. (NT-O)

ECE 421 03(3-0-0). Telecommunications I. F. Prerequisite: ECE 303/STAT 303 with a C- or better; ECE 312 with a C- or better.
Digital communication (source coding; modulation and detection; channel coding), analog communication (modulation). (NT-O/V)

ECE 422 03(3-0-0). Telecommunications II. S. Prerequisite: ECE 421.
Issues of source coding, detection and estimation, and equalization; introduction of information theory.

ECE 423 03(1-4-0) DSP for Communications. S. Prerequisite: ECE 312.
Design and programming of communication and signal processing algorithms into DSP hardware using C and assembly language. (NT-V)

ECE 430/MATH 430 03(3-0-0). Fourier and Wavelet Analysis with Apps. S. Prerequisite: MATH 345. Credit not allowed for both ECE 430 and MATH 430.
Fourier analysis and transforms, FFTs; sampling theorems, computational algorithms; wavelets; applications to communication, imaging, and compression.

ECE 441 03(3-0-0). Optical Electronics. F. Prerequisite: ECE 342 with a C- or better.
Concepts of modern physics, optical properties of atoms, light sources, lasers, optical detectors, optical cavities, and optical fiber transmission.

ECE 442 04(3-3-0). Numerical Algorithms for VLSI Modeling. S. Prerequisite: ECE 312 with a C- or better; ECE 332 with a C- or better; ECE 342 with a C- or better.
Provide the foundational knowledge of numerical algorithms for modeling and simulations of high speed VLSI circuits.

ECE 444 03(3-0-0). Antennas and Radiation. F. Prerequisite: ECE 342 with a C- or better.
Retarded potential theory, antenna arrays, long wire antennas, dipoles, aperture antennas, receiving antennas.

ECE 450 01(0-3-0). Digital System Design Laboratory. F. Prerequisite: Concurrent registration in ECE 451.
Small digital circuits are designed and simulated using very high speed hardware description language and synthesis tools.

ECE 451 03(3-0-0). Digital System Design. F. Prerequisite: ECE 102 with a grade of C- or better; ECE 202 with a grade of C- or better; concurrent registration in ECE 450.

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State machines with PLAs as controllers and small computers; timing and race elimination considerations; state and microprogramming implementation.

**ECE 452 03(3-0-0). Computer Organization and Architecture.** S. Prerequisite: ECE 251 with a C- or better.
- CPU design; microarchitecture; data path and control path; pipelining; memory system; I/O system; program optimization by system software/hardware. (NT-O)

**ECE 454 03(3-0-0). Database Computers.** F. Prerequisite: ECE 251 with a C- or better or CS 370.
- Computer architectures for database processing. Data filters, associative processors, parallel and distributed computers, text search processors.

**ECE 456 04(3-3-0). Computer Networks.** S. Prerequisite: ECE 251; ECE 303/STAT 303; CS 160 or (CS 155; CS 156; CS 157). Credit not allowed for both ECE 456 and CS 457.
- Circuit/packet switching, protocols, LAN/MAN, TCP/IP, error correction, ATM, wireless LANS, mobile networks. (NT-O)

**ECE 457 03(3-0-0). Fourier Optics.** S. Prerequisite: ECE 311 with a C- or better; ECE 342 with a C- or better.
- Introduction to optical systems for signal and information processing with emphasis on Fourier optics.

**ECE 461 03(3-0-0). Power Systems.** F. Prerequisite: ECE 332 with a C- or better; ECE 462 or concurrent registration.
- Multi-phase power systems; power generation, transformer design, power distribution, power costs.

**ECE 462 01(0-3-0). Power Systems Laboratory.** F. Prerequisite: ECE 332 with a C- or better; ECE 461 or concurrent registration.
- Set of labs designed to enhance students’ understanding of power systems.

**ECE 465 03(3-0-0). Electrical Energy Generation Technologies.** S. Prerequisite: ECE 202 with a C- or better.
- Various electrical energy generation alternatives. Comparisons based on cost, reliability, availability and environmental impact. (NT-O)

**ECE 466 03(3-0-0). Integrated Lighting Systems.** F. Prerequisite: ECE 331 or INTD 330.
- Technical underpinnings of light sources, their associated heat sink fixtures and power electronics drivers.

**ECE 471A 01(1-0-0). Semiconductor Physics.** S. Prerequisite: PH 142; MATH 340 or MATH 345. Credit not allowed for both ECE 471A and ECE 471I. This is a partial semester course.
- Fundamentals of semiconductor electron, hole states and motion: bandgap, effective mass, carrier density, Fermi level, doping, drift and diffusion.

**ECE 471B 01(1-0-0). Semiconductor Junctions.** S. Prerequisite: ECE 331; ECE 471A. This is a partial-semester course. Credit not allowed for both ECE 471B and ECE 471I.
- Quantitative analysis of field, carrier and current distributions in pn and metal-semiconductor junctions.

**ECE 472 03(3-0-0). MOS Integrated Circuits.** S. Prerequisite: ECE 332 with a C- or better.
- MOS transistor theory, design rules, layout design, gate, cell and circuit design, memories, clocking strategies, MOS technologies.

**ECE 495 Var. Independent Study.**

**ECE 501/ENGR 501 03(0-0-3). Foundations of Systems Engineering.** F, S. Prerequisite: None. Credit not allowed for both ECE 501 and ENGR 501.
- Functional components of systems engineering, application of systems engineering to practical problems, system life-cycle process (NT-O)

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**ECE 503 03(3-0-0). Ultrafast Optics.** S. Prerequisite: ECE 341; ECE 342.
- Principles and theory behind ultrashort pulse generation, amplification, and manipulation.

**ECE 504 03(3-0-0). Physical Optics.** F. Prerequisite: ECE 341; ECE 342.
- Classical optics from first principles; basic electromagnetic theory to wave and geometric guides.

**ECE 505 03(3-0-0). Nanostructures: Fundamentals and Applications.** F. Prerequisite: ECE 342; PH 353.
- Fundamentals of quantum confinement; nanostructures optical properties; fabrication and characterization. (NT-O)

**ECE 506 03(3-0-0). Optical Interferometry and Laser Metrology.** F. Prerequisite: ECE 341; ECE 342; ECE 441.
- High resolution metrology techniques utilizing and interferometric sensors using lasers and other light sources. (NT-O)

**ECE 507 03(3-0-0). Plasma Physics and Applications.** S. Prerequisite: ECE 342.
- Fundamental principles and industrial applications of plasmas.

**ECE 508/ENGR 508 03(3-0-0). Introduction to Power System Markets.** F. Prerequisite: ECE 461. Credit not allowed for both ECE 508 and ENGR 508.
- Deregulated electrical power systems, system security, investments in generation and transmission, ancillary services, and nodal pricing. (NT-O)

**ECE 509/ENGR 509 03(3-0-0). Signal Processing for Power Systems.** F. Prerequisite: ECE 312; ECE 461. Credit not allowed for both ECE 509 and ENGR 509.
- Signal processing tools for analyzing power systems, voltage frequency, magnitude variations, unbalance, waveform distortion. (NT-O)

**ECE 512 03(3-0-0). Digital Signal Processing.** F. Prerequisite: ECE 312 with a C- or better.
- Discrete time signals and systems, digital filter design and implementation, fast algorithms, quantization effects. (NT-O)

**ECE 513 03(3-0-0). Digital Image Processing.** S., SS. Prerequisite: ECE 303/STAT 303 with a C- or better; ECE 312.
- Image acquisition and display systems, image enhancement, restoration and encoding, image analysis; real-life applications. (NT-O)

**ECE 514 03(3-0-0). Applications of Random Processes.** F. Prerequisite: ECE 303/STAT 303 with a C- or better; ECE 312 with a C- or better.
- Bit-error rates, signal-to-noise power ration, signal detection, signal estimation, Wiener filter, application.

**ECE 516 03(3-0-0). Information Theory.** Prerequisite: ECE 303/STAT 303; ECE 421.
- Information measures and their properties; lossless data compression; channel capacity; channel coding theorem; rate distortion theorem.

**ECE 520 03(3-0-0). Optimization Methods-Control and Communication.** S. Prerequisite: MATH 229; MATH 317.
- Linear and nonlinear optimization theory and methods; applications in systems, control, and communication.

**ECE 521 03(3-0-0). Satellite Communication.** S. Prerequisite: ECE 421.
- Principles of satellite communication systems engineering.

**ECE 524 03(3-0-0). Wireless Telecommunications.** S. Prerequisite: ECE 421.
- Physical layer design, including channel modeling, receiver design and performance, and multiple access techniques.
ECE 525 3(3-0-0). Fiber Optic Communications. S, SS. Prerequisite: ECE 471B.
Optoelectronic and optical components for fiber optics; communications system physical layer issues and examples. (NT-O)

ECE 526/BIOM 526 03(3-0-0). Biological Physics. S. Prerequisite: MATH 340 or MATH 345, PH122 or PH142. Credit not allowed for both ECE 526 and BIOM 526.

ECE 530/ENGR 530 03(3-0-0). Overview of Systems Engineering Processes. F, S. Prerequisites: ECE 303/STAT 303 or STAT 315. Credit not allowed for both ECE 530 and ENGR 530.
Systems engineering life-cycle process and analysis techniques. Reliability and robustness. (NT-O)

ECE 531/ENGR 531 03(3-0-0). Engineering Risk Analysis. F, S. Prerequisite: ECE 303/STAT 303 or STAT 315. Credit not allowed for both ECE 531 and ENGR 531.
Estimation and risk identification, development of mitigation techniques. (NT-O)

ECE 532/ENGR 532 03(3-0-0). Dynamics of Complex Engineering Systems. F, S. Prerequisites: ENGR 501/ECE 501 or concurrent registration. Credit not allowed for both ECE 532 and ENGR 532.
Higher-level behavior and issues that emerge from interactions between components in complex socio-technical systems. (NT-O)

ECE 534 03(3-0-0). Analog Integrated Circuit Design. F. Prerequisite: ECE 332 with a C- or better; concurrent registration in ECE 535.
Design methods for state-of-the-art analog integrated circuits, including CMOS op-amps, comparators, and phase-locked loops. (NT-O)

ECE 535 01(0-2-0). Analog Integrated Circuit Laboratory. F. Prerequisite: Concurrent registration in ECE 534.
Analog integrated circuits are designed and simulated using modern software tools. (NT-O)

ECE 536 03(3-0-0). RF Integrated Circuit Design. F. Prerequisite: ECE 332.
Design of state-of-the-art ICs for RF applications including CMOS low-noise amplifiers, voltage-controlled oscillators, mixers and power amplifiers. (NT-O)

*ECE 537/BIOM 537 03(3-0-0). Biomedical Signal Processing. S. Prerequisite: MATH 340 or ECE 311 or STAT 303. Credit not allowed for both ECE 537 and BIOM 537.
Measuring, manipulating, and interpreting biomedical signals.

*ECE 538 04(3-3-0). Design/Analysis of Analog Digital Interface. F, S. Prerequisite: ECE 312 with a C- or better; ECE 332 with a C- or better; ECE 451.
Topics of interface circuit designs analog and digital interfaces. Basic concept of designing and analyzing analog and digital interface circuits.

*ECE 540 03(3-0-0). Computational Electromagnetics. S. Prerequisite: ECE 342.
Computational techniques for practical applications in electromagnetic fields, devices, scattering, propagation, and radiation.

ECE 546 03(3-0-0). Laser Fundamentals and Devices. S. Prerequisite: ECE 441.
Amplification of light, laser excitation mechanisms, laser devices, characteristics and design.

ECE 548 03(3-0-0). Microwave Theory and Component Design. F. Prerequisite: ECE 342 with a C- or better.
Fundamentals of microwave engineering, components, devices, and measurements. (NT-O)

ECE 549 03(3-0-0). Radar Systems and Design. F. Prerequisite: ECE 444.
Fundamental ideas of radar operation and basic design of various radar types including current topics. (NT-O)

ECE 550A-B. Microprocessors Based Systems. F. Prerequisite: ECE 451.
High-performance microprocessors, e.g., 68000 family; intelligent I/O processors. Asynchronous bus, virtual memory, microprocessor in control and multi-user systems. A) 04(3-2-0). B) 03(3-0-0). CSUN students only.

ECE 554 03(3-0-0). Computer Architecture. F. Prerequisite: CS 470 or ECE 452.
Fundamentals of computer design, multiprocessors and thread-level parallelism, storage systems, and interconnection networks and clusters. (NT-O/V)

ECE 555 03(3-0-0). Robot Motion Planning. F. Prerequisite: CS 253; MATH 369.
Concepts in geometry and spatial reasoning for the design of autonomous robots.

ECE 557 03(3-0-0). Digital Optical Computing. S. Prerequisite: ECE 441 or ECE 451 or ECE 554.
Optical devices; optical disks, holographic memories; interconnection networks. Optical systems for numerical and nonnumerical data processing. (NT-V)

ECE 560/CS 560 04(3-2-0). Foundations of Fine-Grain Parallelism. F. Prerequisite: CS 475. Credit not allowed for both ECE 560 and CS 560.
Programming novel architectures; performance tuning; automatic parallelization; program transformation; polyhedral model; equation-based programming.

ECE 561/CS 561 04(3-3-0). Hardware/Software Design of Embedded Systems. F, S. Prerequisite: CS 270 or CS 470 or ECE 251 or ECE 452. Credit not allowed for both CS 561 and ECE 561.
Embedded systems design including system level modeling, design space exploration, hardware-software partitioning, high level synthesis. (ECE 561 only: NT-O)

ECE 562 03(3-0-0). Power Electronics I. F. Prerequisite: ECE 332 with a C- or better.
Switch mode and resonant converters, control using switch averaged dynamic models, modeling of all circuit components including sources, loads, and switches. (NT-O)

ECE 563 03(3-0-0). Power Electronics II. S. Prerequisite: ECE 562.
Electrical energy, processing circuits, lightweight power management, and power conversion circuits, emphasizing small signal transfer functions. (NT-O/V)

*ECE 564 03(3-0-0). Resonant Converters. S. Prerequisite: ECE 562.
Analysis and design of resonant converters.

ECE 565/ENGR 565 03(3-0-0). Electrical Power Engineering. F, S. Prerequisite: ECE 332; ECE 342. Credit not allowed for both ECE 565 and ENGR 565.
Analysis of power systems in terms of current, voltage, and active/reactive power; introduction of computer-aided tools for power systems. (NT-O)

ECE 566 03(3-0-0). Grid Integration of Wind Energy Systems. F, S. Prerequisite: (ECE 461; ECE 462) or ECE 565. Credit not allowed for both ECE 566 and ENGR 566.
Aspects of integration of wind energy conversion systems (WECS) to electric power transmission grids. (NT-O)

ECE 567/ENGR 567 03(3-0-0). Systems Engineering Architecture. F, S. Prerequisite: ECE 501 or ENGR 501. Credit not allowed for both ECE 567 and ENGR 567.

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Observation/classification of systems architecture. Systems architecture principles and critical evaluation through design studies. (NT-O)

ECE 568/ENGR 568 03(3-0-0). Electrical Energy Generation Systems. F. S. Prerequisite: Written consent of instructor.
Energy systems: renewable and traditional. Physics and operation of energy devices; solar-photovoltaic, wind energy, gas, coal, and nuclear plants. (NT-O)

*ECE 569/MECH 569 03(3-0-0). Micro-Electro-Mechanical Devices. S. Prerequisite: ECE 331 with a C- or better or MECH 344. Credit not allowed for both ECE 569 and MECH 569.
Micro-electro-mechanical processes and applications in sensors, optics, and structures. (NT-O)

ECE 571 03(3-0-0). VLSI System Design. S. Prerequisite: ECE 451; concurrent registration in ECE 575.
Design of integrated circuits at the system level including design, digital systems, parallel architecture, systolic arrays. (NT-V)

ECE 572 01(1-0-0). Semiconductor Transistors. S. Prerequisite: ECE 331; ECE 471B. This is a partial-semester course. Credit not allowed for both ECE 572 and ECE 471.
Quantitative analysis of electric field, carrier and current distributions in MOSFETS and bipolar junction transistors; scaling, non-idealities. (NT-O)

ECE 573 03(1-4-0). Semiconductor Optoelectronics Laboratory. S. Prerequisite: ECE 471B.
Experimental characterization techniques for semiconductor optoelectronic devices and design and testing of related electronic circuits. (NT-O)

*ECE 574 03(3-0-0). Optical Properties in Solids. S. Prerequisite: ECE 441 with a C- or better.
Light propagation and interaction with materials; linear and nonlinear optical properties. (NT-O)

ECE 575 01(3-0-3). Experiments in VLSI System Design I. S. Prerequisite: ECE 451; concurrent registration in ECE 571.
Set of labs designed to enhance students' understanding of the materials in ECE 571. (NT-O)

ECE 576 03(3-0-0). VLSI Processing-Science and Technology I. S. Prerequisite: ECE 472.
Physics, chemistry of VLSI processing including plasma, thermal techniques of oxidation, deposition; photolithography; etching; cleaning, process modeling. (NT-O)

*ECE 604 03(3-0-0). Nonlinear Optics. F. Prerequisite: ECE 504; PH 451.
Principles of nonlinear optics, symmetry properties, multiple order nonlinear phenomenon, and nonlinear spectroscopy. (NT-O)

ECE 611 03(3-0-0). Nonlinear Control Systems. F. Prerequisite: ECE 412.
Controller analysis and design for nonlinear systems. (NT-O)

*ECE 612 03(3-0-0). Robust Control Systems. S. Prerequisite: ECE 411.
Introduction to modern robust control theory techniques for analysis and design of large-scale uncertain multivariable systems. (NT-O)

*ECE 614 03(3-0-0). Principles of Digital Communications. S. Prerequisite: ECE 514.
Information theory, optimal receiver design, waveform coding, error correcting coding. (NT-O)

ECE 621/ENGR 621 03(3-0-0). Energy Storage for Electrical Power Systems. F. S. Prerequisite: Written consent of instructor. Credit not allowed for both ECE 621 and ENGR 621.
Physics and operation of electrical, mechanical, thermal and novel energy storage systems/devices. (NT-O)

ECE 622/ENGR 622 03(3-0-0). Energy Networks and Power Distribution Grids. F. S. Prerequisite: ECE 411 or MECH 417; ECE 565/ENGR 565. Credit not allowed for both ECE 622 and ENGR 622.
Energy networks: generation, storage, consumers. Systems approach to analysis of distribution networks and transition to intelligent grid systems. (NT-O)

ECE 623/ENGR 623 03(3-0-0). Electric Power Quality. S. Prerequisite: ECE 461 or ECE 562. Credit not allowed for both ECE 623 and ENGR 623.
Interconnecting power electronic devices and renewable energy sources to power systems. (NT-O)

*ECE 641 03(3-0-0). Electromagnetics. F. Prerequisite: ECE 342 with a C- or better.
Electrostatics, magnetostatics, boundary value problems, EM induction, quasi-statistics, Maxwell's equations. (NT-O)

*ECE 642 03(3-0-0). Time Harmonic Electromagnetics. S. Prerequisite: ECE 641.
Maxwell’s equations, radiation, boundary value problems, dyadic Green's functions, scattering theory. (NT-O)

*ECE 650 03(3-0-0). Extreme Ultraviolet and Soft X-Ray Radiation. S. Prerequisite: ECE 342.
Fundamental principles of short wavelength electromagnetic radiation. (NT-O)

ECE 651 03(3-0-0). Detection Theory. F. Prerequisite: ECE 512; ECE 514.
Neyman-Pearson and Bayes detectors and properties, matched filter and matched subspace detectors, distributed detection, and applications. (NT-O)

ECE 652 03(3-0-0). Estimation and Filtering Theory. S. Prerequisite: ECE 411 or ECE 412; ECE 514 or STAT 525.
Linear and Nonlinear parameter and state estimation methods; Optimal Kalman state estimation and applications. (NT-O)

ECE 655 03(3-0-0). Multidimensional Digital Signal Processing. S. Prerequisite: ECE 512.
Multidimensional signals and systems, 2-D transforms, stability methods, design and implementations, spectral factorization, and image modeling. (NT-O)

ECE 656 03(3-0-0). Machine Learning and Adaptive Systems. F. Prerequisite: ECE 512.
Adaptive system theory, statistical pattern recognition, supervised and unsupervised learning, support vector machines, manifold learning, applications. (NT-O)

ECE 658/CS 658 04(3-3-0). Internet Engineering. F. Prerequisite: CS 457 or ECE 456. Credit not allowed for both ECE 658 and CS 658.
Link technologies, multiple access, hardware and software for interworks routing, switching flow control, multicast, performance, and application. (NT-O)

ECE 660 03(3-0-0). Advanced Topics in VLSI Design. S. Prerequisite: ECE 571.
VLSI synthesis, optimization, and other issues. (NT-O)

ECE 661 04(3-3-0). Advanced Topics in Embedded Systems. S. Prerequisite: ECE 561/CS 561; ECE 452.
Embedded systems design: networks on chip, novel memory architectures, synthesis algorithms, optimization for low power, fault tolerance, security. (NT-O)

ECE 666 03(3-0-0). Topics in Robotics. S. Prerequisite: ECE 555 or MECH 514 or MECH 564.
Recent advances in robotics, automation, and intelligent systems. (NT-O)

ECE 670 B/DCS 670B-D Var[1-4]. Topics in Architecture/Systems. F. S. Prerequisite: CS 570 or ECE 554. Credit not allowed for both ECE 670B-D and CS 670B-D.

*Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCsubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
B) Performance evaluation and modeling. C) Distributed systems.  
D) Architecture of advanced systems.

ECE 672/PH 672 03(3-0-0). Principles of Semiconductors. S.  
Prerequisite: ECE 471B or PH 531. Credit not allowed for both ECE 672 and PH 672.  
Electronic properties of semiconductors: band structure, statistics, transport properties, photoelectronic properties, potential barriers, interfaces.

ECE 673 03(3-0-0). Thin Film Growth. F. Prerequisite: One course in thermodynamics.  
Microstructures of physically vapor-deposited films; thin-film morphological development; atomistic processes of condensation, nucleation, and growth.

ECE 674/*CS 674 03(3-0-0). Heterogeneous Computing. S.  
Prerequisite: CS 551 or CS 570 or CS 575 or ECE 550 or ECE 554. Credit not allowed for both ECE 674 and CS 674.  
Allocation of resources to tasks in parallel and distributed heterogeneous computing systems. A variety of computational environments are considered.

ECE 695 Var. Independent Study.

ECE 697/ENGR 697 Var[1-6]. Group Study. F, S, SS.


ECE 721 03(3-0-0). Topics in Communication Theory. F.  
Prerequisite: ECE 521.  
Detection and estimation theory; radar-sonar problems; nonlinear modulation; information theory; communication systems.

ECE 742 03(3-0-0). Topics in Electromagnetics. S. Prerequisite: ECE 641.  
Applications of wave propagation and scattering to microwave radar, Doppler radar, meteorological radar applications.

ECE 744 03(3-0-0). Topics in Plasma Dynamics. S. Prerequisite: None.  
Kinetic equations, nonlinear theory of waves and instabilities; plasma fluctuation and radiations; plasma diagnostics and plasma heating.

ECE 752 03(3-0-0). Topics in Signal Processing. F. Prerequisite: ECE 512; ECE 514 or STAT 525.  
Adaptive filtering, spectral estimation, sonar/radar signal processing, and detection/classification schemes.

ECE 777 03(3-0-0). X-ray Lasers. S. Prerequisite: ECE 546.  
Fundamentals, design, and implementation of soft X-ray lasers and X-ray optics.

ECE 795 Var. Independent Study.

ECE 799 Var. Dissertation.

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ECOLOGY COURSES
Nondepartmental, Interdisciplinary
Warner College of Natural Resources and
College of Natural Sciences

ECOL 505 02(2-0-0). Foundations of Ecology. F. Prerequisite: One course in ecology.
Overview of the science of ecology; what questions are asked, how they are answered.

ECOL 571 Var[1-3]. Advanced Topics in Ecology. S. Prerequisite: One course in ecological principles.
Current research topics presented and analyzed by visiting scientists.

ECOL 592 Var[1-3]. Interdisciplinary Seminar in Ecology. F, S. Prerequisite: One 300- or 400-level course in ecology.
Concepts and principles of basic and applied ecology in an interdisciplinary context.

ECOL 600 03(2-0-1). Community Ecology. S. Prerequisite: One course in general ecology, calculus, and statistics.
Current theories and tests of the dynamics and regulation of plant and animal communities.

*ECOL 610 03(3-0-0). Ecosystem Ecology. F. Prerequisite: LIFE 320 or any ECOL course.
Concepts, methods, issues in ecosystem science: energy and matter cycling, systems perspectives, simulation modeling, sustainability, global change.

*ECOL 620 04(2-2-1). Applications in Landscape Ecology. F. Prerequisite: Previous coursework in geographic information systems, ecology, statistics, and mathematics.
Spatial patterning of landscape elements and dynamics of ecological systems; spatial heterogeneity. Influence on biotic and abiotic processes.

ECOL 693 01(0-0-1). Research Seminar. Prerequisite: Written consent of instructor.
Critique of research programs, plans, and ecological theory.

ECOL 695 Var. Independent Study.

ECOL 698 Var. Research.
Non-thesis research in ecology.


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ECONOMICS COURSES
Department of Economics
College of Liberal Arts

ECON 101 03(3-0-0). Economics of Social Issues. (GT-SS1, AUCC 3C). F, S, SS. Prerequisite: None.
- Economic analysis of poverty, crime, education, and other social issues. Basics of macro, micro, and political economy.

ECON 202 03(2-0-1). Principles of Microeconomics. (GT-SS1, AUCC 3C). F, S, SS. Prerequisite: MATH 117 or MATH 118 or MATH 141 or MATH 155 or MATH 160. Credit not allowed for both ECON 202 and AREC 202.
- Introduction to decision-making by households, firms, and government, and resulting allocation of resources through markets. (NT-O)

ECON 204 03(2-0-1). Principles of Macroeconomics. (GT-SS1, AUCC 3C). F, S, SS. Prerequisite: ECON 204; MATH 117 or MATH 118 or MATH 141 or MATH 155 or MATH 160.
- Determinants of national output, employment, and price level; inflation and unemployment; fiscal and monetary policy. (NT-O)

ECON 211 03(3-0-0). Gender in the Economy. (GT-SS1, AUCC 3E). F, S, SS. Prerequisite: None.
- Role gender plays in economies; the way gender affects economic outcomes for individuals and societies. (NT-O)

ECON 212 03(3-0-0). Racial Inequality and Discrimination. (GT-SS1, AUCC 3C). F. Prerequisite: None.
- Economic inequality between Afro-Americans and Euro-Americans. Debates about causes, consequences, and remedies.

ECON 240/AREC 240 03(3-0-0). Issues in Environmental Economics. (GT-SS1, AUCC 3C). F, S, SS. Prerequisite: None. Credit not allowed for both ECON 240 and AREC 240.
- Discussion and economic analysis of current environmental issues with special emphasis on the impact of economic growth. (NT-C/O)

ECON 304 03(3-0-0). Intermediate Macroeconomics. F, S, SS. Prerequisite: ECON 204; MATH 141 or MATH 155 or MATH 160.
- Theory of national income, its measurement and determinants; analysis of inflation, growth, debt, and public policy. (NT-C/O)

ECON 306 03(3-0-0). Intermediate Microeconomics. F, S, SS. Prerequisite: ECON 202 or ECON 204; MATH 141 or MATH 155 or MATH 160.
- Analysis of competitive and noncompetitive markets in terms of efficiency of resource utilization. (NT-O)

*ECON 310 03(3-0-0). Poverty and the Welfare State. S, SS. Prerequisite: AREC 202 or ECON 101 or ECON 202.
- Description and analysis of U.S. poverty; the “underclass”; feminization of poverty; working poor; the welfare state.

ECON 315 03(3-0-0). Money and Banking. F, S, SS. Prerequisite: ECON 204.
- Monetary theory and policy; description of financial institutions and markets. (NT-O)

ECON 320 03(3-0-0). Economics of Public Finance. F, S, SS. Prerequisite: ECON 204.
- Impact of taxes, government expenditures on allocation of resources, distribution of income; evaluation of government expenditure program; tax policies. (NT-O)

ECON 325 03(3-0-0). Health Economics. S. Prerequisite: AREC 202 or ECON 204.
- Economic analysis of health care markets, health insurance markets, and public policy regarding health care.

ECON 327 03(3-0-0). Law and Economics. F. Prerequisite: ECON 202 or AREC 202.
- Economic analysis of the common law.

ECON 332/POLS 332 03(3-0-0). International Political Economy. F, S. Prerequisite: AREC 202 or ECON 202; POLS 232. Credit not allowed for both ECON 332 and POLS 332.
- Theories on relations between international politics and economics. Policy implications of different theories and case studies.

ECON 335/AREC 335 03(3-0-0). Introduction to Econometrics. F, S. Prerequisite: ECON 204; MATH 141 or MATH 155 or MATH 160; STAT 201 or STAT 204 or STAT 301 or STAT 307. Credit not allowed for both ECON 335 and AREC 335.
- Estimating statistical regression models of economic relationships; treatment of special problems that may arise in analysis of economic data. (NT-O)

ECON 340/AREC 340 03(3-0-0). Introduction: Economics of Natural Resources. S. Prerequisite: AREC 202 or ECON 202. Credit not allowed for both ECON 340 and AREC 340.
- Concepts, theories, institutions; analytical methods for economic evaluation of alternative resource use patterns and land use plans.

*ECON 344 03(3-0-0). Economics of Energy Resources. S. Prerequisite: AREC 202 or ECON 202.
- Supply, consumption trends and projected demand for alternative energy resources in domestic and world perspective; economics of public energy policies.

ECON 346/AREC 346 03(3-0-0). Economics of Outdoor Recreation. S. Prerequisite: AREC 202 or ECON 202. Credit not allowed for both ECON 346 and AREC 346.
- Benefit cost framework in public planning for outdoor recreation, pricing problems, projecting demand, and regional economic development.

ECON 370 03(3-0-0). Comparative Economic Systems. F. Prerequisite: AREC 202 or ECON 101 or ECON 202.
- Place of the economy in different societies; nature and evolution of capitalism; crisis of command economies and capitalist restoration.

ECON 372 03(3-0-0). History of Economic Institutions and Thought. F, S. Prerequisite: AREC 202 or ECON 101 or ECON 202.
- Origins and development of capitalist institutions including contemporary issues of alienation, loss of community, and changing values. (NT-O)

ECON 376 03(3-0-0). Marxist Economic Thought. S. Prerequisite: AREC 202 or ECON 101 or ECON 202.
- Marxist critique of capitalism and orthodox economics in both its original 19th-century and contemporary settings.

ECON 379/HIST 379 03(3-0-0). Economic History of the United States. F. Prerequisite: AREC 202 or ECON 101 or ECON 202 or any two courses in American history; completion of 45 credits. Credit not allowed for both ECON 379 and HIST 379.
- Economic analysis of growth and welfare from beginning of industrialization to present.

ECON 404 03(3-0-0). Macroeconomic Policy. S. Prerequisite: ECON 304.
- Alternative macroeconomic policies, policy coordination; application to current macroeconomic problems, policies, proposals.

*ECON 410 03(3-0-0). Labor Economics. S. Prerequisite: ECON 306.
- Capital/labor relationship; supply, demand of labor; wage determination; role of unions; unemployment and instability; structure of modern working class.

*ECON 435 03(3-0-0). Economic Forecasting. S. Prerequisite: AREC 335/ECON 335 or STAT 340; ECON 204.

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Theory and techniques used in economic forecasting as practiced by economists in industry, government, and academic life.

**ECON 440 03(3-0-0). International Economics I.** F. Prerequisite: ECON 306. Theory of international trade; payments, commercial policies, and economic integration. (NT-O)

**ECON 442 03(3-0-0). International Economics II.** F, S, SS. Prerequisite: ECON 304. Balance of payments, adjustment mechanisms, and international monetary systems. (NT-O)

**ECON 460 03(3-0-0). Economic Development.** F. Prerequisite: ECON 304. Economic problems of underdeveloped nations. (NT-O)

**ECON 463 03(3-0-0). Regional Economics-Tools/Analysis/Policy.** F, S, SS. Prerequisite: ECON 306. Introduction to economic importance of location for firms, consumers, and policy makers. Basic tools, applications, and student research. (NT-O)

**ECON 474 03(3-0-0). Recent Economic Thought.** S. Prerequisite: ECON 304; ECON 306. Nontraditional schools of economic thought, such as institutionalism and neo-Marxism, that critique neoclassical economic theory.

**ECON 484 Var[1-3]. Supervised College Teaching.** F, S, SS. Prerequisite: Written consent of instructor. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

Assistance in teaching introductory economics courses.

**ECON 487 Var[1-3]. Internship.**

**ECON 492 03(0-0-3). Seminar.** F, S. SS. Prerequisite: Senior status. Summarizes, debates, and applies issues and policies chosen by the instructor. Emphasis on student participation, debate, and research.

**ECON 495 Var. Independent Study.**

**ECON 501 03(3-0-0). Quantitative Methods for Economists.** F. Prerequisite: MATH 141 or MATH 155 or MATH 160. Quantitative methods essential for graduate study in economics; functional forms, optimization, matrix methods, topological modeling.

**ECON 504 03(3-0-0). Applied Macroeconomics.** S. Prerequisite: ECON 304; ECON 306. Application of macroeconomic models to economic growth, economic fluctuations, and policy analysis.

**ECON 505 03(3-0-0). History of Economic Thought.** F. Prerequisite: Graduate status. History of economic thought as a foundation for studying economic theory.

**ECON 506/AREC 506 03(3-0-0). Applied Microeconomic Theory.** F. Prerequisite: ECON 306. Credit not allowed for both ECON 506 and AREC 506. Introduction to mathematical models in modern microeconomics, including choices and demand, production and supply, and market structures and failures.

**ECON 510 03(3-0-0). Labor Market Analysis.** F. Prerequisite: ECON 304; ECON 306. Determination of wages and employment. Focus on theoretical and applied controversies.

**ECON 515 03(3-0-0). Financial Institutions-Structure/Regulation.** F. Prerequisite: None. Regulation of financial institutions in the U.S.; international banking and international financial institutions, and financial modernization.

**ECON 520 03(3-0-0). Public Economics I.** S. Prerequisite: ECON 506. Analysis and evaluation of tax policy in terms of efficiency and equity.

**ECON 530/AREC 570 03(3-0-0). Methodology of Economic Research.** F. Prerequisite: ECON 304; ECON 306. Credit not allowed for both ECON 530 and AREC 570. Methodological foundations of science and research. Concepts and skills for planning, performing, reporting, and evaluating economic research.

**ECON 535/AREC 535 03(3-0-0). Applied Econometrics.** F. Prerequisite: AREC 335/ECON 335; ECON 304 or ECON 306; Credit not allowed for both ECON 535 and AREC 535. Econometric techniques applied to testing and quantification of theoretical economic relationships drawn from both microeconomics, macroeconomics.

**ECON 540/AREC 540 03(3-0-0). Economics of Natural Resources.** F. Prerequisite: ECON 340/AREC 340; MATH 141. Credit not allowed for both ECON 540 and AREC 540. Public natural resources policy, effect on resource use in private sector, optimal pricing of minerals, timber and fisheries, public project analysis.

**ECON 541/AREC 541 03(3-0-0). Environmental Economics.** S. Prerequisite: ECON 306. Credit not allowed for both ECON 541 and AREC 541. Economics of environmental policy; partial equilibrium and general equilibrium model; pollution; natural environments; population and economic growth.

**ECON 563/AREC 563 03(3-0-0). Regional Economics-Theory, Methods, and Issues.** F. Prerequisite: ECON 306; ECON 501 or concurrent registration. Credit not allowed for both ECON 563 and AREC 563. Tools and methods of regional economics, including supply, demand, and externality analyses. Applications to current urban and regional policy issues.

**ECON 570 03(3-0-0). Evolution of Economic Thought.** F. Prerequisite: ECON 304; ECON 306. From Plato and Aristotle to the modern period.

**ECON 604 03(3-0-0). Macroeconomic Analysis I.** S. Prerequisite: ECON 304; ECON 501. Theoretical and empirical analysis of short-run and long-run macroeconomic performance across countries using dynamic models.

**ECON 606/AREC 606 03(3-0-0). Microeconomic Analysis I.** S. Prerequisite: ECON 306; ECON 501. Credit not allowed for both ECON 606 and AREC 606. Advanced price/allocation theory: consumer/producer decisions; uncertainty; market structure; partial/general equilibrium; efficiency/welfare.

**ECON 635/AREC 635 03(3-0-0). Econometric Theory I.** F. Prerequisite: AREC 535/ECON 535; ECON 501 or concurrent registration. Credit not allowed for both ECON 635 and AREC 635. Theory of mathematical statistics and classical linear regression model in context of economic application.

**ECON 640 03(3-0-0). International Trade Theory.** F. Prerequisite: ECON 306 or ECON 506. Theory of international trade including comparative advantage, factor growth, market distortions, and commercial policy.

**ECON 663 03(3-0-0). Urban and Regional Modeling.** S. Prerequisite: ECON 506. Methodological approaches in regional economics: general equilibrium, input-output, compatible general equilibrium models; social accounting matrices.
ECON 695 Var. Independent Study.

ECON 698 03(0-0-3). Research—Technical Paper. F, S, SS. Prerequisite: ECON 504; ECON 506; ECON 705; ECON 735/AREC 735.


ECON 704 03(3-0-0). Macroeconomic Analysis II. F. Prerequisite: ECON 604.
Theoretical and empirical frameworks for analyzing macroeconomic policies and their impact on economic growth, employment, and income distribution.

ECON 705 03(3-0-0). Heterodox Approaches to Economics. S. Prerequisite: ECON 505.
Contemporary heterodox approaches to economic research.

ECON 706/AREC 706 03(3-0-0). Microeconomic Analysis II. F. Prerequisite: ECON 606. Credit not allowed for both ECON 706 and AREC 706.
Advanced topics in microtheory: game theory; market imperfections; adverse selection; principal-agent problems; social choice theory; incentives, etc.

ECON 715 03(3-0-0). Monetary Economics. F. Prerequisite: ECON 504.
Principle issues of monetary theory: money supply and demand, interest rates, and current problems of monetary policy.

ECON 720 03(3-0-0). Public Economics II. F. Prerequisite: ECON 506.
Analysis of welfare foundations of public expenditure, including cost-benefit analysis.

ECON 735/AREC 735 02(2-0-0). Econometric Theory II. S. Prerequisite: AREC 635/ECON 635. Credit not allowed for both ECON 735 and AREC 735. This is a partial-semester course.
Econometrics models and estimators in econometrics, from fully parametric to semiparametric and nonparametric approaches.

ECON 736/AREC 736 A-C 01(1-0-0). Advanced Econometric Methods. S. Prerequisite: AREC 735/ECON 735 or concurrent registration. Credit not allowed for both ECON 736A-C and AREC 736A-C. This is a partial-semester course.

ECON 742 03(3-0-0). International Production and Monetary Theory. S. Prerequisite: ECON 304 or ECON 504.
Factor movements, theory of international production (multinationalism), balance of payments, and international monetary system.

*ECON 760 03(3-0-0). Theories of Economic Development. S. Prerequisite: ECON 460.
Analysis of fundamentals of economic development (processes, problems, and strategies) with special reference to developing nations.

*ECON 770 03(3-0-0). Economic Thought and Systems. S. Prerequisite: ECON 570.
Aspects of modern economic thought and comparative economics selected according to backgrounds and interests of the class.

ECON 771 03(3-0-0). Political Economy of Race and Gender. F, S. Prerequisite: Graduate status.
Economic approaches to inequality based on race/ethnicity, gender, and class.

ECON 772 03(3-0-0). Marxian Political Economy. F. Prerequisite: ECON 505.
Marxian method, relevance of Marxian approach, and relation to other economic approaches.

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
ADULT EDUCATION COURSES
School of Education
College of Health and Human Sciences

EDAE 495 Var. Independent Study-Adult Education.

EDAE 520 03(0-0-3), Adult Education. F. Prerequisite: None.
Philosophical foundations, a description of program service areas,
adult participation trends, and current issues. (NT-O, V)

EDAE 586 Var. Practicum. Prerequisite: None.
Participation in field experiences relevant to study program and
objectives.

EDAE 590 Var. Workshop. Prerequisite: None.
Specially designed learning situations to provide opportunities for
concentrated problem-solving experiences. (NT-O)

EDAE 601 03(3-0-0), Philosophy/Organization of Workforce
Education. SS. Prerequisite: None.
Principles, philosophy, practices, and innovations of workforce
education and human resources. (NT-O/V)

EDAE 620 03(0-0-3), Processes and Methods. F. Prerequisite: None.
Processes and methods including helping theories used by adult
learning facilitators. (NT-O)

EDAE 624 03(0-0-3), Adult Teaching and Learning I. S. Prerequisite:
EDAE 520.
Using theory and best practices to design and deliver instruction for
adults. (NT-O)

EDAE 629 03(0-0-3), Program Development. S. Prerequisite: None.
Models for planning, implementing, and evaluating programs for
adult learners. (NT-O)

EDAE 639 03(1-0-2), Instructional Design. F. Prerequisite: none.
Apply instructional design principles in the development of a course
or workshop and explore application of various learning methods.
(NT-O)

EDAE 668 03(1-0-2), Cognitive Theory and Learning Transfer. F, S,
SS. Prerequisite: (EDAE 620; EDAE 624) or written consent of
instructor.
Investigation of learning processes and training strategies that lead to
application of learning outside of the classroom. (NT-B/O)

EDAE 687 Var. Internship.
Career or job fieldwork experience with an adult education
institution, agency, or program.

EDAE 692 Var. Seminar-Adult Education. (NT-O)

EDAE 695 Var. Independent Study.

EDAE 698 Var. Research. Prerequisite: EDAE 520; EDAE 624;
EDRM 600.

EDAE 699 Var. Thesis. Prerequisite: EDAE 520; EDAE 624; EDRM
600.

EDAE 724 03(0-0-3). Adult Teaching and Learning II. F.
Prerequisite: None.
Adult teaching and learning, alternative delivery systems,
performance technology, and faculty evaluation.

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; S Special course fee; NT Approved for nontraditional course offering (B =
blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and
AUCC-subcode = All
University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
## EDCL 675 03(3-0-0). The Community College. SS. Prerequisite: None.
Role and scope of community college: history, philosophy, organization, administration.

## EDCL 687 Var. Internship.

## EDCL 701 03(0-0-3). Higher Education Law. S. Prerequisite: None.
Legal theory, analysis, and review of cases relevant to higher education. (NT)

## EDCL 702 03(2-0-1). Community College Curriculum. F. Prerequisite: None.
Investigation and research of critical curricular issues affecting the community college now and in the future.

## EDCL 703 03(2-0-1). Community College Leadership. S. Prerequisite: EDCL 675.
Investigation and research of critical leadership issues affecting the community college now and in the future.

## EDCL 750 03(0-0-3). Simulated Presidential Cabinet I. SS. Prerequisite: EDCL 701; EDUC 710.
Issues and challenges relating to students, faculty, instructional programs, noninstructional programs, and instructional delivery.

## EDCL 751 03(0-0-3). Simulated Presidential Cabinet II. SS. Prerequisite: EDCL 701; EDUC 710.
Issues and challenges relating to internal/external governance, legal authority, institutional revenues, expenditures and insurances, human resources.

## EDCL 792 Var [1-6]. Seminar. F.

## EDCL 799 Var. Dissertation.

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
## COUNSELING AND CAREER DEVELOPMENT COURSES

**School of Education**

**College of Health and Human Sciences**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDCO 500</td>
<td>Career and Employment Concepts</td>
<td>F. Prerequisite: Bachelor’s degree. Career and lifestyle studies that provide an understanding of career development, employment concepts, and career counseling resources. (NT-O)</td>
</tr>
<tr>
<td>EDCO 550</td>
<td>Professional School Counseling</td>
<td>S. Prerequisite: Admission to Counseling and Career Development Program or approval of instructor. History, professionalism, ethics, program planning and program development of school counseling programs.</td>
</tr>
<tr>
<td>EDCO 552</td>
<td>School Counseling Program Delivery/ Evaluation</td>
<td>F. Prerequisite: EDCO 550. Effective school counseling program development, delivery, and evaluation.</td>
</tr>
<tr>
<td>EDCO 590</td>
<td>Var. Workshop</td>
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</tr>
<tr>
<td>EDCO 625</td>
<td>Foundations of Counseling</td>
<td>F. Prerequisite: Bachelor’s degree. Foundations and techniques of individual guidance and counseling.</td>
</tr>
<tr>
<td>EDCO 650</td>
<td>Individual Guidance and Counseling</td>
<td>F. Prerequisite: EDCO 625. Theories of individual counseling and development.</td>
</tr>
<tr>
<td>EDCO 651</td>
<td>Group Guidance and Counseling</td>
<td>S. Prerequisite: EDCO 650. Theory and techniques of group guidance and counseling.</td>
</tr>
<tr>
<td>EDCO 652</td>
<td>Ethics in Counseling/Career Development</td>
<td>S. Prerequisite: Admission to Counseling and Career Development Program. Awareness and critical analysis of ethical and legal issues in counseling and career development.</td>
</tr>
<tr>
<td>EDCO 656</td>
<td>Tests and Assessment</td>
<td>SS. Prerequisite: None. Use of tests in educational, vocational, and counseling assessment. ($)</td>
</tr>
<tr>
<td>EDCO 660</td>
<td>Career Development Counseling</td>
<td>S, SS. Prerequisite: EDCO 500. Career development programs and processes over the life span with particular attention to career choice.</td>
</tr>
<tr>
<td>EDCO 662</td>
<td>Counseling Children and Adolescents</td>
<td>SS. Prerequisite: Admission to M.Ed. Counseling and Career Development program. Counseling theories and interventions applied to the child and adolescent client population.</td>
</tr>
<tr>
<td>EDCO 686</td>
<td>Var. Practicum</td>
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<tr>
<td>EDCO 687</td>
<td>Var. Internship</td>
<td></td>
</tr>
<tr>
<td>EDCO 692</td>
<td>Seminar-Brief Counseling</td>
<td>S, SS. Prerequisite: EDCO 650; EDCO 652; proof of professional counseling liability insurance. Blends theory of brief counseling with practice. Individualized for application in the student’s counseling setting.</td>
</tr>
<tr>
<td>EDCO 693</td>
<td>Var. Seminar</td>
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<tr>
<td>EDCO 696</td>
<td>Var. Group Study</td>
<td></td>
</tr>
</tbody>
</table>

EDCO 792A-C Var. Seminar.
A) Individual counseling. B) Group counseling. C) Contemplative practices in counseling and education. S.

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CAREER AND TECHNICAL EDUCATION COURSES
School of Education
College of Health and Human Sciences

EDCT 300 02(0-0-2). Principles of Career and Technical Education. F, S, SS. Prerequisite: None. Offered only through Continuing Education, School of Education.

EDCT 370 03(3-0-0). Laboratory Management, Safety, and Liability. S, SS. Prerequisite: None.

EDCT 387 Var. Internship.

EDCT 400 02(2-0-0). Building Student Organizations/Partnerships. F, S, SS. Prerequisite: None. Credit not allowed for both EDCT 400 and EDCT 402.

EDCT 403 02(0-0-2). Coordination Techniques of Cooperative Programs. F, S, SS. Prerequisite: None. Offered only through Continuing Education, School of Education.

EDCT 420 03(3-0-0). Agricultural Experience and Adult Education. F. Prerequisite: None.

EDCT 425 04(4-0-0). Methods/Materials in Agricultural Education. F. Prerequisite: Concurrent registration in EDCT 492; EDUC 350 or concurrent registration or EDUC 450 or concurrent registration.

EDCT 430 04(4-0-0). Methods/Materials in Business Education. F. Prerequisite: Concurrent registration in EDCT 492; EDUC 350 or concurrent registration or EDUC 450 or concurrent registration.

EDCT 441 01(1-0-0). Methods/Materials-Vocational Marketing Education. F. Prerequisite: EDCT 431; EDUC 350 or concurrent registration or EDUC 450 or concurrent registration.

EDCT 451 04(3-2-0). Methods-Family/Consumer Sciences Education. F. Prerequisite: EDUC 350 or concurrent registration or EDUC 450 or concurrent registration.

EDCT 465 03(3-0-0). Methods and Materials in Technology Education. F. Prerequisite: EDUC 350 or concurrent registration or EDUC 450 or concurrent registration.

EDCT 471 02(2-0-0). Orientation and Assessment of New Teachers. F, S, SS. Prerequisite: None. Offered only through Continuing Education, School of Education.

EDCT 472 01(0-0-1). Classroom Management. F, S, SS. Prerequisite: Admission to TAP; EDCT 471. Offered only through Continuing Education, School of Education.

EDCT 473 01(0-0-1). Communication Strategies. F, S, SS. Prerequisite: Admission to TAP; EDCT 471. Offered only through Continuing Education, School of Education.

EDCT 485 Var. Student Teaching. F, S. Prerequisite: EDUC 450; appropriate special (content) methods courses.

EDCT 486 Var[1-6]. Practicum. Prerequisite: Admission to teacher licensure.

EDCT 492 Var. Seminar-Professional Relations. F, S. Prerequisite: EDUC 450; appropriate special (content) methods course; concurrent registration in EDCT 485.

EDCT 494 Var. Independent Study.

EDCT 496 Var. Group Study.

EDCT 520 Var. Teaching Agricultural Education. SS. Prerequisite: Admission to teacher licensure.

EDCT 571 03(0-0-3). Vocational Assessment for Special Needs. F, S, SS. Prerequisite: None.

EDCT 590 Var. Workshop.

EDCT 612 03(0-0-3). Career and Technical Administrative Strategies. F, S, SS. Offered only through Continuing Education, School of Education.

EDCT 630 02(2-0-0). Organization of Business Education. SS. Prerequisite: EDCT 300.

EDCT 631 02(2-0-0). Management of Business Departments. SS. Prerequisite: EDCT 300.

EDCT 640 02(2-0-0). Methods in Marketing Education. SS. Prerequisite: EDCT 441.

EDCT 641 02(2-0-0). Programs in Marketing Education. SS. Prerequisite: EDCT 441.

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Techniques used in determining need for and implementations of new or additional programs of vocational marketing education. (NT-O)

EDCT 693 Var. Seminar.
EDHE 590A-M 01(0-0-1). Workshop-Student Personnel.
Prerequisite: Enrollment in SAHE program.

EDHE 660 02(1-0-1). Financial Management in Student Affairs. F, S. Prerequisite: Written consent of instructor.
   Budgeting, fiscal planning, and financial administration in student affairs. (NT-O)

EDHE 661 03(3-0-0). Inclusive University. F, S. Prerequisite: Enrollment in SAHE program.
   Exploration of broad range of human differences and their impact in higher education. (NT-O)

EDHE 662 02(2-0-0). Trends/Issues/Assessment in Higher Education. F, S. Prerequisite: Enrollment in SAHE program.
   Assessment and research involving students in collegiate settings. (NT-O)

EDHE 670 03(0-0-3). College Student Personnel Administration. F, S, SS. Prerequisite: Written consent of instructor.
   Historical, philosophical, and professional development in student affairs functions; analysis of role of student affairs in higher education. (NT-O)

EDHE 671 03(3-0-0). Higher Education Administration. F, S, SS. Prerequisite: None.
   History, purpose, structure, and role of leadership within the administration of higher education with relevance to present day higher education. (NT-O)

EDHE 672 02(2-0-0). Ethical and Practical Issues-Student Affairs. F, S. Prerequisite: Enrollment in SAHE program.
   Ethical principles and standards used in student affairs. (NT-O)

EDHE 673 03(0-0-3). Student Development Theory. F, S. Prerequisite: None.
   Strategies for application of student development theories in practice. (NT-B)

EDHE 674 03(3-0-0). Campus Ecology. SS. Prerequisite: None.
   Patterns of relationships among students and the college campus social and physical environments. (NT-O)

EDHE 675 03(3-0-0). Campus Crisis Management. F. Prerequisite: Bachelor’s degree. Offered only online.
   Crisis management on college campuses. (NT-O)

EDHE 676 03(3-0-0). Organizational Behavior in Student Affairs. S, SS. Prerequisite: Enrollment in SAHE program.
   Understanding and application of basic organizational behavior principles within administration of student affairs in higher education. (NT-O)

EDHE 677 03(3-0-0). Law in Student Affairs. F, S. Prerequisite: Enrollment in SAHE program.
   Legal issues focusing on sources and application of educational law and responsibilities of higher education administrators. (NT-O)

EDHE 678 02(2-0-0). Current Issues in Student Affairs. S, SS. Prerequisite: Enrollment in SAHE program.
   Capstone analyzing current issues and leadership in transition to professional roles. (NT-O)

EDHE 692A-D Var. Seminar. Prerequisite: Enrollment in SAHE program.

EDHE 694 Var. Independent Field Studies.

EDHE 695 Var. Independent Study.
EDOD 506 03(3-0-0). Human Resource Development. F, S, SS. Prerequisite: Admission to the Organizational Learning, Performance and Change specialization or written consent of instructor.

Human resource development foundational theory, research, and techniques for workplace and organizational learning and performance. (NT-O)

EDOD 670 03(3-0-0). Strategic Human Resource Development. SS. Prerequisite: Admission to OPC specialization.

Examine fundamentals of strategy from a HRD perspective, utilizing management tools, recent research and contemporary theory.

EDOD 671 03(3-0-0). Establish Relations, Diagnose Organizations. F, S, SS. Prerequisite: Admission to the Organizational Learning, Performance and Change specialization or written consent of instructor.

Build relationships with clients and examine current practices to diagnose organizational learning and performance issues. (NT-O)

EDOD 672 03(3-0-0). Change Facilitation. F. Prerequisite: Admission to OPC specialization.

Roles and responsibilities of change agents and the fundamentals of change: principles, practices, processes, and resistance strategies.

EDOD 673 03(3-0-0). Plan and Implement Change Interventions. F, S, SS. Prerequisite: Admission to the Organizational Learning, Performance and Change specialization or written consent of instructor.

Plan strategies and facilitate change interventions to improve organizational learning and performance. (NT-O)

EDOD 674 03(3-0-0). Analyze Workplace Learning. F, S, SS. Prerequisite: Admission to the Organizational Learning, Performance and Change specialization or written consent of instructor.

Analyze workplace learning and performance issues drawing on foundational principles. (NT-O)

EDOD 675 03(3-0-0). Design, Develop, Implement Workplace Learning. F, S, SS. Prerequisite: Admission to the Organizational Learning, Performance and Change specialization or written consent of instructor.

Design, develop, and implement workplace learning and performance interventions drawing on foundational principles. (NT-O)

EDOD 676 03(3-0-0). Evaluate Workplace Learning. F, S, SS. Prerequisite: Admission to the Organizational Learning, Performance and Change specialization or written consent of instructor.

Evaluate workplace learning and performance interventions drawing on foundational principles. Examine satisfaction, learning, and performance results. (NT-O)

EDOD 677 03(3-0-0). Action Learning and Inquiry. F, S, SS. Prerequisite: Admission to the Organizational Learning, Performance and Change specialization or written consent of instructor.

Literature reviews and data collection methods as the basis for diagnosing organizational learning and performance issues. (NT-O)

EDOD 678 03(3-0-0). Assess Change Interventions. F, S, SS. Prerequisite: Completion of a minimum of 15 500-level or above EDOD credits or written consent of instructor.

Assess and institutionalize change interventions to improve organizational learning and performance. (NT-O)

EDOD 687 Var. Internship
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Credits</th>
<th>Prerequisites</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDRM 600 03(3-0-0)</td>
<td>Introduction to Research Methods</td>
<td>F, S, SS</td>
<td>None</td>
<td>Methods of research, scientific methods, problem identification, research design, preparation and evaluation of research reports. (NT-O/V)</td>
</tr>
<tr>
<td>EDRM 602 03(3-0-0)</td>
<td>Action Research</td>
<td>S, SS</td>
<td>EDRM 600</td>
<td>Provide educators with knowledge and skills to plan and implement school-based research to improve teaching and learning. (NT-B)</td>
</tr>
<tr>
<td>EDRM 606 03(3-0-0)</td>
<td>Principles: Quantitative Data Analysis</td>
<td>F, S, SS</td>
<td>EDRM 600; STAT 201</td>
<td>Quantitative data analysis in social science research; descriptive statistics; fundamentals of inference. (NT-B)</td>
</tr>
<tr>
<td>EDRM 612 03(2-0-1)</td>
<td>Assessing Students in Educational Settings</td>
<td>F, S, SS</td>
<td>Admissions into a Master’s program within the School of Education</td>
<td>Various ways of assessing students including traditional, authentic, and portfolio techniques for P-20 education. (NT-O)</td>
</tr>
<tr>
<td>EDRM 666 03(3-0-0)</td>
<td>Program Evaluation</td>
<td>F, S</td>
<td>EDRM 600</td>
<td>Models and practices of program evaluation in both public and private sector organizations. (NT-B)</td>
</tr>
<tr>
<td>EDRM 692 Var. Seminar-Research Methods and Proposal Design</td>
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<tr>
<td>EDRM 698 Var. Research</td>
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<td>EDRM 699 Var. Thesis</td>
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<tr>
<td>EDRM 700 03(3-0-0)</td>
<td>Quantitative Research Methods</td>
<td>F, S</td>
<td>EDRM 606 or concurrent registration</td>
<td>Design, data analysis, interpretation of results, and evaluation of educational research studies. (NT-B)</td>
</tr>
<tr>
<td>EDRM 701 03(3-0-0)</td>
<td>Applied Linear Models-Educational Research</td>
<td>S</td>
<td>EDRM 606</td>
<td>General linear model applications in educational research emphasizing conceptual understanding and characteristics of non-experimental designs.</td>
</tr>
<tr>
<td>EDRM 702 03(3-0-0)</td>
<td>Foundations of Educational Research</td>
<td>F, S</td>
<td>None</td>
<td>Philosophical, theoretical, and ethical foundations of educational research. (NT-B)</td>
</tr>
<tr>
<td>EDRM 703 03(3-0-0)</td>
<td>Applied Longitudinal Data Analysis</td>
<td>F</td>
<td>EDRM 701</td>
<td>Methods and empirical applications of individual growth modeling and discrete-time event history analysis in educational research.</td>
</tr>
<tr>
<td>EDRM 704 03(3-0-0)</td>
<td>Qualitative Research</td>
<td>F</td>
<td>EDRM 600</td>
<td>Examination of qualitative research theory, methods, and applications to education and the social sciences. (NT-O)</td>
</tr>
<tr>
<td>EDRM 705 03(3-0-0)</td>
<td>Qualitative Data Analysis</td>
<td>S</td>
<td>EDRM 704</td>
<td>Examination of qualitative methods of data analysis, data presentation, and use of computer. (NT-O)</td>
</tr>
</tbody>
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EDUCATION COURSES
School of Education
College of Health and Human Sciences

EDUC 255 02(2-0-0). Introduction to Education. F, S, SS. Prerequisite: None.
Overview of teaching profession emphasizing teaching opportunities, licensure, and University professional program.

EDUC 275 03(3-0-0). Schooling in the United States. (GT-SS1, AUCC 3C). F, S, SS. Prerequisite: Completion of 30 credits course work.
Social, political, historical, and economic forces that shape U.S. system of public schooling (P-12). (NT-O)

EDUC 296 Var. Group Study.

EDUC 320 03(0-0-3). Educational Psychology. F, S, SS. Prerequisite: None. Offered as an online or correspondence course only.
Psychological conditions of classroom learning and teaching including understanding needs of exceptional children in the classroom. (NT-O/C)

EDUC 331 02(1-2-0). Educational Technology and Assessment. F, S, SS. Prerequisite: EDUC 275; EDUC 340; admission to teacher licensure.
Skills and strategies for the use of appropriate technology and assessment in teacher education.

EDUC 340 03(1-2-1). Literacy and the Learner. F, S, SS. Prerequisite: Completion of 30 credits of course work. Required background check through CDE, CBI, FBI.
Understanding and supporting literacy and numeracy development. Field experiences, service learning experiences.

EDUC 350 03(2-2-0). Instruction I-Individualization/Management. F, S. SS. Prerequisite: EDUC 275; EDUC 340; concurrent reg. in EDUC 386; admission to teacher licensure.
Theory, research, and practice of teaching at the junior high/middle school level; adapting instruction for individuals including learners with special needs.

EDUC 386 Var[1-3]. Practicum-Instruction I. Prerequisite: EDUC 275; EDUC 340; concurrent registration in EDUC 350; admission to teacher licensure.

EDUC 400 03(1-4-0). Diagnostic Teaching of Reading. F. S. Prerequisite: EDUC 275; EDUC 340; concurrent registration in EDUC 350; admission to teacher licensure.

EDUC 425 04(2-6-0). Early Childhood Education I. F, S. Prerequisite: EDUC 275; EDUC 340; admission to teacher licensure.
Integrated methods; theoretical bases; teacher’s role; appropriate curriculum; measurement; environments; pedagogy; instructional design and decisions.

EDUC 426 04(2-4-0). Early Childhood Education II. F, S. Prerequisite: EDUC 425. Integrated methods; organizing/preparing materials/activities; applying decisions; managing groups; individual instruction; assessment/evaluation.

EDUC 450 04(2-4-0) Instruction II-Standards and Assessment. F. S. Prerequisite: EDUC 331; EDUC 350; EDUC 386; concurrent registration in EDUC 486J. Course must be taken semester immediately prior to student teaching semester.
Theory, research, and practice of standards-based instruction: assessment; literacy and technology. Includes work in public schools.

EDUC 460 04(3-2-0). Methods and Materials in Teaching Science. F. Prerequisite: Admission to teacher licensure.

EDUC 462 04(4-0-0). Methods and Assessment in Teaching Languages. F. Prerequisite: Admission to teacher licensure; oral and written competency in the language endorsement area.
Objectives, methods, and resource materials for teaching languages in secondary schools.

EDUC 463 04(4-0-0). Methods in Teaching Language Arts. F. S. Prerequisite: Admission to teacher licensure.
Objectives, content, and methods of teaching English, speech, and journalism in secondary schools.

EDUC 464 04(4-0-0). Methods and Materials in Teaching Mathematics. S. Prerequisite: 18 credits in mathematics; admission to teacher licensure.
Problems and techniques of teaching secondary mathematics; evaluation of student achievement and teacher effectiveness.

EDUC 465 04(4-0-0). Methods and Materials in Social Studies. F. Prerequisite: Admission to teacher licensure.
Methods of teaching social studies; sources of information and teaching materials and literature for social studies teachers.

EDUC 466 04(4-0-0). Methods and Assessment in K-12 Art Education. F. Prerequisite: EDUC 275; admission to teacher licensure.
Objectives, methods, and resource materials for teaching art in elementary and secondary schools.

EDUC 474 02(1-3-0). Elementary Music Methods I. F. Prerequisite: Admission to teacher licensure.
Developmentally appropriate strategies and materials for K-6 music instruction; emphasis on common methodologies, resources, standards-based teaching.

EDUC 475 02(1-3-0). Elementary Music Methods II. S. Prerequisite: EDUC 474.
Classroom management, motivational strategies, technology tools, assessment/evaluation of music learning and field experiences in K-6 music education. ($)

EDUC 476 02(1-3-0). Choral Methods for Secondary Schools. F. Prerequisite: MU 217; admission to teacher licensure.
General music classes, choral techniques and literature; current practices and trends. ($)

EDUC 477 02(1-3-0). Instrumental Methods for Secondary Schools. F. Prerequisite: MU 217; admission to teacher licensure.
Organization and administration of instrumental music, grades 5-12. ($)

EDUC 485A-C. Var[6-14]. Student Teaching. F, S.
Teacher education candidates participate in an intensive and extensive on-site capstone experience within a public school setting. A) Elementary. Prerequisite: EDUC 450; appropriate special methods courses. B) Secondary. Prerequisite: EDUC 450; appropriate special methods courses. (S) C) Early childhood. Prerequisite: EDUC 426. ($)

EDUC 486A-E Var. Practicum. Prerequisite: Admission to teacher licensure.

EDUC 493A-B Var[1-3]. Seminar. Prerequisite: EDUC 426 or EDUC 450; appropriate special methods course(s); EDUC 485A or concurrent registration, or EDUC 485B or concurrent registration, or EDUC 485C or concurrent registration, or EDCT 485 or concurrent registration.
A) Professional relations. Collegial and professional discussions, support, and assistance. B) Assessment of learning. Information and techniques that enable educators to use assessment results to inform planning and instructional practices.

Current trends in science education, K-12; techniques of experimentation demonstrations; study of equipment, facilities, and resource materials.

EDUC 493B Var[1-3]. Seminar. Prerequisite: EDUC 426 or EDUC 450; appropriate special methods course(s); EDUC 485A or concurrent registration, or EDUC 485B or concurrent registration, or EDUC 485C or concurrent registration, or EDCT 485 or concurrent registration.
A) Professional relations. Collegial and professional discussions, support, and assistance. B) Assessment of learning. Information and techniques that enable educators to use assessment results to inform planning and instructional practices.

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EDUC 494 Var. Independent Field Studies.
Specialized field study in the public schools under direction and supervision of faculty.

EDUC 495 Var. Independent Study.

EDUC 496 Var. Group Study.

EDUC 501 03(3-0-0). Reading in the Content Areas. SS. Prerequisite: EDUC 320.
Specific methods, materials, and techniques for helping students become more efficient in reading content area material.

EDUC 502 03(3-0-0). Human Relations in Education. F. S. Prerequisite: Bachelor’s degree or EDCT 300.
Human relations in an individual’s educational, organizational, and social activities as applied to various educational settings. (NT-O)

EDUC 525A-D Expert Teaching. Prerequisite: Bachelor’s degree; admission to teacher licensure.
Theories related to effective classroom instruction. A) Inclusion, special needs. 02(0-0-2) S. B) Thinking and learning. 02(0-0-2) F. C) Literacy and numeracy. 03(0-0-3) S. D) Standards, assessment. 02(0-0-2). F.

EDUC 526 04(0-4-2). Interdisciplinary Methods. F. Prerequisite: Bachelor’s degree; admission to teacher licensure.
Methods and theories related to effective classroom instruction.

EDUC 530 03(2-2-0). Technology Enhanced Learning. F, SS. Prerequisite: Bachelor’s degree.
Enhancing instruction and learning through the effective use of technology. (NT-O)

EDUC 570 03(2-2-0). Perspectives of Special Education. F, SS. Prerequisite: None. Historical and legal, philosophical foundations, student characteristics, and building collaborative relationships in special education.

EDUC 572 03(3-0-0). Special Needs-Foundations and Practices. SS. Prerequisite: Teacher licensure.
Foundations and professional practices relevant for teaching students with mild/moderate special needs.

EDUC 573 03(3-0-0). Differentiating Instruction for Diverse Needs. F, SS. Prerequisite: EDUC 570.
Information techniques, and practice regarding methods for differentiating instruction.

EDUC 574 03(3-0-0). Transition and Secondary Services. F, SS. Prerequisite: EDUC 570.
Methods comprising state-of-the-art transition services for individuals with disabilities for the special education generalist.

EDUC 575 04(4-0-0). Methods for Mild/Moderate Special Needs. S. Prerequisite: EDUC 572; teacher licensure.
Methods addressing learning of students with mild/moderate special needs and instructional accommodations in regular classes.

EDUC 576A-L. Issues in Education. F, S, SS. Prerequisite: Baccalaureate degree. Offered only through Division of Continuing Education.
Issues in educating a diverse student population. Methods used in identification and assessment; strategies for intervention and/or instruction. A) Talented and Gifted. 02(0-0-2). B) Attention Deficit Disorder. 02(0-0-2). C) Autism/Asperger’s. 02(0-0-2). D) Behavior is Language. 02(0-0-2). E) Classroom Management. 02(0-0-2). F) Teaching Diversity. 01(0-0-1). G) Harassment in Schools. 01(0-0-1). H) Assessing Special Needs. 02(0-0-2). I) Sexually Transmitted Diseases. 01(0-0-1). J) Drugs and Alcohol. 02(0-0-2). K) Child Abuse. 02(0-0-2). L) Traumatized Child. 02(0-0-2). (NT-C)

EDUC 591A-F Var. Workshop.

EDUC 601 03(2-0-1). Principles of Supervision and Evaluation. F.S. Prerequisite: None.
Supervision and evaluation of instruction including required Colorado evaluation training. (NT-B)

EDUC 618 03(3-0-0). School Law. F, S. Prerequisite: None.
Legal framework for operation and management of public and private schools emphasizing legal responsibilities for administrators and teachers.

EDUC 619 03(3-0-0). Curriculum Development. S, SS. Prerequisite: None.
Principles and procedures for school personnel in planning the public school curriculum. (NT-O)

EDUC 620 02(2-0-0). Philosophy of Education. SS. Prerequisite: None.
Contemporary philosophies as related to principles and practices in education.

EDUC 622 03(3-0-0). Innovative Social Studies Teaching. SS. Prerequisite: EDUC 485A or EDUC 485B.
Current trends in secondary school social studies teaching and curriculum techniques and materials for value formulation, decision-making skills, concepts, generalizations, and attitudes.

EDUC 623 03(0-2-2). Innovative Science Teaching. SS. Prerequisite: EDUC 485A or EDUC 485B.
Innovative trends in curriculum and methodology of science teaching.

EDUC 625 03(3-0-0). Contexts of Schooling. SS. Prerequisite: Admission to graduate program.
History, purpose, structure, and role of schooling with relevance to current issues, U.S. and international.

EDUC 628 03(3-0-0). Models of Teaching. F. S, SS. Prerequisite: Must be enrolled in one of the following levels: professional or graduate.
Exploration of pedagogical topics and skill development related to instructional approaches. (NT-T)

EDUC 629 03(3-0-0). Communication and Classrooms. F, S, SS.
Exploration of pedagogical topics and growth experiences related to classroom management and presentation skills. (NT-T)

*EDUC 635 03(3-0-0). Educators, Systems and Change. F, S, SS. Prerequisite: EDUC 485A or EDUC 485B. Offered only through the Division of Continuing Education.
Process of change in education, focusing on teacher’s role as leader and facilitator. (NT)

EDUC 645 03(3-0-0). Leadership and Ethics in Public Education. SS. Prerequisite: Admission to administrator licensure.
Focus on leadership functions for public schools and ethical dimensions of leadership.

EDUC 646 03(3-0-0). School Resource Management. SS. Prerequisite: Admission to administrator licensure.
School resource management including fiscal, personnel, and organization. (NT-O)

EDUC 647 03(3-0-0). School Culture, Climate, and Communications. SS. Prerequisite: Admission to administrator licensure; concurrent registration in EDUC 645; EDUC 646.
Assist public school leaders in their facilitation role in enhancing human relations and communication within schools and communities.

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EDUC 648A-B. Role of the Principal—Managing/Leading Change
Role of the principal as a result of changes in society and in the schools. A) Professional learning community 01(1-0-0). F. Prerequisite: Admission to administrator licensure; concurrent registration in EDUC 687B. B) Managing and leading change 02(1-0-1). S. Prerequisite: Admission to administrator licensure; concurrent registration in EDUC 687B. (NT-O)

EDUC 651 03(2-0-1). Multicultural and Special Populations. F, S, SS. Prerequisite: Bachelor’s degree. Special concerns for working with people of various cultural, ethnic, exceptional, and special interest groups. (NT-B/O)

EDUC 660 03(0-0-3). Advanced Methods—Science and Math Instruction. SS. Prerequisite: None. Offered as an online course only through the Division of Continuing Education. Knowledge and skills to improve the teaching of science, technology, engineering, and mathematics for in-service K-12 teachers. (NT-O).

EDUC 670 03(1-0-2). Grant Writing. F, S, SS. Prerequisite: None. Offered as an online course only through the Division of Continuing Education. Mechanics of proposal writing, including intangibles of the grant-seeker’s art. (NT-O)

EDUC 675 03(1-0-2). Analyzing Education Literature. F, S, SS. Prerequisite: EDRM 700 or EDRM 702 or EDRM 704. Analyze, critique, and interpret scholarly literature in the discipline. (NT-B)

EDUC 684 Var. Supervised College Teaching.


EDUC 687A-E Var. Internship. A) Administration. B) Principal. C) Guidance and counseling. D) Teacher licensure I. Prerequisite: Must be enrolled in one of the following levels: professional or graduate. E) Teacher licensure II. Prerequisite: Must be enrolled in one of the following levels: professional or graduate.

EDUC 693A-C Var. Seminar. A) Administrator. B) Instruction. C) Teacher licensure capstone. Prerequisite: Must be enrolled in one of the following levels: professional or graduate.

EDUC 695 Var. Independent Study.

EDUC 696 Var. Group Study.

EDUC 709 03(3-0-0). Leadership Development. F, S, SS. Prerequisite: None. Principles, theories, attributes, and skills related to individual leadership development. (NT-B)

EDUC 710 03(0-0-3). Higher Education Finance. S. Prerequisite: None. Federal, state, and local revenue distribution, budget preparation and controls, accounting options, audit preparation. (NT)

EDUC 713 03(3-0-0). Teaching, Learning, and Professional Growth. F. Prerequisite: Admission to Ph.D. program. Teaching, learning, and professional development perspectives related to educational change and reform.

EDUC 714 03(3-0-0). Education Policy Analysis. S, SS. Prerequisite: Admission to Ph.D. program. Frameworks for analyzing, designing policy proposals, and implementing plans.

EDUC 715 03(3-0-0). Critical Issues for Special Populations. S. Prerequisite: EDUC 709; EDUC 713. Social and cultural issues related to special populations are researched and analyzed to understand policy that guides educational decisions.

EDUC 716 03(3-0-0). Capstone: Educational Equity and Reform. F, SS. Prerequisite: EDUC 709; EDUC 713. Applies tenets of educational leadership research and theory into a context of equity, global citizenship and environmental responsibility.

EDUC 720 03(3-0-0). Human Learning, Cognition, and Motivation. F, S. Prerequisite: EDUC 628 or EDUC 629. Theories of learning, cognition, and motivation applicable to enhancing effective and efficient learning for individuals and teams.

EDUC 725 03(3-0-0). Professionalism in Education and Leadership. F, SS. Prerequisite: Admitted into doctoral program. Credit not allowed for both EDUC 725 and EDHE 725. Professional choices and ethical decision making in education and leadership, with emphasis on higher education.

EDUC 786 Var. Practicum.

EDUC 787 Var. Internship.

EDUC 792 Var. Seminar. (NT-O)

EDUC 793 Var. Seminar.

EDUC 795 Var. Independent Study.

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ENGINEERING SCIENCE COURSES
Nondepartmental
College of Engineering

EGSC 492 01(0-0-1), Seminar, F. S.

EGSC 495 Var. Independent Study.

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# Engineering Courses

## Nondepartmental College of Engineering

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR 101</td>
<td>Grand Challenges in Engineering</td>
<td>F. Prerequisite: None. National Academy of Engineering’s Grand Challenges in Engineering: overview, roles of engineering disciplines, engineering and societal challenges.</td>
</tr>
<tr>
<td>ENGR 102</td>
<td>Problem Solving for Engineers</td>
<td>F, S. Prerequisite: MATH 160 or concurrent registration. Engineering problem solving: dimensional analysis; precision, accuracy, repeatability; problems from all major engineering disciplines.</td>
</tr>
<tr>
<td>ENGR 298 Var[1-3]</td>
<td>Undergraduate Research</td>
<td>Prerequisite: Written consent of research mentor and department head. Directed undergraduate research with a faculty mentor.</td>
</tr>
<tr>
<td>ENGR 389 01(0-0-1)</td>
<td>Engineering Cooperative Experience</td>
<td>F, S, SS. Prerequisite: Written permission of instructor. May be taken up to 9 times. Semester-long full-time industry engineering experience in a position relevant to the student’s major field.</td>
</tr>
<tr>
<td>ENGR 486 Var[1-3]</td>
<td>Practicum</td>
<td>F, S, SS.</td>
</tr>
<tr>
<td>ENGR 496 Var[1-3]</td>
<td>Group Study</td>
<td>F, S.</td>
</tr>
<tr>
<td>ENGR 498 Var[1-3]</td>
<td>Undergraduate Research</td>
<td>Prerequisite: Thirty credits in engineering and science; written consent of instructor. Directed undergraduate research with a faculty mentor.</td>
</tr>
<tr>
<td>ENGR 501/ECE 501</td>
<td>Foundations of Systems Engineering</td>
<td>F, S. Prerequisite: None. Credit not allowed for both ENGR 501 and ECE 501. Functional components of systems engineering, application of systems engineering to practical problems, system life-cycle process. (NT-O)</td>
</tr>
<tr>
<td>ENGR 508/ECE 508</td>
<td>Introduction to Power System Markets</td>
<td>F. Prerequisite: ECE 461. Credit not allowed for both ENGR 508 and ECE 508. Deregulated electrical power systems, system security, investments in generation and transmission, ancillary services, and nodal pricing. (NT-O)</td>
</tr>
<tr>
<td>ENGR 509/ECE 509</td>
<td>Signal Processing for Power Systems</td>
<td>F. Prerequisite: ECE 312; ECE 461. Credit not allowed for both ENGR 509 and ECE 509. Signal processing tools for analyzing power systems, voltage frequency, magnitude variations, unbalance, waveform distortion. (NT-O)</td>
</tr>
<tr>
<td>ENGR 510</td>
<td>Engineering Optimization: Method/Application</td>
<td>F. Prerequisite: MATH 229; MATH 261. Credit not allowed for both ENGR 510 and MATH 510. Optimization methods; linear programming, network flows, integer programming, interior point methods, quadratic programming, engineering applications. (NT-O)</td>
</tr>
<tr>
<td>ENGR 520</td>
<td>Engineering Decision Support/Expert Systems</td>
<td>S. Prerequisite: ENGR 510 or MATH 510. Credit not allowed for both ENGR 520 and ENGR 610. Decision support systems for complex engineering problems; multicriteria decision making and optimization; hybrid knowledge-based/algorithmic methods. (NT-O/V)</td>
</tr>
<tr>
<td>ENGR 521</td>
<td>Geospatial Engineering Management, Policies</td>
<td>F. Prerequisite: CIVE 576 or concurrent registration. Web-based, service-oriented, distributed GIS system development; geospatial implementation, data preparation, map authoring, application development (NT-O)</td>
</tr>
<tr>
<td>ENGR 522</td>
<td>Object-Oriented GIS Programming for Engineers</td>
<td>F. Prerequisite: CIVE 577. Object-oriented GIS programming with C# &amp; .NET framework; integration of GIS libraries; development of custom desktop GIS applications in engineering. (NT-O)</td>
</tr>
<tr>
<td>ENGR 523</td>
<td>Photogrammetric Engineering/Remote Sensing</td>
<td>S. Prerequisite: CIVE 576 or CIVE 577. Photogrammetry and remote sensing; image registration and resampling; image processing and classification; multi-sensor fusion, imaging spectroscopy. (NT-O)</td>
</tr>
<tr>
<td>ENGR 524</td>
<td>Geospatial Web Technologies for Engineers</td>
<td>S. Prerequisite: CIVE 576. Web-based, service oriented, distributed GIS System development; geospatial implementation, data preparation, map authoring, application development. (NT-O)</td>
</tr>
<tr>
<td>ENGR 530/ECE 530</td>
<td>Overview of Systems Engineering Processes</td>
<td>F, S. Prerequisite: ECE 303/STAT 303 or STAT 315. Credit not allowed for both ENGR 530 and ECE 530. Systems engineering life-cycle process and analysis techniques. Reliability and robustness. (NT-O)</td>
</tr>
<tr>
<td>ENGR 531/ECE 531</td>
<td>Engineering Risk Analysis</td>
<td>F. Prerequisite: ECE 303/STAT 303 or STAT 315. Credit not allowed for both ENGR 531 and ECE 531. Estimation and risk identification, development of mitigation techniques. (NT-O)</td>
</tr>
<tr>
<td>ENGR 532/ECE 532</td>
<td>Dynamics of Complex Engineering Systems</td>
<td>F. S. Prerequisite: ENGR 501/ECE 501 or concurrent registration. Credit not allowed for both ENGR 532 and ECE 532. Higher-level behavior and issues that emerge from interaction between components in complex socio-technical systems. (NT-O)</td>
</tr>
<tr>
<td>ENGR 550/MATH 550</td>
<td>Engineering Optimization</td>
<td>F, S. Prerequisite: MATH 340 or MATH 345 or MATH 530 Credit not allowed for both ENGR 550 and MATH 550. Finite elements, finite differences, spectral methods, method of lines, conservation laws; stability and convergence analysis for PDEs.</td>
</tr>
<tr>
<td>ENGR 565/ECE 565</td>
<td>Electrical Power Engineering</td>
<td>F, S. Prerequisite: ECE 332; ECE 342. Credit not allowed for both ENGR 565 and ECE 565. Analysis of power systems in terms of current, voltage, and active/reactive power; introduction of computer-aided tools for power systems. (NT-O)</td>
</tr>
<tr>
<td>ENGR 567/ECE 567</td>
<td>Systems Engineering Architecture</td>
<td>F. S. Prerequisite: ENGR 501 or ENGE 501. Credit not allowed for both ENGR 567 and ECE 567. Observation/classification of systems architecture. Systems architecture principles and critical evaluation through design studies. (NT-O)</td>
</tr>
<tr>
<td>ENGR 568</td>
<td>Electrical Energy Generation Systems</td>
<td>F, S. Prerequisite: Written consent of instructor. Credit not allowed for both ENGR 568 and ECE 568. Energy systems: renewable and traditional. Physics and operation of energy devices; solar-photovoltaic, wind energy, gas, coal, and nuclear plants. (NT-O)</td>
</tr>
<tr>
<td>ENGR 597</td>
<td>Group Study in Systems Engineering</td>
<td>F, S. Prerequisite: CIS 600; ENGR 530/ECE 530; ENGR 531/ECE 531. Capstone study experience in systems engineering. (NT-O)</td>
</tr>
<tr>
<td>+ENGR 601/AGRI 601</td>
<td>Bioenergy Technology</td>
<td>F. Prerequisite: None. Required field trips.</td>
</tr>
</tbody>
</table>

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Science and engineering aspects of bioenergy production, including plant biology, fermentation, and biofuel properties.

ENGR 621/ECE 621 03(3-0-0). Energy Storage for Electrical Power Systems. F, S. Prerequisite: Written consent of instructor. Credit not allowed for both ENGR 621 and ECE 621.

Physics and operation of electrical, mechanical, thermal and novel energy storage systems/devices. (NT-O)

ENGR 622/ECE 622 03(3-0-0). Energy Networks and Power Distribution Grids. F, S. Prerequisite: ECE 411 or MECH 417; ECE 565/ENGR 565. Credit not allowed for both ENGR 622 and ECE 622.

Energy networks: generation, storage, consumers. Systems approach to analysis of distribution networks and transition to intelligent grid systems. (NT-O)

ENGR 623/ECE 623 03(3-0-0). Electric Power Quality. S. Prerequisite: ECE 461 or ECE 562. Credit not allowed for both ENGR 623 and ECE 623.

Interconnecting power electronic devices and renewable energy sources to power systems. (NT-O)

ENGR 695 Var. Independent Study. F, S, SS. Prerequisite: None. (NT-O)

ENGR 697/ECE 697 Var[1-6]. Group Study. F, S, SS.

ENGR 699 Var. Thesis. F, S, SS. Prerequisite: None. (NT-O)

ENGR 795 Var. Independent Study. F, S, SS. Prerequisite: None. (NT-O)

ENGR 799 Var. Dissertation. F, S, SS. Prerequisite: None. (NT-O)

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ENVIRONMENTAL ENGINEERING COURSES
Department of Civil and Environmental Engineering
College of Engineering

As noted in the University Curriculum Committee minutes of 2/28/14, effective Fall Semester 2014, all courses with the ENVE subject code were dropped.
<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERHS 192</td>
<td>Environmental Health First Year Seminar</td>
<td>F. Prerequisite: Freshman standing. Introduction to biosciences, college life, learning skills, problem solving, and degree planning.</td>
</tr>
<tr>
<td>ERHS 210</td>
<td>Cancer Biology, Medicine and Society</td>
<td>F. Prerequisite: None. A broad overview of cancer biology and cancer medicine.</td>
</tr>
<tr>
<td>ERHS 220</td>
<td>Environmental Health</td>
<td>F. S. Prerequisite: BZ 101 or concurrent registration or BZ 104 or concurrent registration or BZ 110 or concurrent registration or BZ 120 or concurrent registration or LIFE 102 or concurrent registration. Impact of people on the physical and biological environment as well as impact of the environment on people; emphasis placed on human health.</td>
</tr>
<tr>
<td>ERHS 230</td>
<td>Environmental Health Field Methods</td>
<td>F. S. Prerequisite: CHEM 113 with a C or better; CHEM 114 with a C or better. Field and laboratory techniques necessary for practice of environmental health.</td>
</tr>
<tr>
<td>ERHS 300</td>
<td>Introduction to Radiation Biology</td>
<td>S. Prerequisite: LIFE 102; PH 121. Genetic and somatic effects of radiation on cells, tissues, and the whole organism; tumor therapy; carcinogenesis; risks vs. benefits of radiation.</td>
</tr>
<tr>
<td>ERHS 320</td>
<td>Environmental Health—Water and Food Safety</td>
<td>F. Prerequisite: MIP 300 or concurrent registration. Water quality and food safety for practice of environmental health.</td>
</tr>
<tr>
<td>ERHS 332</td>
<td>Principles of Epidemiology</td>
<td>S. Prerequisite: MIP 300 or concurrent registration; STAT 301 or concurrent registration or STAT 307 or concurrent registration. Use of epidemiological methods in studying distribution of diseases in human populations.</td>
</tr>
<tr>
<td>ERHS 350</td>
<td>Industrial Hygiene and Air</td>
<td>F. Prerequisite: BMS 300; CHEM 341 or concurrent registration; ERHS 230; PH 122. Industrial and airborne hazards, disease prevention, hazard control and evaluation.</td>
</tr>
<tr>
<td>ERHS 400</td>
<td>Radiation Safety</td>
<td>F, S, SS. Prerequisite: CHEM 112; ERHS 300; PH 122. Radiation physics, dosimetry, radiation measurement, emergencies and waste management. Essentials of radiation safety.</td>
</tr>
<tr>
<td>ERHS 405</td>
<td>Fundamentals of Ergonomics</td>
<td>S. Prerequisite: One college-level animal biology or anatomy/physiology or engineering design course or concurrent registration. Offered as an online course only. Basic skills, knowledge, and abilities in ergonomics; focus on musculoskeletal injury prevention. (NT-O)</td>
</tr>
</tbody>
</table>

ERHS 174 O1(1-0-0), Freshman Scholar, F. S. Prerequisite: Admission to CVMBS Freshman Scholar’s Program. May be taken up to 2 times for credit. Scholarship-supported exploration of biomedical research theory and practice.

ERHS 192 O1(1-0-0), Environmental Health First Year Seminar, F. Prerequisite: Freshman standing. Introduction to biosciences, college life, learning skills, problem solving, and degree planning.

ERHS 210 O2(2-0-0), Cancer Biology, Medicine and Society, F. Prerequisite: None. A broad overview of cancer biology and cancer medicine.

ERHS 220 O3(3-0-0), Environmental Health, F, S. Prerequisite: BZ 101 or concurrent registration or BZ 104 or concurrent registration or BZ 110 or concurrent registration or BZ 120 or concurrent registration or LIFE 102 or concurrent registration. Impact of people on the physical and biological environment as well as impact of the environment on people; emphasis placed on human health.

ERHS 230 O3(0-0-6), Environmental Health Field Methods, F, S. Prerequisite: CHEM 113 with a C or better; CHEM 114 with a C or better. Field and laboratory techniques necessary for practice of environmental health. ($)

ERHS 300 O3(3-0-0), Introduction to Radiation Biology, S. Prerequisite: LIFE 102; PH 121. Genetic and somatic effects of radiation on cells, tissues, and the whole organism; tumor therapy; carcinogenesis; risks vs. benefits of radiation.

ERHS 320 O3(3-0-0), Environmental Health—Water and Food Safety, F. Prerequisite: MIP 300 or concurrent registration. Water quality and food safety for practice of environmental health.

ERHS 332 O3(3-0-0), Principles of Epidemiology, S. Prerequisite: MIP 300 or concurrent registration; STAT 301 or concurrent registration or STAT 307 or concurrent registration. Use of epidemiological methods in studying distribution of diseases in human populations.

ERHS 350 O3(3-0-0), Industrial Hygiene and Air, F. Prerequisite: BMS 300; CHEM 341 or concurrent registration; ERHS 230; PH 122. Industrial and airborne hazards, disease prevention, hazard control and evaluation.

ERHS 400 O3(3-0-0), Radiation Safety, F, S, SS. Prerequisite: CHEM 112; ERHS 300; PH 122. Radiation physics, dosimetry, radiation measurement, emergencies and waste management. Essentials of radiation safety.

ERHS 405 O2(2-0-0), Fundamentals of Ergonomics, S. Prerequisite: One college-level animal biology or anatomy/physiology or engineering design course or concurrent registration. Offered as an online course only. Basic skills, knowledge, and abilities in ergonomics; focus on musculoskeletal injury prevention. (NT-O)

ERHS 410 O3(3-0-0), Environmental Health Waste Management, S. Prerequisite: CHEM 245 or concurrent registration or CHEM 343 or concurrent registration or CHEM 346 or concurrent registration; ERHS 230. Recognition of impacts, occupational and environmental, in handling wastes; administrative management for waste programs.

ERHS 430 O3(3-0-0), Human Disease and the Environment, S. Prerequisite: None. Overview of the human diseases which are associated with the environment.

ERHS 446 O3(3-0-0), Environmental Toxicology, F. Prerequisite: CHEM 245 or CHEM 341 or CHEM 345; LIFE 102. Essentials of environmental toxicology based on problem-oriented discussions addressing environmental impacts of organic/inorganic chemicals.

ERHS 448 O3(3-0-0), Environmental Contaminants: Exposure and Fate, F. Prerequisite: CHEM 245 or CHEM 341 or CHEM 345; LIFE 102. Pathways of exposure and behavior of environmental contaminants. Exposure assessment in environmental health protection.

ERHS 487 O7(0-21-0), Internship-Environmental Health, F, S. Prerequisite: None. Professional field practice in environmental health with a public or private sector agency.

ERHS 492 O1(0-0-1), Environmental Health Seminar, S. Prerequisite: None. Networking, preparation of resume, and statement of qualifications for professional internship or employment.

ERHS 494 Var. Independent Study in Environmental Health, Prerequisite: ERHS 220. Directed independent study or project under faculty guidance.

ERHS 498 Var[1-4], Research, Prerequisite: Written consent of instructor. Research in environmental and radiological health sciences.

ERHS 502 O3(3-0-0), Fundamentals of Toxicology, F. Prerequisite: BMS 300 or BMS 360; CHEM 245 or CHEM 341 or CHEM 345. Fundamental principles of toxicology; dose-response, organ targets, toxic agents.

ERHS 503 O1(1-0-0), Toxicology Principles, S. Prerequisite: CHEM 113; LIFE 102; credit not allowed for both ERHS 502 and ERHS 503. This is a partial-semester course. Principles of toxicology for applications in industrial hygiene and environmental public health.

ERHS 504 O2(2-0-0), Occupational and Environmental Toxicology, S. Prerequisite: ERHS 502 or (ERHS 503 or concurrent registration) or ERHS 446. This is a partial-semester course. Toxic effects of harmful agents found in occupational and environmental settings.

ERHS 510 O3(3-0-0), Cancer Biology, S. Prerequisite: BC 351 or BC 403 or concurrent registration or BZ 310 or CM 501. Cancer biology, from epidemiology and classification, through the molecular basis of the phenotypes to detection and treatment.

ERHS 515 O2(2-0-0), Non-Ionizing Radiation Safety, F, S. SS. Prerequisite: CHEM 107 or CHEM 113; MATH 118; PH 122 or PH 142. Evaluation and safe use of non-ionizing radiation sources. Calculation of safe distances for exposure and maximum permissible exposures. (NT-O)

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ERHS 520 03(3-0-0). Environmental and Occupational Health Issues. F. Prerequisite: BZ 110 or LIFE 102; CHEM 245 or CHEM 341 or CHEM 345. Issues in environmental and occupational health sciences in the context of public health and regulatory concerns. (NT-O)

ERHS 526 03(3-0-0). Industrial Hygiene. F. Prerequisite: CHEM 245 or CHEM 341 or CHEM 345; ERHS 520 or concurrent registration; PH 110 or PH 121. Theory and application of industrial hygiene principles to management of the occupational environment.

ERHS 527 01(0-3-0). Industrial Hygiene Laboratory. S. Prerequisite: ERHS 526 or concurrent registration.

Industrial hygiene field monitoring equipment and techniques.

ERHS 550 03(3-0-0). Environmental Contaminant Modeling I. Prerequisite: ERHS 250; ERHS 520 or concurrent registration. Theory and application of industrial hygiene principles to management of the occupational environment.

ERHS 551 02(1-3-0). Nuclear Instruments and Measurements. S. Prerequisite: ERHS 530 or concurrent registration.

Instrument systems for measurement and identification of ionizing radiations.

ERHS 552 03(3-0-0). Occupational Safety. S. Prerequisite: ERHS 350.

Introduction to occupational safety hazard recognition and control.

ERHS 553 03(3-0-0). Radiological Physics and Dosimetry I. F. Prerequisite: MATH 155 or MATH 160; PH 122.

Radiation chemistry. Quantification of uncertainty in radioactive samples and dosimetry. (NT-V)

ERHS 554 02(2-0-0). Radiological Physics and Dosimetry II. F. Prerequisite: MATH 155 or MATH 160; PH 122.

Applications to disease control with literature examples.

ERHS 595B-K Var. Independent Study. F. Prerequisite: None.

Hands-on techniques exposure to molecular toxicology. ($)

ERHS 595C-K Var. Independent Study. S. Prerequisite: CHEM 245 or CHEM 343 or CHEM 346.

Toxic effects of commonly encountered abused substances and laboratory methods to identify and measure these.

ERHS 561 02(2-0-0). Radiation Public Health. F. S. Prerequisite: ERHS 530; ERHS 550 or concurrent registration; or ERHS 300 and ERHS 400 with written consent of instructor. Aspects of radiation public health for students in health physics with emphasis on contemporary issues in radiation protection.

ERHS 563 02(2-0-0). Environmental Contaminant Modeling I. S. Prerequisite: MATH 155. Mathematical modeling of radionuclides and chemical transport in aquatic and terrestrial ecosystems.

ERHS 565 02(2-0-0). Chemical and Biological Warfare Agents. S. Prerequisite: CHEM 245 or CHEM 346.

Current understanding of chemical and biological agents used in asymmetric warfare.

ERHS 566 03(2-2-0). Forensic Toxicology. S. Prerequisite: CHEM 245 or CHEM 343 or CHEM 346.

Toxicology as applied in public (regulatory) and private (pharmaceutical, industrial) sectors.

ERHS 570 02(2-0-0). Radiocology. S. Prerequisite: None.

Environmental transport and exposure assessment of radioactive and other contaminants; estimating risk for human health and ecological impacts. (NT-O)

ERHS 595B-K Var. Independent Study.


ERHS 601 03(3-0-0). Metabolism and Disposition of Toxic Agents. S. Prerequisite: ERHS 502.

Metabolism of toxic agents and effects on their fate in the body. Covalent and non-covalent interactions with cellular targets.

ERHS 602 03(3-0-0). Toxicological Mechanisms. S. Prerequisite: ERHS 502.

Role of cellular information systems in toxic mechanisms: DNA expression, signal transduction and control of cellular processes.

ERHS 549 03(3-0-0). Environmental Health Risk Assessment. S. Prerequisite: ERHS 446 or ERHS 502 or ERHS 532.

Environmental contamination and health effects of chemicals using risk assessment, management and communication approaches.

ERHS 550 05(5-0-0). Principles of Radiation Biology. S. Prerequisite: BIOL 310; ERHS 300 or ERHS 530.

Dose-response relationships; physical, chemical, and biological modification of radiation damage; radiation oncology; radiation genetics and oncogenesis.

ERHS 555 03(3-0-0). Quantitative Methods for Radiation Safety. F. Prerequisite: ERHS 530 or concurrent registration.

Analytical methods used in health physics, radiophysics and radiochemistry. Quantification of uncertainty in radioactive samples and dosimetry. (NT-O)

ERHS 556 03(3-0-0). Monte Carlo Methods in Health Physics. F. S. Prerequisite: ERHS 530 or concurrent registration; eligibility for access to government software. Monte Carlo methods for the assessment of complex systems or macroscopic quantities on basis of statistical nature of microscopic components.

ERHS 561 02(2-0-0). Radiation Public Health. F. S. Prerequisite: ERHS 530; ERHS 550 or concurrent registration; or ERHS 300 and ERHS 400 with written consent of instructor. Aspects of radiation public health for students in health physics with emphasis on contemporary issues in radiation protection.

ERHS 563 02(2-0-0). Environmental Contaminant Modeling I. S. Prerequisite: MATH 155. Mathematical modeling of radionuclides and chemical transport in aquatic and terrestrial ecosystems.

ERHS 565 02(2-0-0). Chemical and Biological Warfare Agents. S. Prerequisite: CHEM 245 or CHEM 346.

Current understanding of chemical and biological agents used in asymmetric warfare.

ERHS 566 03(2-2-0). Forensic Toxicology. S. Prerequisite: CHEM 245 or CHEM 343 or CHEM 346.

Toxic effects of commonly encountered abused substances and laboratory methods to identify and measure these.

ERHS 561 02(2-0-0). Radiation Public Health. F. S. Prerequisite: ERHS 530; ERHS 550 or concurrent registration; or ERHS 300 and ERHS 400 with written consent of instructor. Aspects of radiation public health for students in health physics with emphasis on contemporary issues in radiation protection.

ERHS 563 02(2-0-0). Environmental Contaminant Modeling I. S. Prerequisite: MATH 155. Mathematical modeling of radionuclides and chemical transport in aquatic and terrestrial ecosystems.

ERHS 565 02(2-0-0). Chemical and Biological Warfare Agents. S. Prerequisite: CHEM 245 or CHEM 346.

Current understanding of chemical and biological agents used in asymmetric warfare.

ERHS 566 03(2-2-0). Forensic Toxicology. S. Prerequisite: CHEM 245 or CHEM 343 or CHEM 346.

Toxic effects of commonly encountered abused substances and laboratory methods to identify and measure these.

ERHS 567 03(0-6-0). Cell and Molecular Toxicology Techniques. F. Prerequisite: None.

Hands-on techniques exposure to molecular toxicology. ($)

ERHS 568 03(3-0-0). Pharmaceutical and Regulatory Toxicology. S. Prerequisite: ERHS 502.

Toxicology as applied in public (regulatory) and private (pharmaceutical, industrial) sectors.

ERHS 570 02(2-0-0). Radiocology. S. Prerequisite: None.

Environmental transport and exposure assessment of radioactive and other contaminants; estimating risk for human health and ecological impacts. (NT-O)

ERHS 595B-K Var. Independent Study.


ERHS 601 03(3-0-0). Metabolism and Disposition of Toxic Agents. S. Prerequisite: ERHS 502.

Metabolism of toxic agents and effects on their fate in the body. Covalent and non-covalent interactions with cellular targets.

ERHS 602 03(3-0-0). Toxicological Mechanisms. S. Prerequisite: ERHS 502.

Role of cellular information systems in toxic mechanisms: DNA expression, signal transduction and control of cellular processes.

*Alternate year offering (odd); +Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
ERHS 603 03(3-0-0). Toxicological Pathology. F. Prerequisite: BMS 300 or BMS 360.
Toxicological study of pharmacologic, chemical and environmental agents and resulting morphologic and cellular changes.

ERHS 611 02(2-0-0). Cancer Genetics. F. Prerequisite: BZ 350 or MIP 450.
Role of genetic background in determining individual susceptibility to cancer.

ERHS 630 03(3-0-0). Radiological Physics and Dosimetry II. S.
Prerequisite: ERHS 530.
Calculations and measurement techniques for dosimetry shielding and protection from ionizing radiations.

**ERHS 632 01(0-3-0). Techniques in Radiation Dosimetry. F.
Prerequisite: ERHS 630 or concurrent registration.
Techniques for determining the absorbed dose in tissue from ionizing radiations.

ERHS 633 01(0-3-0). Radiation Detection Methods in Radiobiology. S.
Prerequisite: ERHS 630 or concurrent registration.
Detection and measurement of ionizing radiation appropriate for radiobiologists.

*ERHS 636 03(3-0-0). Industrial Hygiene Control Methods. S.
Prerequisite: ERHS 526; ERHS 536 or concurrent registration.
Controlling occupational exposures to chemical agents, emphasizing local exhaust ventilation; personal protective devices.

**ERHS 637 03(3-0-0). Environment, Safety, and Health Management. F.
Prerequisite: ERHS 526.
Environment, safety, and health management systems for occupational health practitioners; major environmental and DOT regulatory standards and laws.

*ERHS 640 03(3-0-0). Advanced Epidemiology. S.
Prerequisite: ERHS 532.
In-depth exploration of advanced epidemiologic methods.

*ERHS 642 03(3-0-0). Applied Logistic Regression. S.
Prerequisite: ERHS 532; ERHS 542.
Basic and advanced concepts of logistic regression with focus on practical applications in epidemiology using SAS.

*ERHS 656 03(3-0-0). Occupational Noise Control. F.
Prerequisite: ERHS 527.
Measurement and control of industrial or environmental noise emphasizing practical solutions. (NT-O)

*ERHS 658 03(2-0-1). Environmental/Occupational Epidemiology. S.
Prerequisite: ERHS 532.
Epidemiologic analyses of effects of exposure to environmental and occupational health hazards.

ERHS 665 03(2-3-0). Radiochemistry. S.
Prerequisite: CHEM 114; ERHS 530 or concurrent registration; MATH 155.
Radionuclide separation and measurement and radiotracer applications in physical and biological systems.

ERHS 670 Var[1-3]. Directed Readings. F, S, SS.
Prerequisite: ERHS 520.
Advanced study through supervised readings on specialized topics.

ERHS 671 01(0-3-0). Experimental Radiobiology. S.
Prerequisite: ERHS 400 or ERHS 532; concurrent registration in ERHS 570.
Experimental techniques used in radiobiological and environmental radioactivity studies.

ERHS 675 03(3-0-0). Environmental Health Regulatory Compliance. S.
Prerequisite: 15 credits of regular-numbered ERHS courses 500-level or above or written consent of instructor.
Requirements and strategies for meeting obligations under regulations and laws involved in environmental and occupational health protection.

°ERHS 679 02(0-0-2). Occ Env Health Interdisciplinary Symposium. F.
Prerequisite: Enrollment in a graduate program related to occupational, environmental, or public health. May be repeated for credit. Required field trips.
Evaluation of occupational and environmental health issues, through multidisciplinary interactions in seminars and field visits.

ERHS 684 Var[1-3]. Supervised College Teaching.
Participation in environmental health course teachings under guidance of faculty in classroom, laboratory, or field.

ERHS 687 Var[1-6]. Internship.
Advanced study or research in environmental health with a governmental agency, private sector entity, or research facility.

ERHS 692 01(1-0-0). Seminar. F.
S. Prerequisite: ERHS 630.
Professional seminar series with student interaction on weekly basis; topics presented by outside experts, faculty, or doctoral candidates.

ERHS 693A-D 01(0-0-1). Research Seminar.
Presentation of student research and discussion of publications from scientific literature. A) Epidemiology. B) Industrial hygiene. C) Toxicology. D) Health physics.

ERHS 695A-P Var. Independent Study.

ERHS 696A-D Var[1-3]. Group Study
A) Epidemiology. Prerequisite: ERHS 520. B) Industrial hygiene. Prerequisite: ERHS 520. C) Toxicology. Prerequisite: ERHS 520. D) Health physics. Prerequisite: ERHS 530.

ERHS 698 Var[1-6]. Research. Prerequisite: Written consent of research mentor.

Master’s-level research and preparation of thesis.

*ERHS 701 04(4-0-0). Advanced Diagnostic Imaging Modalities. S.
Prerequisite: VM 786A or VM 786B or DVM.
Interpretation/applications of advanced imaging methods including ultrasound, nuclear medicine, magnetic resonance imaging and computed tomography.

*ERHS 711 Var. Advanced Radiographic Interpretation. S.
Prerequisite: VM 786A or VM 786B or DVM.
Radiographic interpretation of disease processes of all major systems in large and small animals.

*ERHS 712 03(3-0-0). Physics of Diagnostic Imaging. F.
Prerequisite: DVM or equivalent professional veterinary medicine degree.
Physics of imaging for radiology, ultrasound, computerized tomography, magnetic resonance, and nuclear medicine.

*ERHS 714 03(3-0-0). Radiation Therapy Physics. F.
Prerequisite: DVM or health physics, physics, or engineering graduate student.
Radiation therapy physics, photon and electron production for therapeutic use, teletherapy, brachytherapy, radiation protection and quality assurance.

ERHS 721 Var[1-3]. Radiation Oncology. F, S, SS.
Prerequisite: None.
Management of spontaneous and experimental tumors with emphasis on radiation therapy.

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; S Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCSubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
ERHS 726 03(3-0-0). Aerosols and Environmental Health. F. Prerequisite: PH 141.
Properties and behavior of environmental and occupational aerosols emphasizing how airborne particles affect health of humans and the environment.

°ERHS 733 03(3-0-0). Environmental Carcinogenesis. S. Prerequisite: BC 403.
Molecular and cellular mechanisms by which environmental carcinogens exert effects.

*ERHS 751 03(3-0-0). Advanced Radiation Biology I. F. Prerequisite: ERHS 550.
Molecular and cellular mechanisms of radiation damage and repair; mammalian radiation genetics.

°ERHS 753 03(3-0-0). Advanced Radiation Biology II. S. Prerequisite: ERHS 550.
Perturbations in cell cycle and cell population growth kinetics by radiation; radiation effects on normal tissues; radiation oncogenesis.

ERHS 765 01(0-3-0). Environmental Contaminant Modeling II. SS. Prerequisite: ERHS 563; ERHS 570.
Development and analysis of advanced computer models for radionuclide and chemical transport in aquatic and terrestrial ecosystems.

ERHS 770 01(0-0-1). Radiation Biology Basic to Tumor Therapy. F, S. Prerequisite: None.
Current aspects of radiation biology pertinent to improvements in radiation therapy.

ERHS 784 Var[1-3]. Supervised College Teaching.
Participation in environmental health course teachings under guidance of faculty in classroom, laboratory, or field.

ERHS 786 Var. Practicum. Prerequisite: ERHS 530.

ERHS 787 Var[1-6]. Internship.
Advanced study or research in environmental health with a governmental agency, private sector entity, or research facility.

ERHS 792 01(0-0-1). Seminar.
Professional seminar series with student interaction on weekly basis; topics presented by outside experts, faculty or doctoral candidates.

ERHS 793 01(0-0-1). Seminar.

ERHS 795A-P Var. Independent Study.

ERHS 796 Var. Group Study.

Doctoral-level research and preparation of dissertation.

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; S Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
ECOSYSTEM SCIENCE AND SUSTAINABILITY COURSES

Department of Ecosystem Science and Sustainability

Warner College of Natural Resources

ESS 130 01(0-0-0). System Theory and Information Management. S. Prerequisite: BUS 150 or CS 110.
- Applying computers, networks, software applications, and the internet for managing information in ecosystem science an sustainability.

ESS 210/GR 210 03(3-0-0). Physical Geography. F, S. Prerequisite: None. Credit not allowed for both ESS 210 and GR 210.
- Energy, mass budget, and human impacts on atmosphere, hydrosphere, and continental land surfaces.

ESS 211 03(3-0-0). Foundations in Ecosystem Science. S. Prerequisite: ESS 210/GR 210.
- Linkage between society and ecosystems services as foundation for sustainability of the coupled human-environmental system.

ESS 220 01(0-0-1). Research Skills for Ecosystem Science I. F. Prerequisite: Written consent of instructor.
- Fundamental skills for participating in ecosystem science research through hands-on learning-modules.

ESS 221 01(0-0-1) Research Skills for Ecosystem Science II. S. Prerequisite: ESS 220; concurrent registration in ESS 298; written consent of instructor.
- Advanced topics in the practice of the scientific method and participation in research.

ESS 298 Var[1-2]. Research. F, S, SS. Prerequisite: Concurrent registration in ESS 221.
- Directed ecosystem science research.

+ESS 311 03(3-0-0). Ecosystem Ecology. F. Prerequisite: ESS 211. Required field trips.
- Principles of ecosystems ecology, emphasis on their application to coupled natural and human systems.

ESS 330 03(3-0-0). Quantitative Reasoning for Ecosystem Science. S. Prerequisite: ESS 211 or LIFE 230; MATH 155 or MATH 160; STAT 301 or STAT 307 or STAT 315; junior or senior standing.
- Understanding diverse approaches for using data and models to understand complex ecological systems.

ESS 400 03(2-0-1). Sustainability and Ecosystem Science. S. Prerequisite: ESS 311; ESS 330.
- Integrates ecosystems services and sustainability strategies, application to coupled natural and human systems.

ESS 411 03(2-2-0). Earth Systems Ecology. F. Prerequisite: ESS 311.
- Earth as a system, stressing ecological interactions among energy, water, and biogeochemistry.

ESS 440 04(2-0-2). Practicing Sustainability. S. Prerequisite: ESS 311; ESS 330; senior standing.
- Capstone integration of ecosystem science and sustainability, focused on case studies.

+ESS 486 02(0-0-2). Ecosystem Practicum. F. Prerequisite: ESS 311; NR 220; senior standing. Required field trips.
- One-week field practicum to examine ecosystem science and sustainability issues in Colorado landscapes. ($)

ESS 487 Var[1-6]. Internship. F, S, SS. Prerequisite: Written consent of instructor.
- Supervised work experience in professional settings related to Ecosystem Science and Sustainability.

optional courses:

ESS 495 Var. 1-6. Independent Study in Ecosystem Science. F, S, SS. Prerequisite: None.

ESS 501 03(3-0-0). Principles of Ecosystem Sustainability. F. Prerequisite: Upper division coursework in ESS 311 or F 625.
- Principles of ecosystem sustainability and threats to sustainability. Students will investigate and develop case studies. (NT-O)

ESS 524 03(3-0-0). Foundations for Carbon/Greenhouse Gas Mgmt. F. Prerequisite: Upper division coursework in biology, ecology, or chemistry.
- Foundations for understanding greenhouse gas emissions management and accounting. (NT-O)

ESS 542 01(0-0-1). Greenhouse Gas Policies. F. Prerequisite: Admission to graduate school.
- Rules, regulations and standards for greenhouse gas management and accounting. (NT-O).

ESS 543 02(2-0-0). Current Topics in Climate Change. F. Prerequisite: Upper division coursework in biology, ecology, or chemistry.
- Climate fundamentals and current topics in climate change. (NT-O)

+ESS 545 04(2-6-0). Applications in Greenhouse Gas Inventories. F. Prerequisite: ESS 524; ESS 542. Required field trips.
- Overview of methods for estimating greenhouse gas emissions and mitigation potential for agriculture and forestry activities.

*ESS 565 04(3-2-0). Niche Models. F. Prerequisite: (BSPM 526/BZ 526 or BZ 535 or BZ 548 or BZ 561 or ECOL 505 or ECOL 600 or ECOL 610 or ECOL 620 or FW 555 or FW 622; STAT 511) or written consent of instructor.
- Concepts and application of niche models in ecosystem science.

ESS 575 04(3-2-0). Models for Ecological Data. S. Prerequisite: MATH 255; STAT 340.
- Gaining insight about the operation of ecological processes using models and data.

ESS 587 Var. 1-6. Internship. F, S. Prerequisite: none.

*ESS 625/F 625 03(3-0-0). Ecology of Forest Production. S. Prerequisite: 300-level course in ecology. Credit not allowed for both ESS 625 and F 625.
- Develops student expertise in understanding forest production and sustainability issues in Colorado landscapes. (NT-O)

ESS 660 03(3-0-0). Biogeochemical Cycling in Ecosystems. S. Prerequisite: CHEM 245; SOCR 240; one course in advanced ecology.
- Biotic and abiotic processes responsible for distribution and fluxes of elements at ecosystem, landscape, and global scales.

ESS 692 01(0-0-1). Seminar. F, S. Prerequisite: none. (NT-O)

ESS 695 Var[1-6]. Independent Study in Ecosystem Science. F, S, SS. Prerequisite: None.

Supervisor-approved independent study in Ecosystem Science.

- Alternate year offering (odd); * Alternate year offering (even); + Field trips; S Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
**ETHNIC STUDIES COURSES**

*Department of Ethnic Studies*

*College of Liberal Arts*

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**ETST 100 03(3-0-0). Introduction to Ethnic Studies.** (GT-SS3, AUCC 3E) F, S, SS. Prerequisite: None.

Key concepts, theories, and historical experiences that form the basis of scholarly work in comparative ethnic studies, domestically and internationally.

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**ETST 110 01(0-0-1). Blacks in Higher Education.** SS. Prerequisite: Must be enrolled in the Black issues Forum.

Contemporary issues of Blacks in higher education.

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**ETST 120 01(0-0-1). Native Americans in Higher Education.** SS. Prerequisite: Must be enrolled in the Native American Issues Forum.

Contemporary issues of Native Americans in higher education.

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**ETST 130 01(1-0-0). West Africa in Global and Local Perspective.** F. Prerequisite: None.

Sociopolitical and historical perspective of social and cultural issues in contemporary Ghana, West Africa, and connections to the African diaspora.

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**ETST 205 03(3-0-0). Ethnicity and the Media.** (GT-SS3, AUCC 3E). F. Prerequisite: None.

Ethnic representation across time as represented in auto/biography, fiction, poetry, and popular media.

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**ETST 208/ART 208 03(3-0-0). Native American Art and Material Culture.** S. Prerequisite: None. Credit not allowed for both ETST 208 and ART 208. Required field trips.

Traditional arts and material culture of the indigenous peoples of North America. ($)

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**ETST 210 03(3-0-0). Asian American Leaders and Leadership.** F. Prerequisite: None.

Cultural, historical and social influences on Asian American leaders and leadership explored via historical, culture, and value.

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**ETST 234/E 234 03(3-0-0). Introduction to Native American Literature.** F. Prerequisite: None. Credit not allowed for both ETST 234 and E 234.

Native American writings and their significance in American culture.

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**ETST 239/E 239 03(3-0-0). Introduction to Chicano Literature.** F, S. Prerequisite: None. Credit not allowed for both ETST 239 and E 239.

Chicano fiction and poetry with consideration of historical roots and influences.

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**ETST 240 03(3-0-0). Native American Cultural Expressions.** (GT-AH2, AUCC 3B). F. Prerequisite: None.

Exploration of Native lives and expressions through examination of Native architecture, art, music, film, activism, and literature.

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**ETST 250/HIST 250 03(3-0-0). African American History.** (GT-HI1, AUCC 3D). F. Prerequisite: None. Credit not allowed for both ETST 250 and HIST 250.

Slavery, emancipation, labor, political, socioeconomic, and cultural history of African Americans since colonial times.

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**ETST 252/HIST 252 03(3-0-0). Asian American History.** (GT-HI1, AUCC 3D). F. Prerequisite: None. Credit not allowed for both ETST 252 and HIST 252.

Asian American historical experience in the United States from 1850s to the present time.

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**ETST 253 03(3-0-0). Chicana/o History and Culture.** (GT-HI1, AUCC 3E). F. Prerequisite: None.

Historical study of Chicana/o/Mexicana/o people and culture from Spanish colonization to beginning of 20th century.

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**ETST 254 03(3-0-0). La Chicana in Society.** F. Prerequisite: None.

Historical contributions of Chicana women and current gender issues in Chican/o communities in the U.S.

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**ETST 255/HIST 255 03(3-0-0). Native American History.** (GT-HI1, AUCC 3D). S. Prerequisite: None. Credit not allowed for both ETST 255 and HIST 255.

History of Native American peoples in the United States to the present, including origin stories.

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**ETST 256 03(3-0-0). Border Crossings: People/Politics/Culture.** (GT-SS3, AUCC 3E). S. Prerequisite: None.

Colonial and post-colonial discourse, politics of representation and epistemology of “location” it has produced: first and third world.

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**ETST 261 03(3-0-0). Latina/o Populations in the U.S.** F. Prerequisite: None.

Historical processes and sociocultural phenomena that define Latina/o populations in the U.S.

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**ETST 300 03(3-0-0). Queer Studies and Women of Color.** F, S. Prerequisite: None.

Historical/contemporary analysis of contributions of women of color to queer studies; racialized sexual/gender identities; written and cultural works. (NT-O)

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**ETST 310 03(3-0-0). African American Studies.** F. Prerequisite: None.

Meaning of African-American studies in context of American higher education; historical development of such studies; perceptions and misperceptions.

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**ETST 312 03(3-0-0). African American Situation.** F. Prerequisite: None.

Examination of historical, political, social, and economic experiences of the African American people.

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**ETST 316/JTC 316 03(3-0-0). Multiculturalism and the Media.** S. Prerequisite: None. Credit not allowed for both ETST 316 and JTC 316.

Media and multiculturalism with emphasis on race, ethnicity, and other protected groups.

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**ETST 318/ANTH 318 03(3-0-0). Peoples and Cultures of the Southwest.** F, S. Prerequisite: ANTH 100. Credit not allowed for both ETST 318 and ANTH 318.

Analyze development of cultures of the American Southwest; colonialism, migration, political incorporation, and socioeconomic processes. (NT-O)

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**ETST 319/ANTH 319 03(3-0-0). Latin American Peasantries.** F, S. Prerequisite: ANTH 100 or ANTH 200 or ETST 100. Credit not allowed for both ETST 319 and ANTH 319.

Sociocultural, economic, and political responses of Latin American peasants to poverty and global processes.

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**ETST 320 03(3-0-0). Ethnicity and Film: Asian-American Experience.** F. Prerequisite: None.

Asian American film image and film representation through both mainstream and independent movies.

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**ETST 324 03(3-0-0). Asian Pacific Americans and the Law.** S. Prerequisite: None.

Legal history of Asian Pacific Americans examined through case studies.

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**ETST 332 03(3-0-0). Contemporary Chicana/o Issues.** S. Prerequisite: None.

Current Chicana/o issues including conquest, immigration, urbanization, health in context of societal trends.

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**ETST 340 03(3-0-0). Native American Perspectives on Conquest.** S. Prerequisite: None.

Native life and expression in the U.S. through response of Native Americans to conquest via revitalization movements, literature, arts.

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ETST 344 03(3-0-0). Native American Religious History and Issues. F. Prerequisite: None.
Native ritual, ceremony, and sacred existence; clearer understanding of Native life and religious ways.

ETST 352/SOWK 352 03(3-0-0). Indigenous Women, Children, and Tribes. F. Prerequisite: None. Credit not allowed for both ETST 352 and SOWK 352.
Historical and contemporary lives of women, children, and tribal communities.

ETST 354 03(3-0-0). A Century of Black Cinema. F. Prerequisite: None.
History of black cinema in 20th century.

ETST 360 03(3-0-0). Service and Leadership in Black Communities. S. Prerequisite: None.
Sociocultural context of leadership in and beyond the African American community.

ETST 364/HIST 364 03(3-0-0). Asian American Social Movements, 1945-Present. F, S. Prerequisite: HIST 151 of HIST 252/ETST 252; completion of 45 credits. Credit not allowed for both ETST 364 and HIST 364.
Historical relationships between Asian Americans and social movements for social, economic, and political equity in the U.S. since 1945.

ETST 365 03(3-0-0). Global Environmental Justice Movements. F, S. Prerequisite: None.
How the world’s poor and minorities self-empower to challenge institutional racism and government apathy in order to secure basic environmental goods.

ETST 370 03(3-0-0). Caribbean Identities. F, S. Prerequisite: None.
Development of Caribbean identities from the arrival of Amerindian groups to the abolition of slavery in the nineteenth century.

ETST 371 03(3-0-0). The Modern Caribbean. F, S. Prerequisite: None.
Modern political and socio-economic developments in the Caribbean with emphasis on race, ethnicity, and gender.

ETST 377 03(3-0-0). African Americans in Sports. F. Prerequisite: Completion of AUCC category 2.
Sociocultural and historical dimensions of African Americans in sports.

ETST 404 03(3-0-0). Race Formation in the United States. F. Prerequisite: None.
Concept of race as a social construct in the shaping of U.S. character, values, and institutions.

ETST 405 03(3-0-0). Ethnicity, Class, and Gender in the U.S. S. Prerequisite: None.
Roles of and interconnections among ethnicity, class and gender for various groups in the United States.

*ETST 410 03(3-0-0). African American Periods and Personalities. S. Prerequisite: None.
Historical moments, movements, and men and women who have helped shape the African American heritage.

ETST 411 03(3-0-0). Black Feminism(s). F, S. Prerequisite: None.
History and trajectory of Black feminist thought from the nineteenth century to the present.

*ETST 412 03(3-0-0). Africa and African Diaspora. F. Prerequisite: None.
Interdisciplinary investigation of retention, transformation, and creation of culture in plantation economies of Americas.

ETST 413 03(3-0-0). Queer Creative Expressions. F, S. Prerequisite: None.
Analysis of queer creative expressions within socio-political discourse and cultural works, with an emphasis on critical, queer feminist theory.

*ETST 414/ANTH 414 03(3-0-0). Development in Indian Country. F. Prerequisite: None. Credit not allowed for both ETST 414 and ANTH 414.
Critical examination of history, public policy, and tribal strategies for economic development and natural resource management in Indian country.

ETST 422/E 422 03(3-0-0). African-American Literature. F, S. Prerequisite: CO 150; E 270. Credit not allowed for both ETST 422 and E 422.
African-American literature as a distinct tradition of writing and protest.

*ETST 424 03(3-0-0). Asian Pacific American Literature and Culture. S. Prerequisite: None.
Asian Pacific American culture viewed through literature, art, and popular culture.

ETST 425 03(3-0-0). Indigenous Film and Video. F, S. Prerequisite: None.
Historical and contemporary analysis of film featuring indigenous peoples.

ETST 430 03(3-0-0). Latina/o Creative Expression. S. Prerequisite: Junior or senior status.
Creative expression in literature, art, theatre, music: approach to understanding experiences of various Chicana/o/Latina/o groups in the U.S.

ETST 432 03(3-0-0). Latina/o Routes to Empowerment. S. Prerequisite: Junior or senior status.
Critical examination of political and economic strategies used to incorporate Chicana/o/Latina/o groups into U.S. society.

ETST 438/E 438 03(3-0-0). Native American Literature. F. Prerequisite: None. Credit not allowed for both ETST 438 and E 438.
Literature of Native Americans emphasized as distinctive tradition in American literature and cultural expression of indigenous peoples.

ETST 444/SOC 444 03(3-0-0). Federal Indian Law and Policy. S. Prerequisite: None. Credit not allowed for both ETST 444 and SOC 444.
Indian policy processes and their impact on Native lives and culture, particularly Native sovereignty.

ETST 454/SPCM 454 03(2-2-0). Chicano/a Film and Video. F, S. Prerequisite: None. Credit not allowed for both ETST 454 and SPCM 454.
Emergence of Chicano/a cinema from a place of displacement, resistance, and affirmation found in contemporary Chicano/a film, video.

ETST 484 Var[1-3]. Supervised College Teaching. Prerequisite: Written consent of instructor. May be taken only once. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

ETST 487 Var[1-6]. Internship. Prerequisite: ETST 100.

ETST 492 03(0-0-3). Seminar. F, S.

ETST 493 03(3-0-0). Ethnic Studies Research Methods and Writing. S. Prerequisite: ETST 100; 18 additional ETST credits. Senior standing required.
Research ethics, methodology, theory, and writing in ethnic studies.

ETST 495 Var. Independent Study. F, S.

ETST 500 03(3-0-0). Race, Ethnicity, and Nationality. S. Prerequisite: None.

Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
Intersections of race, ethnicity, and nationality within a broader framework of political economy.

**ETST 501 03(3-0-0). Ethnic Studies History and Theory.** F. Prerequisite: Graduate or senior status.

- History and theory of study of racial and ethnic formation, identity, and politics.

**ETST 502 03(3-0-0). Research Methods.** F. Prerequisite: Graduate or senior status.

- Interdisciplinary ethnic studies research methods.

**ETST 503 03(3-0-0). Contemporary Ethnic Studies Issues.** F. Prerequisite: Graduate or senior status.

- Contemporary ethnic studies issues in the United States and abroad.

**ETST 505 03(3-0-0). Academic Writing.** S. Prerequisite: Graduate status.

- Academic writing skills development including article summaries, literature reviews, annotated bibliographies, proposals, and journal articles.

**ETST 510 03(3-0-0). Ethnicity, Race, and Health Disparities in U.S.** F. Prerequisite: None.

- Health status of ethnic/racial populations; cultural dimensions that underlie health and health disparities.

**ETST 513/ANTH 513 03(3-0-0). Capitalism and Global Ethnic Conflicts.** S. Prerequisite: ANTH 200 or ETST 100. Credit not allowed for both ETST 513 and ANTH 513.

- Causes of global ethnic conflicts with emphasis on resource competition, capitalist development schemes, and role of the state.

**ETST 520 03(3-0-0). Race and U.S. Social Movements.** S. Prerequisite: Graduate or senior status.

- Intersections of race, class, gender, and sexuality which structure life chances and mobilize movements for rights, recognition, and resources.

**ETST 530 03(3-0-0). Race, Labor, and the Economy.** S. Prerequisite: Graduate or senior status.

- Social stratification, class, race, and gender formation, neoliberalism, and the impact of globalization.

**ETST 531 03(3-0-0). Latina/o Politics in the U.S.** F, S. Prerequisite: None.

- Impact of Latina/o politics on the U.S. political system by examining Latina/o political mobilization patterns and behaviors.

**ETST 535 03(3-0-0). Chicana Feminism: Theory and Form.** F, S. Prerequisite: None.

- Different forms of Chicana feminism as produced by Chicana scholars, writers, poets, artists and activists from historical and contemporary accounts.

**ETST 540 03(0-0-3). Race in Latin America.** F, S. Prerequisite: Admission to Ethnic Studies graduate program.

- Examination of race in Latin America and its intersection with ethnicity, class, gender, and sexuality.

**ETST 541 03(3-0-0). Gender, Violence, and Indigenous Peoples.** F, S. Prerequisite: None.

- Multiple forms of violence against indigenous women and children in the Americas, Australia, and New Zealand.

**ETST 544/POLS 544 03(3-0-0). National Identities and Nation Building.** F. Prerequisite: None. Credit not allowed for both ETST 544 and POLS 544.

- How statist conceptions of race and ethnicity have been mobilized in nation-building projects.

**ETST 545 03(3-0-0). Immigration and Citizenship in U.S. History.** F, S. Prerequisite: Graduate student standing.

- Comparative survey of immigration and citizenship debates in the U.S. since the 19th century, with a focus on the politics of racial formations.

**ETST 550 03(3-0-0). Law, Policy, and Indigenous Peoples.** S. Prerequisite: Graduate or senior status.

- Laws and policies impacting indigenous women, children, families, and communities in North America, New Zealand, and Australia.

**ETST 555 03(3-0-0). African American Intellectual Thought.** S. Prerequisite: Graduate student standing.

- Historical efforts of Black/African American intellectuals to describe the conditions and circumstances of African descendants in the U.S.

**ETST 560 03(3-0-0). Race, Ethnicity, and Higher Education.** F. Prerequisite: None.

- Historical and contemporary experiences of people of color as students, faculty, and staff in higher education in the United States.

**ETST 684 Var. Supervised College Teaching.**

**ETST 687 Var. Internship.**

**ETST 695 Var. Independent Study.**

**ETST 698 Var. Research in Ethnicity.**

**ETST 699 Var. Thesis.**

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
FOREST SCIENCES COURSES
Department of Forest and Rangeland Stewardship
Warner College of Natural Resources

F 210 03(2-2-0). Forest Ecogeography. F, S. Prerequisite: BZ 101 or BZ 104 or BZ 110 or BZ 120 or LIFE 102.
Ecogeography of forested ecosystems on a global scale and identification of important North American trees.

+F 224 01(0-2-0). Wildland Fire Measurements. F. Prerequisite: None. Required field trips
Wildland fire control and use measurements: fuels, weather, topography, fire behavior, and fire ecology.

F 230 02(0-4-0). Forestry Field Measurements. SS. Prerequisite: None.
Develop field skills using maps, compasses and aerial photos; photo interpretation; tree and stand measurements; stand volume and value estimates.

F 310/RS 310 03(2-2-0). Forest and Rangeland Ecogeography. F, S. Prerequisite: BZ 101 or BZ 104 or BZ 110 or BZ 120 or LIFE 102.
Distribution of wildland plant communities and identification of important grasses, forbs, shrubs and trees common in North America.

F 311 03(3-0-0). Forest Ecology. F, S. Prerequisite: LAND 220/LIFE 220 or LIFE 320.
Relationships of ecological concepts to the dynamics of forest ecosystems.

F 312 01(0-2-0). Dendrology Lab. F, S. Prerequisite: Concurrent registration in F 310.
Identification of characteristic trees common to North American forests.

+F 321 03(2-2-0). Forest Biometry. F. Prerequisite: NR 220; F 230; MATH 141; STAT 201 or STAT 301. Required field trips.
Measurement and estimation of timber in logs, trees, and stands. Sampling with varying probabilities. ($)

F 322 03(3-0-0). Economics of the Forest Environment. F.S. Prerequisite: AREC 202 or AREC 240/ECON 240 or ECON 202.
Economic principles and techniques applied to forested environments.

F 324 03(3-0-0). Fire Effects and Adaptations. F. Prerequisite: LAND 220/LIFE 220 or LIFE 320.
Introduction to fire ecology including fire history, ecosystem effects, and organism responses.

F 325 03(3-0-0). Silviculture. S. Prerequisite: F 230; F 311; NR 220. Credit not allowed for both F 325 and NR 326.
Principles of silviculture and their application to major forest types of United States.

Principles of timber harvesting and effects of logging on the environment.

+F 331 03(2-2-0). Wood Products in Society. F. Prerequisite: None.
Role of wood products in society; spectrum of wood products, some field trips.

F 421 04(3-3-0). Forest Stand Management. F. Prerequisite: F 230; F 321; F 322; F 325.
Forest management plan preparation: forest condition and health assessment; evaluation of silvicultural treatments; implementation and monitoring. ($)

F 422 03(2-2-0). Quantitative Methods in Forest Management. F. Prerequisite: F 321; F 322.
Design and analysis of optimization and non-optimization models in forest managerial operations.

F 424 03(2-2-0). Wildland Fire Behavior and Management. F. Prerequisite: LAND 220/LIFE 220 or LIFE 320.
Policies and strategies for the management of fire and fuels. Fire behavior, fuels treatments, prescribed fire, suppression operations, and prevention. ($)

F 425 03(3-0-0). Advanced Wildland Fire Behavior and Management. S. Prerequisite: F 424; NR 319.
Advanced strategies, techniques, and tools for managing wildland fire management: prediction, prevention, suppression, and use for resource benefit.

F 430 03(1-4-0). Forestry Field Practices. S. Prerequisite: F 330; F 421.
Forestry field course, S212 saw certification, collect stand inventory data, develop and implant stand prescriptions, and harvest and process trees. ($)

F 487 Var[3-12]. Professional Forestry Internship. Prerequisite: Written consent of department head.
Professional-level field experience with forestry organization.

F 495 Var. Independent Study.

F 510 03(2-3-0). Ecophysiology of Trees. S. Prerequisite: BZ 440.
Environmental factors affecting physiology of woody plants; emphasis on water relations in trees and importance of water in physiological processes.

F 520 03(3-0-0). Advanced Quantitative Methods in Forestry I. F. Prerequisite: F 322; MATH 160.
Design and analysis of optimization models in forest management operations: linear, goal, and dynamic programming.

F 521 03(2-2-0). Advanced Quantitative Methods in Forestry II. S. Prerequisite: F 520.
Analysis of forest inventory information; dynamic and stochastic models oriented to decision making and research in forestry.

F 522 03(3-0-0). Advanced Forest Economics. S. Prerequisite: ECON 306.
Analysis of forestry issues: financial maturity, management intensity, federal policy, taxation, natural environments, and silviculture.

*F 524 03(2-2-0). Forest Fire Meteorology and Behavior. F. Prerequisite: None.
Effects of atmospheric processes on wild and prescribed fires; interrelationships of weather, fuels, and topography on forest and range fires.

F 525 04(3-0-1). Silvicultural Practices. S. Prerequisite: F 311.
Comprehensive coverage of silvicultural practices as applied in U.S. forestry.

F 540 03(2-3-0). Fuels, Vegetation and Fire Management. F, S, SS. Prerequisite: Admission to the Continuing Education in Fuels Management program through the Office of Conference Services.
Develop, test, and display the impact of alternative fuels and vegetation treatments on vegetation development, fuels and fire behavior.

F 541 03(3-0-0). Data Analysis/Interpretation-Fire Managers. F. Prerequisite: Employment as wildfire manager. Offered only through Division of Continuing Education.
Knowledge and skills for complex analyses of fire information. (NT)

F 542 03(3-0-0). Wildland Fire Economics and Management. S. Prerequisite: Employment as wildland fire manager.

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Managerial economics and management techniques applied to wildland fire situations. (NT)

**F 544 03(3-0-0). Decision Methods for Fire Managers.** F, S, SS.
Prerequisite: Written consent of instructor.
Application of decision methods, including optimization techniques, finance, and decision trees to initial attack and fuels management problems.

**F 593 01(0-0-1). Seminar-Fire Science.** F.

**F 624 03(2-2-0). Fire Ecology.** S. Prerequisite: F 424; one course in ecology.
Fire in forest and range ecosystems; principles and techniques for evaluating fire effects on vegetation, soils, watersheds, and wildlife.

**F 625/ESS 625 03(3-0-0). Ecology of Forest Production.** S.
Prerequisite: 300-level course in ecology. Credit not allowed for both F625 and ESS 625.
Develops student expertise in understanding carbon and nutrient flows in forests. (NT-O)

**F 693 01(0-0-1). Seminar.** F, S.

**F 695 Var. Independent Study.**

**F 698 Var. Research.**

**F 699 Var. Thesis.**

**F 721 03(3-0-0). Forest Policy.** S. Prerequisite: NR 320.
Policies and institutions affecting management of forest lands in U.S.

**F 798 Var. Research.**

**F 799 Var. Dissertation.**
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisite</th>
<th>Description</th>
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<tbody>
<tr>
<td>FACS 179 02(2-0-0)</td>
<td>Introduction to Family and Consumer Sciences</td>
<td>S</td>
<td>None</td>
<td>Career options in family and consumer sciences; professional leadership responsibilities.</td>
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<tr>
<td>FACS 320 03(3-0-0)</td>
<td>Finance—Personal and Family</td>
<td>F, S, SS</td>
<td>None</td>
<td>Management of income, expenditures, credit, savings, investment, insurance, taxes, and assets considering legislation and economic conditions. (NT-O)</td>
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<tr>
<td>FACS 479 02(0-0-2)</td>
<td>Colloquium-Family and Consumer Sciences</td>
<td>S</td>
<td>FACS 179</td>
<td>Current topics and issues related to professional roles, responsibilities, and opportunities.</td>
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<td>FACS 494 Var. Independent Study</td>
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<td>FACS 590 Var[1-3]. Workshop</td>
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<td>FACS 698 Var. Research</td>
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FESA 310 03(0-0-3). Fire Service Leadership. F, S, SS. Prerequisite: None.
Theory, practice and application of ethical leadership in public safety; developing personal ethics and leadership skills and abilities. (NT-O)

FESA 330 03(3-0-0). Industrial Processes and Fire Protection. S. Prerequisite: None. Offered only through the Division of Continuing Education.
Industrial processes and fire protection managed by fire and safety personnel. (NT-O/V)

FESA 331 03(3-0-0). Structure Influence on Tactics and Strategy. F, S. Prerequisite: None. Offered only through the Division of Continuing Education.
How construction type, alterations, design and materials influence a building’s reaction to fire. Fireground influence on tactics and strategy. (NT-O/V)

FESA 333 03(3-0-0). Proposals/Reports in Fire Service Administration. F, S. Prerequisite: None. Offered only through the Division of Continuing Education.
Process of preparing reports and developing a proposal supported by research. Introduction to research techniques, Internet and library use; conventions of documentation. (NT-O/V)

FESA 334 01(1-0-0). Orientation to Experiential Learning. F, S. Prerequisite: None. Offered only through the Division of Continuing Education.
Demonstration of knowledge, skill, and professional experience for the purpose of enhancing documentation and career development skills. (NT-O/V)

FESA 335 03(3-0-0). Trends in Fire Science Technologies. F. Prerequisite: None. Offered only through the Division of Continuing Education.
Analytical tools designed to evaluate, align, select, and implement emerging fire science technologies. (NT-O)

FESA 336 03(3-0-0). Fire and Emergency Services Management. F, S. Prerequisite: None. Offered only through the Division of Continuing Education.
Fire and emergency service administrative structures and processes. Examination of management and leadership models and applications. (NT-O)

FESA 337 03(3-0-0). Policy and Public Administration. F, S. Prerequisite: FESA 336. Offered only through the Division of Continuing Education.
Political and legal foundations of fire and emergency services. Public administration concepts, decision making and policy development. (NT-O)

FESA 338 03(3-0-0). Essentials of Emergency Management. F, S. Prerequisite: None. Offered only through the Division of Continuing Education.
Emergency management theory; mitigation, planning, response, and recovery in large-scale incidents. Development/operation of emergency operation centers. (NT-O)

FESA 339 03(3-0-0). Incident Command Systems. S. Prerequisite: FESA 331 or FESA 338. Offered only through the Division of Continuing Education.
Theory and application of incident command systems (ICS) to the command and coordination of major emergency operations. (NT-O)

FESA 341 03(3-0-0). Fire Officer I-A. F, S. Prerequisite: Enrollment in FESA program or written consent of instructor. Offered only online.
Fire officer competencies at the supervisory level of performance, as confirmed by NFPA Standard 1021, Level I, 4.1 to 4.4. (NT-O)

FESA 342 03(3-0-0). Fire Officer I-B. F, S. Prerequisite: FESA 341 with a grade of C or better. Offered only online.
Fire officer competencies at the supervisory level of performance, as confirmed by NFPA Standard 1021, Level II, 4.5 to 4.7. (NT-O)

FESA 431 03(3-0-0). Emergency Medical Services Management. F. Prerequisite: FESA 432; FESA 433. Offered only through the Division of Continuing Education.
Emergency medical service models, design implementation evaluation, Interactions with health care systems, public policy and public health systems. (NT-O)

FESA 432 03(3-0-0). Fire and Emergency Services Budgeting. F, S. Prerequisite: FESA 433; FESA 336. Offered only through the Division of Continuing Education.
Application of emergency service budgeting systems with emphasis on revenues, public financial controls, capital funding and performance measures. (NT-O)

FESA 433 03(3-0-0). Fire and Emergency: Human Resources. F, S. Prerequisite: FESA 433; FESA 336. Offered only through the Division of Continuing Education.
Theory, practice, and models of human resources applied to emergency organizations; workforce development, HR functions, and labor relation. (NT-O)

FESA 434 03(3-0-0). Training Program Management. F. Prerequisite: FESA 432; FESA 433. Offered only through the Division of Continuing Education.
Development of agency training and education programs. Utilization of training and education practices, resources, facilities and technologies. (NT-O)

FESA 435 03(3-0-0). Volunteer/Combination Organization Management. S. Prerequisite: FESA 432; FESA 433. Offered only through the Division of Continuing Education.
Development and management of fire and emergency service organizations with volunteer and combination resources. (NT-O)

FESA 436 03(3-0-0). Fire Protection Through Model Building Codes. S. Prerequisite: None. Offered only through the Division of Continuing Education.
Overview of the most current fire codes that are used across the United States. Discussion of fire inspection methodology and enforcement practices. (NT-O/V)

FESA 437 03(0-0-3). Fire and Emergency: Legal Considerations. F, S, SS. Prerequisite: FESA 432; FESA 433.
Fire service in relation to the complex legal system of the United States, individual states, and local jurisdictions. (NT-O)

FESA 438 03(3-0-0). Prevention Program Management. F. Prerequisite: FESA 432; FESA 433. Offered only through the Division of Continuing Education.
Design, implementation, and evaluation of fire and risk prevention programs using education, engineering, and enforcement approaches. (NT-O)
FESA 441 03(3-0-0). Fire Officer II-A. F, S. Prerequisite: FESA 342 with a grade of C or better. Offered only online.

Fire officer competencies at the supervisory/managerial level of performance, as confirmed by NFPA Standard 1021, Level II, 5.1 to 5.4. (NT-O)

FESA 442 03(3-0-0). Fire Officer II-B. F, S. Prerequisite: FESA 441 with a grade of C or better. Offered only online.

Fire officer competencies at the supervisory/managerial level of performance, as confirmed by NFPA Standard 1021, Level II, 5.5 to 5.7. (NT-O)

FESA 467 03(3-0-0). Integrated Management Simulation. F, S. Prerequisite: FESA 331; FESA 338; FESA 432; FESA 433; completion of 15 credits of selected electives. Offered only through the Division of Continuing Education.

Integration management and administrative knowledge and skills in the development of a fire and emergency service management simulation. (NT-O)

FESA 492 Var[1-3]. Seminar. F, S. Prerequisite; Written consent of instructor. Offered only through the Division of Continuing Education.

Discussion and documentation of professional experience in fire and emergency services. (NT-O)

FESA 495 Var[1-6]. Independent Study. F, S. Prerequisite: FESA 334; completion of 30 credits of FESA coursework. Offered only through Division of Continuing Education. (NT-O)

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FIN 300 03(3-0-0). Principles of Finance. F, S, SS. Prerequisite: ACT 205 or ACT 210; AREC 202 or ECON 202; ECON 204; MATH 141 or MATH 155 or MATH 160. Credit not allowed for both FIN 300 and FIN 305.

Overview of financial markets and institutions, analysis of securities and investigation of financial management techniques.

FIN 305 03(3-0-0). Fundamentals of Finance. F, S, SS. Prerequisite: ACT 205 or ACT 210; ECON 204. Credit not allowed for both FIN 305 and FIN 300.

Role of finance in management of the firm; role, structure of financial markets and institutions, valuation of basic securities. (NT-O)

FIN 310 03(3-0-0). Financial Markets and Institutions. F, S, SS. Prerequisite: ECON 204.

Analysis of the functions and operations of financial markets and the primary and secondary securities created in those markets.

FIN 311 03(3-0-0). Debt Securities Analysis. F. Prerequisite: ECON 315 or FIN 310; FIN 300; FIN 355.

Analysis of corporate, government, and mortgage-based debt securities. Emphasis on securitization of asset-backed obligations.

FIN 320 03(3-0-0). Introduction to Financial Planning. F, S. Prerequisite: ACT 210; ECON 202.

Personal financial planning including budgeting, tax planning, credit management, investing, retirement, and estate planning.

FIN 342 03(3-0-0). Risk Management and Insurance. F. Prerequisite: FIN 300 or FIN 305.

Management of insurable risks for the individual and business firm.

FIN 355 03(3-0-0). Principles of Investments. F, S, SS. Prerequisite: FIN 300; FIN 310.

Modern investment theory with applications in the debt and equity markets, with introduction to portfolio management.

FIN 370 03(3-0-0). Financial Management—Theory and Application. F, S. Prerequisite: FIN 300.

Theory and application of financial management to business firms; case problems used for illustration.

FIN 440 03(3-0-0). Estate Planning. F. Prerequisite: ACT 330; FIN 320.

Methods for conservation and transfer of wealth, considering aspects of tax, trusts, wills, probate, advanced directives, and charitable giving.

FIN 445 03(3-0-0). Financial Plan Development. S. Prerequisite: ACT 330; FIN 320; FIN 342.

Analyze client finances and economic conditions, develop and communicate comprehensive financial plan using financial planning professional standards.

FIN 455 03(3-0-0). Advanced Portfolio Management. S. Prerequisite: FIN 355.

Advanced hedging and portfolio management theory and techniques.


Futures, options, asset-backed securities and other derivatives as they are used in financial risk management.

FIN 471 03(3-0-0). Enterprise Valuation. F, S. Prerequisite: FIN 355; FIN 370.

Analytical framework for measuring, managing, and applying principles and tools to value enterprises.

FIN 475 03(3-0-0). International Business Finance. F, S, SS. Prerequisite: FIN 300.

International financial management emphasizing markets, instruments, hedging techniques, and operating strategies.

FIN 487 Var. Internship.

FIN 495 Var. Independent Study.

FIN 496 Var. Group Study.

FIN 498 Var[1-3]. Research.

FIN 524/STAT 524 03(3-0-0). Financial Statistics. F. Prerequisite: (MATH 345; STAT 420) or admission to MSBA program with Financial Risk Management specialization. Credit not allowed for both FIN 524 and STAT 524.

Probability and statistical concepts and quantitative tools used in financial modeling and decision-making. (NT-O)

FIN 600 03(3-0-0). Financial Management—Theory and Case Studies. F. Prerequisite: FIN 300 or FIN 305.

Financial problems for various types of business organizations. (NT-V)

FIN 601 03(3-0-0). Financial Management and Markets. S. Prerequisite: Admission to GSSE program.

Integrated coverage of financial management, investments, and markets and institutions from the public, private, and nonprofit perspective.

FIN 602 01(1-0-0). Options and Futures. F, S, SS. Prerequisite: Admission to a master’s program in business. This is a partial-semester course.

Advanced analysis and pricing of derivative securities, such as futures, forwards and options. (NT-O)

FIN 603 01(1-0-0). Corporate Risk Management. F, S, SS. Prerequisite: Admission to a master’s program in business. This is a partial-semester course.

Survey of topics related to corporate risk management including the role and function of insurance and risk management for business enterprises. (NT-O)

FIN 605 03(3-0-0). Enterprise Valuation. F. Prerequisite: FIN 300; Admission to MSBA program with Financial Risk Management specialization.

Corporate valuation methodologies including dividend discount model, relative valuation using market multiples, free cash flows and options analysis.

FIN 610 03(3-0-0). Debt Securities Analysis. S. Prerequisite: FIN 524/STAT 524; FIN 655.

Valuation of corporate, government, and mortgage-backed debt securities and strategies for management of debt security portfolios. (NT-V)

FIN 625 03(3-0-0). Quantitative Methods in Finance. F. Prerequisite: FIN 300.

Review and application of mathematical and analytical techniques used in solving financial problems.

FIN 630 03(3-0-0). Financial Modeling. S. Prerequisite: FIN 625.

Practical applications of financial modeling and computer programming to analyze financial data.

FIN 655 03(3-0-0). Investments. S. Prerequisite: None.

Investment analysis and decision making emphasizing equity securities and portfolio management. (NT-V)

FIN 665 03(3-0-0). Financial Engineering. S. Prerequisite: FIN 610 or FIN 655 or FIN 675.

Using futures, options, swaps, and securitized transactions in financial management.
FIN 669 03(3-0-0). Financing, Evaluating Sustainable Enterprise. F.
Prerequisite: BUS 601; FIN 601. Credit not allowed for both FIN 669 and BUS 669.
Theoretical and applied approaches to the funding and evaluation of enterprises.

FIN 670 03(3-0-0). Risk Management Theory and Application. S.
Prerequisite: FIN 605; FIN 625; FIN 655.
Fundamentals of financial risk management using quantitative techniques and models to identify, measure, and manage corporate risk.

FIN 675 03(3-0-0). International Finance. S. Prerequisite: None.
Analysis of the foreign exchange market and international financial markets. (NT-T/V)

FIN 678 03(3-0-0). Financial Decisions-Theory and Practice. S.
Prerequisite: FIN 600.
Analysis of theory of corporate finance with emphasis on underlying assumptions and implications for financial decisions.

FIN 695 Var. Independent Study.

FIN 696 Var. Group Study.

FIN 698 Var[1-6]. Research. F. S.


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FOOD SCIENCE AND HUMAN NUTRITION COURSES

Department of Food Science and Human Nutrition

College of Health and Human Sciences

FSHN 125 02(2-0-0). Food and Nutrition in Health. F, S. Prerequisite: None. Nutritional quality and safety of food related to human health.

FSHN 150 03(3-0-0). Survey of Human Nutrition. F, S, SS. Prerequisite: None. Basic nutrition principles and concepts; their application to personal health and interactions with societal and environmental issues.

FSHN 192 01(0-0-1). First Year Seminar. F. Prerequisite: None. Facilitate a successful transition to college for new incoming students by emphasizing personal growth and identifying campus resources.

FSHN 300 03(3-0-0). Food Principles and Applications. F, S. Prerequisite: CHEM 103 or CHEM 107 or CHEM 111; FSHN 150. Application of food preparation theories to modification and evaluation of food products.

FSHN 301 02(0-6-0). Food Principles and Applications Laboratory. F, S. Prerequisite: FSHN 300 or concurrent registration. Techniques and manipulative skills for preparation and evaluation of standard and modified food products. ($)

FSHN 350 03(3-0-0). Human Nutrition. F, S, SS. Prerequisite: BMS 300 or concurrent registration; CHEM 245 or CHEM 345. Metabolism of macro and micronutrients; physiological basis underlying dietary recommendations for human health. Nutrients, dietary requirements for physical well-being; evaluation of various diets.


FSHN 386A-C. Practicum. Prerequisite: None. A) Food Service Management 02(0-0-4). F, S, SS. B) Gerontology 03(0-0-9). F, S, SS. C) School Nutrition 03(0-0-9). F, S.

FSHN 392 01(0-0-1). Dietetic Practice Seminar. F, S. Prerequisite: B or above in science courses (CHEM 107 and CHEM 108, or CHEM 111, CHEM 112, and CHEM 113; LIFE 102 or BZ 110; BZ 111; BMS 300; BMS 302; FSHN 150; FSHN 300; FSHN 301); 3.00 overall GPA. Pre-professional skills to prepare students for the pursuit of careers in the field of dietetics.

FSHN 428 03(3-0-0). Nutrition Teaching and Counseling Techniques. S. Prerequisite: FSHN 350. Objectives, principles, and organization of subject matter for nutrition education and counseling.

FSHN 444 01(1-0-0). Nutrition and Aging. F, S. Prerequisite: FSHN 150 or admission to Gerontology Interdisciplinary Studies Program. Credit not allowed for both FSHN 444 and FSHN 459. Effect of aging on nutrient needs and impact of nutrition on successful aging and health in the elderly. (NT-O)

FSHN 445/HDFS 445 03(0-0-3). Early Childhood Health, Safety, and Nutrition. F. Prerequisite: HDFS 310. Credit not allowed for both FSHN 445 and HDFS 445. Offered only online. Planning, promoting and maintaining healthy lifestyle and safe learning environment for preschool children. (NT-O)

FSHN 450 05(4-2-0). Medical Nutrition Therapy. F. Prerequisite: BMS 300; FSHN 350. Use of nutrition therapy in the treatment of acute conditions and chronic disease states. ($)

FSHN 451 03(3-0-0). Community Nutrition. F. Prerequisite: FSHN 350 or concurrent registration. Influences on nutritional status, assessment of nutrition problems and needs, planning and evaluation of nutrition intervention programs.

FSHN 459 03(3-0-0). Nutrition in the Life Cycle. F. Prerequisite: FSHN 350. Credit not allowed for both FSHN 459 and FSHN 444. Nutritional aspects associated with each phase of human life cycle including pregnancy, infancy, childhood, adolescence, and early and late adulthood.

FSHN 470 03(3-0-0). Integrative Nutrition and Metabolism. F, S. Prerequisite: BC 351; FSHN 350. Influence of nutrition on roles and action of hormones and gene expression on metabolism.

FSHN 484 Var[1-3]. Supervised College Teaching. F, S. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.


FSHN 492 02(0-0-2). Seminar in Dietetics and Nutrition. S. Prerequisite: Senior standing. Capstone seminar in nutrition and dietetics.


FSHN 500 02(2-0-0). Food Systems, Nutrition, and Food Security. F. Prerequisite: FSHN 350. Global and local food systems and their potential influence on nutrition and food security.

FSHN 501 03(3-0-0). Research Methods in Dietetics. S. Prerequisite: Admission to GP-IDEA program in dietetics. Offered as an online course only. Testing and generating theory. Methods for collecting and analyzing quantitative and qualitative data, critique of research and proposal development. (NT-O)

FSHN 503 03(3-0-0). Issues in Dietetics Practice. F, S. Prerequisite: Admission to GP-IDEA program in dietetics. Offered as an online course only. Environment in which foodservice, hospitality, and healthcare organizations operate; impact of change on hospitality and healthcare organizations. (NT-O)

FSHN 504 03(3-0-0). Micronutrients. S. Prerequisite: Admission to GP-IDEA program in dietetics. Offered as an online course only. Coordination of structure and function related to metabolic needs as a basis for evaluating micronutrient needs in normal or altered metabolic states. (NT-O)

FSHN 505 03(3-0-0). Nutrition and Physical Activity in Aging. S. Prerequisite: Admission to GP-IDEA program in dietetics. Offered as an online course only. Physiological changes during aging and impacts on health and disease; focus on successful aging with emphasis on physical activity and nutrition. (NT-O)

Alternate year offering (odd); * Alternate year offering (even); + Field trips; S Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCsubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
FSHN 506 03(3-0-0). Nutrition and Human Performance. S. Prerequisite: Admission to GP-IDEA program in dietetics. Offered as an online course only.

- Relationship of specific nutrients and optimal nutrition to physical efficiency and performance. (NT-O)

FSHN 507 03(3-0-0). Nutrition Education in the Community. F, S. Prerequisite: Admission to GP-IDEA program in dietetics. Offered as an online course only.

- Principles and practices of teaching individuals and groups to translate nutrition knowledge into action. Emphasis on research and evaluation. (NT-O)

FSHN 508 03(3-0-0). International Nutrition and World Hunger. S. Prerequisite: Admission to GP-IDEA program in dietetics. Offered only as an online course.

- Magnitude, causes, and nature of hunger and under-nutrition; programs and policies to alleviate hunger. (NT-O)

FSHN 509 03(0-0-3). Nutrition Counseling and Education Methods. F. Prerequisite: Admission to the GP-Idea online M.S. in Dietetics. Offered only online.

- Application of learning theories and nutrition counseling with individuals and groups in the community and clinical settings. (NT-O)

FSHN 510 03(0-0-3). Pediatric Clinical Nutrition. F. Prerequisite: Admission to the GP-Idea Program in Dietetics.

- Physiological, biochemical and nutritional aspects of disease processes relevant to infants and children up to 18 years of age. (NT-O)

FSHN 511 03(3-0-0). Maternal and Child Nutrition. F, SS. Prerequisite: Admission to the GP-Idea Program in Dietetics; written permission of instructor.

- Behavioral, physiological and public health issues impacting dietary and nutritional factors that support growth and development. (NT-O)

FSHN 512 03(0-0-3). Nutritional Aspects of Oncology. S. Prerequisite: Enrolled in the GP-Idea Online M.S. in Dietetics. Offered as an online course only through the Division of Continuing Education.

- Relationships between nutrition and cancer including the role of nutrition in specific cancers, cancer prevention and patient management. (NT-O)

FSHN 520 03(3-0-0). Advanced Medical Nutrition Therapy. SS. Prerequisite: FSHN 550 or FSHN 551 or admission to GP-IDEA program in dietetics.

- Role of nutrition in etiology and treatment of selected disorders. (NT-O)

FSHN 525 02(2-0-0). Nutrition Education Theories and Practice. F. Prerequisite: FSHN 350.

- Examination of current theories, skills, and models used in nutrition education programs as preparation for research and practice.

FSHN 540 03(3-0-0). Nutrigenomics and Advanced Lipid Metabolism. S. Prerequisite: Admission to GP-IDEA program in dietetics. Offered as an online course only.

- How nutrients regulate gene expression (nutrigenetics) and how genotype influences an individual's nutrient requirements (nutrigenomics). (NT-O)

FSHN 550 03(3-0-0). Advanced Nutritional Science I. S. Prerequisite: BC 351 or BC 403; FSHN 350.

- Protein, vitamin, mineral metabolism; human studies, animal models.

FSHN 551 03(3-0-0). Advanced Nutritional Science II. F. Prerequisite: BC 351 or BC 403; FSHN 350.

- Carbohydrate, lipid, energy metabolism; human studies, animal models.

FSHN 575 01(1-0-0). Nutrition Education for a Healthy Heart. F, S, SS. Prerequisite: None. Offered only as a correspondence course only.

- Nutrition-related issues of atherosclerotic cardiovascular disease risk reduction and background in the art/science of facilitating behavior change. (NT-C)

FSHN 586 Var[1-3] Practicum-Advanced Clinical Nutrition. SS.

- CT- Offering: An optional clinical experience in the community.

FSHN 587A-C 06(0-18-0). Internship.


FSHN 590 Var. Workshop. SS.

FSHN 620 03(2-0-1). Community Nutrition Planning and Evaluation. S. Prerequisite: FSHN 350.

- Community nutrition assessment; nutrition program planning and evaluation, nutrition policy analysis.

FSHN 628 02(2-0-0). Advanced Nutrition Counseling Techniques. F. Prerequisite: None.

- Principles, strategies, and techniques for interviewing, assessing, and providing nutrition counseling in community settings.

FSHN 630/HES 630 03(3-0-0). Integrative Exercise and Nutrition Metabolism. S. Prerequisite: FSHN 551; HES 610. Credit not allowed for both FSHN 630 and HES 630.

- Advances in integrative human metabolism under conditions of changing energy flux.

FSHN 640 02(2-0-0). Selected Topics in Nutritional Epidemiology. F. Prerequisite: FSHN 350; STAT 301 or STAT 307/ERHS 307.

- Overview of topics in nutritional epidemiology; study design, interpretation of findings, linkage of data to action.

FSHN 650A-C 02(2-0-0). Recent Developments in Human Nutrition.


FSHN 660 02(2-0-0). Women’s Issues in Lifecycle Nutrition. S. Prerequisite: FSHN 459.

- Current nutritional issues related to selected stages of lifecycle compared to normal adult nutritional needs.

FSHN 661 02(2-0-0). International Nutrition. F. Prerequisite: FSHN 350.

- Roles of technological programs and international agencies in meeting nutritional needs.

FSHN 670 02(1-2-0). Laboratory Methods. F. Prerequisite: CHEM 245; CHEM 246.

- Laboratory techniques and instrumentation in nutrition and food science.

FSHN 675 03(3-0-0). Regulation of Energy Intake. S. Prerequisite: FSHN 350; PSY 454.

- Central and peripheral mechanisms controlling energy intake with emphasis on humans. Current theories, experimental approaches, and new research.

FSHN 684 Var. Supervised College Teaching. F, S.

FSHN 686A-C Var. Practicum.

- A) Counseling. Prerequisite: FSHN 520. (S) B) Nutrition. C) Food service.

FSHN 692 01(0-0-1). Seminar.

FSHN 695A-C Var. Independent Study.

FHSN 696A-D Var. Group Study. F, S, SS.
   A) Food science. B) Nutrition. C) Dietetics. 01(0-0-1). F, S. Prerequisite: Admission to the GPIdea online M.S. in Dietetics. (NT-O) D) Exercise and nutrition.

FHSN 698A-C Var. Research.
   A) Dietetics. F, S. Prerequisite: Enrollment in the Great Plains Idea program in Dietetics. Offered as an online only course through the Division of Continuing Education. (NT-O). B) Nutrition. F, S, SS. C) Food service management. F, S, SS.

   B) Nutrition. C) Food service management.

°FHSN 700 02(2-0-0). Cellular Nutrition. F. Prerequisite: FSHN 550 and FSHN 551 or BC 403 and BMS 501.
   Essential nutrient requirements of cells and organs.

FHSN 792 01(0-0-1). Seminar-Research Topics in Nutrition. F, S.
   Ph.D. seminar in literature review.

FHSN 795 Var. Independent Study.

FHSN 796 01(0-0-1). Group Study.

FOOD TECHNOLOGY COURSES
Department of Food Science and Human Nutrition
College of Health and Human Sciences

FTEC 110 03(3-0-0). Food—From Farm to Table. S. Prerequisite: None.
Commercial food processing related to preservation and enhancing of food quality, safety, and value.

FTEC 210 03(2-2-0). Science of Food Fermentation. F. Prerequisite: CHEM 107 or CHEM 111; LIFE 205 or MIP 300.
Science, history, culture, gastronomy, safety, health, and nutrition aspects of fermented foods and beverages. ($)

FTEC 350 02(2-0-0). Fermentation Microbiology. S. Prerequisite: CHEM 245 or FTEC 210 or LIFE 206 or MIP 302.
Integration of fermentation science, microbiology, and chemistry.

FTEC 360 03(1-4-0). Brewing Processes. F. Prerequisite: CHEM 245; FTEC 210.
Influence of raw material selection, malting, mashing, boiling, and fermentation on quality of beverages.

FTEC 400 03(3-0-0). Food Safety. F. Prerequisite: CHEM 107 or CHEM 111.
Safety of human food emphasizing safe production, processing, marketing, preparation, consumption, and regulations.

*FTEC 420 03(2-2-0). Quality Assessment of Food Products. S. Prerequisite: FTEC 110; LIFE 205.
Quality control of raw ingredients to manufactured products; assessment and sensory evaluation of foods.

+FTEC 422 02(1-2-0). Brewing Analysis and Quality Control. S. Prerequisite: FTEC 460. Required field trips.
Assessment, quantification, and control of various aspects of commercial beer production.

°FTEC 430 02(1-2-0). Sensory Evaluation of Fermented Products. S. Prerequisite: FSHN 301 or FTEC 210.
Application of sensory evaluation techniques to the study of fermented foods.

FTEC 440 02(2-0-0). Refining and Packaging Technology. S. Prerequisite: FTEC 360.
Science, technology and management of refining and packaging.

*FTEC 447 02(2-0-0). Food Chemistry. S. Prerequisite: CHEM 245 or CHEM 345.
Chemistry of food constituents as related to food quality and stability.

FTEC 460 03(2-2-0). Brewing Science and Technology. F, S. Prerequisite: CHEM 245; MATH 118; 21 years of age; completed 60 credits.
Scientific and technical aspects of brewing, fermenting, finishing, and evaluating microbrewed style of lagers and ales. ($)

FTEC 487 Var[1-15]. Internship.

FTEC 492 02(1-0-1). Seminar: Fermentation Science & Technology. F. Prerequisite: FTEC 460; FTEC 465.
Capstone seminar in fermentation science and technology.

FTEC 495 Var. Independent Study.

*FTEC 496A-B 01(0-0-1). Group Study in Fermentation Science. S. Prerequisite: FSHN 350 or FTEC 360.

°FTEC 570 02(2-0-0). Food Product Development. F. Prerequisite: FTEC 447.
Food product concepts, feasibility, and evaluation.

*FTEC 572 02(2-0-0). Food Biotechnology. S. Prerequisite: MIP 334.
Interrelationships among microorganisms, food processing methods, advances in biotechnology and food quality, spoilage, shelf-life and safety.

FTEC 574 02(2-0-0). Current Issues in Food Safety. S. Prerequisite: None.
Current food safety issues from field to table; microbiological, consumer, processing, and agricultural issues.

*FTEC 576 02(2-0-0). Cereal Science. F. Prerequisite: FTEC 447.
Chemistry and functionality of cereal grain components and their importance in human nutrition.

*FTEC 578 03(2-0-1). Bioactives and Probiotics for Health. S. Prerequisite: BC 351; LIFE 205 or MIP 300.
Mechanisms through which functional foods and probiotics modulate intracellular signal transduction and protein expression in chronic disease states. (NT-O)

FTEC 698 Var. Research.


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FISH, WILDLIFE, AND CONSERVATION BIOLOGY COURSES

Department of Fish, Wildlife, and Conservation Biology
Warner College of Natural Resources

Essentials of wildlife ecology as a foundation for understanding issues on the origins, management and conservation of biodiversity. (NT-O)

+FW 111 01(5-1-0). Basic Outdoor Skills in FWCB. F, S. Prerequisite: May be taken up to 3 times for a maximum of 3 credits. Required field trips.
Basic outdoor skills crucial for FWCB and outdoor novices. History of wildlife conservation and reasons for declining outdoor participation. ($)

+FW 204 03(2-3-0). Introduction to Fishery Biology. F. Prerequisite: None. Required field trips.
Exposure to sampling techniques, agencies, and topics in fishery biology careers. ($)

FW 260 03(3-0-0). Principles of Wildlife Management. F, S. Prerequisite: MATH 124; BZ 110 or LIFE 103.
Ecology principles applied to conservation and management of fish/wildlife resources. Quantitative methods, socioeconomic factors, population dynamics.

FW 300 02(2-0-0). Ichthyology. S. Prerequisite: BZ 111 or LIFE 103.
Biology of fishes: anatomy, taxonomy, physiology, behavior, ecology, evolution, and zoogeography.

+FW 301 01(0-2-0). Ichthyology Laboratory. F, S. Prerequisite: FW 300 or concurrent registration. Required field trips.
Anatomy, taxonomy, evolution, and ecology of North American freshwater fishes. ($)

FW 350 04(3-2-0). Teaching Shooting Responsibility. S. Prerequisite: None.
Education and instructor certification course to develop knowledge, skills, behavior for teaching about firearms, shooting sports, and associated ethics.

FW 355 02(0-0-2). Hunter Education for Instructors. F, S. SS. Prerequisite: None. Offered only through the Division of Continuing Education.
Principles of learning and teaching for instructors of state hunter education courses. (NT-C/O)

FW 356 03. Leopold's Ethic for Wildlife and Land. F, S. SS. Prerequisite: None. Offered as a correspondence course only.
Philosophy, art, history, and science of wildlife and land management from writings of Aldo Leopold. (NT-C)

FW 357 03. Wildlife Habitat on the Great Plains. F, S. SS. Prerequisite: None. Offered as a correspondence course only.
Management of cover, food, and water for wildlife and fish in the Great Plains. Emphasis on practices compatible with other uses of private land. (NT-C)

FW 370 03(2-2-0). Design of Fish and Wildlife Projects. F, S. Prerequisite: FW 260 or FW 360; LAND 220/LIFE 220 or LIFE 320; MATH 155 or MATH 160; NR 220; STAT 301 or STAT 307.
Design, analysis, and evaluation of wildlife projects; lab exercises in design and data analysis; preparation and presentation of project proposals.

+FW 375 03(1-4-0). Field Wildlife Studies. S, SS. Prerequisite: FW 260; LAND 220/LIFE 220 or LIFE 320. Required field trips.
Field trip to see wildlife management and habitats and to discuss problems and practices with professional ecologists and resources managers. ($)

FW 384 Var[1-5]. Supervised College Teaching. F, S. SS. Prerequisite: Written consent of instructor. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.
Instruction and practice in laboratory instruction in lower-division departmental courses.

FW 400 03(2-0-1). Conservation of Fish in Aquatic Ecosystems. F. Prerequisite: FW 300; LIFE 320.
Ecological processes that create habitat and biotic template for fish in aquatic ecosystems; human effects; strategies for conserving fishes. ($)

FW 401 03(2-3-0). Fishery Science. F. Prerequisite: FW 300; MATH 141 or MATH 155 or MATH 160; STAT 301 or STAT 307.
Theory, philosophy, and applications for study and management of fishery resources. ($)

FW 402 04(3-2-0). Fish Culture. S. Prerequisite: FW 300.
Principles and practices to produce food, bait, and sport fishes. ($)

*FW 405 03(2-3-0). Fish Physiology. S. Prerequisite: BZ 214 or FW 300. Credit not allowed for both FW 405 and FW 605.
Physiological ecology of fishes; functional adaptations and adjustments used to cope with environmental and physiological states. ($)

FW 455 03(3-0-0). Principles of Conservation Biology. F, S. Prerequisite: FW 260; LIFE 320; STAT 301 or STAT 307. Credit not allowed for both FW 455 and FW 555.
Review of efforts to study and conserve biological diversity, focused on fish and wildlife populations.

+FW 465 03(2-2-0). Managing Human-Wildlife Conflicts. S. Prerequisite: FW 260. Required field trips.
Methods for resolving conflicts caused by wildlife: integrating animal behavior, population dynamics, economics, and human dimensions into solutions.

*FW 467 03(2-0-1). Wildlife Disease Ecology. F. Prerequisite: LIFE 320.
Ecological, epidemiological, and evolutionary principles of disease in fish and wildlife populations; contemporary issues in disease ecology.

*FW 468 03(2-3-0). Wild Bird Management. S. Prerequisite: FW 360.
Ecology and management of game, pest, and rare bird populations and nongame bird communities.

+FW 469 03(3-0-0). Conservation and Management of Large Mammals. F. Prerequisite: BZ 330; FW 260; LIFE 320; STAT 301 or STAT 307. Required field trips.
Principles of behavior, ecology, population dynamics, and conservation related to large mammals. ($)

+FW 471 04(2-4-0). Wildlife Data Collection and Analysis. F, S. Prerequisite: FW 370; NR 220. Required field trips.
Analysis methods used in wildlife management and research; adaptive resource management with emphasis on learning through field and computer labs. ($)

FW 472 03(2-0-1). Issues in Animal Conservation and Management. F. Prerequisite: FW 260; LIFE 320.
Current and emerging issues in fish and wildlife conservation and management at the state, national and global scales.

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; S Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
FW 475 03(3-0-0). Conservation Decision Making S. Prerequisite: MATH 155 or MATH 160; STAT 301; an ecology class; junior or senior standing.
Structured approaches to conservation and management of vertebrates; articulating objectives, developing management options, and predicting outcomes.

*FW 477 03(1-3-1). Wildlife Habitat Use and Management. F. Prerequisite: FW 260; NR319 or NR322. Credit not allowed for both FW 477 and FW 677. Required field trips.
Wildlife habitat evaluation, classification, and improvement; analysis of habitat use patterns; planning and implementation of management plans. (S)

FW 487 Var[1-6]. Internship. Prerequisite: Written consent of instructor.
Field experience in fish and wildlife management.

FW 492 01(0-0-1). Seminar-Wildlife Biology.

FW 495A-B Var. Independent Study. Prerequisite: One course in resource management; one course in ecology; written consent of instructor.

FW 496A-B Var. Group Study. Prerequisite: One course in resource management; one course in ecology.

*FW 540 03(2-0-0). Fisheries Ecology. S. Prerequisite: One course in fishery science; one course in aquatic ecology.
Population, community, and ecosystem management for fishes and other aquatic organisms in freshwater habitats.

FW 544 03(2-0-1). Ecotoxicology. S. Prerequisite: LAND 220/LIFE 220 or LIFE 320; STAT 301 or STAT 307.
Ecological effects of contaminants on populations, communities, and ecosystems.

FW 551 03(2-0-1). Design of Fish and Wildlife Studies. F. Prerequisite: STAT 301 or STAT 307.
Principles, types of studies and philosophy of science in design of experimental, observational, and sampling studies for wildlife investigations. (NT-O)

*FW 552 03(3-0-0). Applied Sampling for Wildlife/Fish Studies. S. Prerequisite: STAT 301 or STAT 307.
Survey sampling theory and techniques, including distance sampling, with emphasis on wildlife and fish studies.

FW 555 03(3-0-0). Conservation Biology. S. Prerequisite: LAND 220/LIFE 220 or LIFE 320; STAT 301 or STAT 307.
Ecological factors in conservation of biological diversity.

FW 561A-E Var[1-3]. Advanced Topics. F, S. Prerequisite: Written consent of instructor.

*FW 567 03(2-0-1). Wildlife Disease Ecology. F. Prerequisite: Graduate standing; LIFE 320; STAT 301 or STAT 307.
Ecological, epidemiological, and evolutionary principles of disease in fish and wildlife populations; contemporary issues in disease ecology. (NT-O)

FW 573 03(3-0-0). Travel Abroad-Wildlife Ecology/Conservation. SS. Prerequisite: Written consent of instructor.
Study tour of various overseas ecosystems and natural resources conservation programs; discussions with local ecologists/managers.

FW 575 03(0-0-3). Wildlife Habitat Evaluation for Educators. F, S, SS. Prerequisite: Graduate standing. Offered only through the Division of Continuing Education.
Teachers or leaders implement wildlife habitat evaluation procedures in classroom or community programs and evaluate performance of students. (NT-C/O)

FW 576 03(0-0-3). Wildlife Policy, Administration, and Law. F, S, SS. Prerequisite: Written consent of instructor.
Evolution of policy affecting wildlife and humans using historical, current, philosophical, legal, and administrative constructs. (NT-C/O)

*FW 605 04(2-3-1). Advanced Physiological Ecology of Fishes. S. Prerequisite: FW 300. Credit not allowed for both FW 605 and FW 405.
Physiological ecology of fishes; functional adaptations and adjustments used to cope with environmental and physiological states. (S)

*FW 662 03(1-2-1). Wildlife Population Dynamics. S. Prerequisite: FW 260; MATH 155 or MATH 160; STAT 301.
Population models; experimental evidence and analysis of theories of population regulation; case studies.

*FW 663 05(3-3-1). Sampling and Analysis of Vertebrate Populations. S. Prerequisite: FW 260; STAT 301.
Sampling and analysis of fish and wildlife populations, including survival estimation, capture-recapture sampling, and transect sampling.

*FW/STAT 673 03(3-0-0). Hierarchical Modeling in Ecology. F. Prerequisite: ESS 575 or STAT 420. Credit not allowed for both FW 673 and STAT 673.
Hierarchical ecological modeling using common forms of data in fish and wildlife studies and emphasizing spatial and temporal aspects of analysis.

*FW 677 03(1-3-1). Wildlife Habitat Management. F. Prerequisite: FW 260. Credit not allowed for both FW 477 and FW 677.
Habitat models; vegetation manipulation and monitoring for wildlife; extended field trips. (S)

FW 684 Var[1-5]. Supervised College Teaching. Prerequisite: Written consent of instructor.


Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
GEOLOGY COURSES
Department of Geosciences
Warner College of Natural Resources

+GEOL 120 03(3-0-0). Exploring Earth: Physical Geology. (GT-SC2, AUCC 3A) F, S, SS. Prerequisite: None. Credit allowed for only one of the following: GEOL 120, GEOL 122, GEOL 124l, GEOL 150. Required field trips. Develops scientific understanding through introduction to earth processes, materials, resources, and hazards.

GEOL 121 01(0-2-0). Introductory Geology Laboratory. (GT-SC1, AUCC 3A) F, S, SS. Prerequisite: GEOL 120 or GEOL 122 or GEOL 124 or concurrent registration in GEOL 120 or GEOL 122 or GEOL 124. Credit allowed for only one of the following: GEOL 150, GEOL 121.

Laboratory applications of introductory geology. ($)

GEOL 122 03(3-0-0). The Blue Planet: Geology of Our Environment. (GT-SC2, AUCC 3A) F, S, SS. Prerequisite: None. Credit allowed for only one of the following: GEOL 120, GEOL 122, GEOL 124, GEOL 150.

Develops scientific understanding through introduction to geological processes, natural hazards, earth resources, and their impacts on society.

GEOL 124 03(3-0-0). Geology of Natural Resources. (GT-SC2, AUCC 3A) S. Prerequisite: None. Credit allowed for only one of the following: GEOL 120, GEOL 122, GEOL 124, GEOL 150.

Develops scientific understanding through introduction to the origin, use, and environmental impact of geological resources extracted from the Earth.

+GEOL 150 04(3-3-0). Physical Geology for Scientists and Engineers. F. Prerequisite: None. Credit allowed for only one of the following: GEOL 120, GEOL 122, GEOL 124, GEOL 150. Required field trips.

Earth materials, structures, and surface processes. Geologic analysis using field data, topographic and geologic maps, and aerial photos. ($)

+GEOL 154 04(3-3-0). Historical and Analytical Geology. S. Prerequisite: GEOL 120 or GEOL 122 or GEOL 124 or GEOL 150.

Physical and biological history of Earth with introduction to laboratory, computer, and field techniques. ($)

+GEOL 232 03(2-3-0). Mineralogy. F. Prerequisite: CHEM 111 or concurrent registration; GEOL 120 or GEOL 122 or GEOL 124 or GEOL 150; MATH 124. Required field trips.

Crystalline structures, chemical, rock-forming and economically important minerals, crystal growth and defects, physical properties of minerals. ($)

GEOL 250 03(2-2-0). The Solid Earth. S. Prerequisite: GEOL 120 or GEOL 122 or GEOL 124 or GEOL 150; MATH 124; MATH 125.

Structure, flow, and composition of the deep Earth; introduction to geophysics; tests of plate tectonic theory.

GEOL 332 02(1-2-0). Optical Mineralogy. F. Prerequisite: GEOL 232 or concurrent registration.

Fundamental light optics in crystalline substances; optical indicatrix; isotropic, uniaxial, and biaxial substances; common minerals in thin section. ($)

GEOL 342 03(3-0-0). Paleontology. F. Prerequisite: GEOL 154.

Description of invertebrates, vertebrates, and plants and their distribution in earth history.

+GEOL 344 04(3-3-0). Stratigraphy and Sedimentology. F. Prerequisite: GEOL 154 with a C or better. Required field trips.

Description, genesis, correlation and age of sediments, sedimentary rocks and layered rock sequences. ($)

+GEOL 364 04(3-3-0). Igneous and Metamorphic Petrology. S. Prerequisite: GEOL 232, with a grade of C- or better. Required field trips.

Identification, classification, geochemistry, petrogenesis of igneous and metamorphic rocks; textural interpretation of hand samples and thin sections. ($)

+GEOL 366 04(3-3-0). Sedimentary Petrology and Geochemistry. F. Prerequisite: CHEM 113; GEOL 154; GEOL 364. Required field trips.

Composition, identification, and classification of sedimentary rocks; geochemical processes affecting sedimentary rocks and surficial deposits. ($)

+GEOL 372 04(3-3-0). Structural Geology. S. Prerequisite: GEOL 154; MATH 125; concurrent registration in PH 141. Required field trips.

Stress and strain in rocks, geometry of deformed rocks, and tectonic principles. ($)

+GEOL 376 03(1-4-0). Geologic Field Methods. S. Prerequisite: GEOL 344; GEOL 372 or concurrent registration.

Scientific, surveying, and mapping methods used in geologic field studies; proposal, map, and report preparation. ($)

GEOL 384 Var[1-5]. Supervised College Teaching. Prerequisite: Written consent of instructor. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

Instruction and practice in laboratory instruction in lower-division departmental courses.

GEOL 401 01(0-3-0). Geology of the Rocky Mountain Region. F. Prerequisite: GEOL 154. May be taken up to three times for credit. Does not count as a geology elective in the departmental major.

Field course; geology of the local Rocky Mountain region. ($)

+GEOL 436 06(0-18-0). Geology Summer Field Course. SS. Prerequisite: GEOL 364; GEOL 376. Required field trips.

Geophysical mapping, measuring sections, interpreting geologic history in Colorado. Required comprehensive reports, geologic maps, and cross sections. ($)

GEOL 442 04(3-2-0). Applied Geophysics. F. Prerequisite: GEOL 372; MATH 161; PH 142.

Geophysical exploration methods emphasizing hydrocarbon and mineral exploration, hydrogeology, and engineering applications.

+GEOL 446 03(3-0-0). Environmental Geology. S. Prerequisite: CHEM 111; GEOL 120 or GEOL 122 or GEOL 124 or GEOL 150; PH 141. Required field trips.

Geology applied to environmental problems.

*GEOL 447 03(2-3-0). Mineral Deposits. F. Prerequisite: GEOL 366; GEOL 372.

Occurrence, origin, and exploration of economic metallic mineral deposits. ($)

+GEOL 452 04(3-3-0). Hydrogeology. F. Prerequisite: GEOL 120 or GEOL 122 or GEOL 124 or GEOL 150 or ESS 210/GR 210; MATH 161 or MATH 255; PH 141. Required field trips.

Interaction of water and geologic materials; surface and groundwater; quantitative analysis and geologic effects on quality and flow of groundwater. ($)

GEOL 454 04(3-3-0). Geomorphology. S. Prerequisite: GEOL 120 or GEOL 122 or GEOL 124 or GEOL 150 or ESS 210/GR 210; STAT 301 or STAT 307 or STAT 315.

Origin of landforms; morphology and processes. ($)

+GEOL 492 Var. Seminar. F, S. (S)

GEOL 494A-1 Var. Independent Study.

Alternate year offering (odd); * Alternate year offering (even); + Field trips; S Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT_subcode = State Guarantee Transfer course and AUCC_subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)

GEOL 498 Var[1-6]. Research. S. Prerequisite: Written consent of instructor.

+GEOL 530 03(2-2-0). Advanced Petrology. S. Prerequisite: GEOL 364.
  Igneous and metamorphic processes and products explored through thermodynamics, phase equilibria, and textural analysis.

+GEOL 546 04(3-3-0). Sedimentary Basin Analysis. S. Prerequisite: GEOL 344. Required field trips.
  Sedimentologic data base, correlation, mapping, facies models, classification, and evolution of sedimentary basins. Applications to petroleum exploration. ($)

°GEOL 547 03(3-0-0). Ore Deposit Geochemistry. S. Prerequisite: GEOL 447.
  Geochemical techniques applied to the geology, exploration, and environmental analysis of ore deposits.

GEOL 551 03(3-0-0). Groundwater Modeling. S. Prerequisite: GEOL 452 or CIVE 423.
  Groundwater modeling from a geologic perspective. Conceptual models and computer modeling of groundwater flow and solute transport.

GEOL 552 Var[2-3]. Advanced Topics in Hydrogeology. S. Prerequisite: GEOL 452.
  Current literature, new techniques, legislative and political developments in hydrogeology, and appropriate case histories.

°GEOL 560 03(3-0-0). Clay Mineralogy. F. Prerequisite: GEOL 364.
  Crystallography and chemistry of clay minerals. Applications to geology, engineering, and soil sciences, X-ray analysis of clays.

°GEOL 562 03(3-0-0). Statistical Data Analysis in Earth Resources. 
  F. Prerequisite: STAT 340; STAT 350.
  Statistical parameters, sequential data, map analysis, and multivariate data.

°GEOL 565 03(3-0-0). Petroleum Geochemistry and Geology. S. Prerequisite: GEOL 366; GEOL 372.
  Geochemistry and geology of hydrocarbon generation, migration, and accumulation. Applications to hydrocarbon exploration.

°GEOL 567 03(3-0-0). Sedimentary Geochemistry. S. Prerequisite: GEOL 366.
  Geochemical processes affecting sedimentary rocks and other surficial materials.

°GEOL 570 03(3-0-0). Plate Tectonics. S. Prerequisite: GEOL 364; GEOL 372; PH 142.
  Examination of the historical development of plate tectonic theory and its application to understanding geological processes.

*GEOL 575 04(3-2-0). Subsurface Geophysical Mapping. S. Prerequisite: GEOL 344; GEOL 372; MATH 161; PH 142.
  Advanced techniques for creating subsurface geological maps based on seismic reflection and well log data.

°GEOL 576 03(3-0-0). Exploration Seismology. S. Prerequisite: GEOL 344; GEOL 372; MATH 161; PH 142.
  Seismic exploration methods, including theory, data acquisition, and data processing.

GEOL 578 04(3-2-0). Global Seismology. F. Prerequisite: PH 142; MATH 261.
  Quantitative introduction to seismology; basics of seismic data analysis; fundamentals of wave propagation; earthquakes; structure of the Earth.

+GEOL 601 01(0-0-1). Geoscience Approaches and Thesis Proposals. F. Prerequisite: Graduate student standing in geosciences. Required field trips.
  Core concepts of scientific approaches, local geology of Colorado, and preparation of geoscience thesis proposals.

+GEOL 652 03(3-0-0). Fluvial Geomorphology. F. Prerequisite: GEOL 120. Required field trips.
  Geomorphology of channels, slopes, and drainage systems. ($)

+GEOL 672 03(2-3-0). Advanced Structural Geology. F. Prerequisite: GEOL 436. Required field trips.
  Rheology, deformation mechanisms, structural associations, and advanced methods of structural analysis. ($)

GEO 684 Var[1-5]. Supervised College Teaching. F, S, SS. Prerequisite: Written consent of instructor.

GEOL 692 Var. Seminar.

GEOL 695 Var. Independent Study.

+GEOL 696 Var. Group Study.

GEOL 698 Var. Research.


*GEOL 747 04(3-3-0). Advanced Sedimentary Petrology. S. Prerequisite: GEOL 344.
  Classification, origin, depositional history, and diagenesis of detrital sedimentary rocks as determined from thin sections.

GEOL 798 Var. Research.

GLOBAL ENVIRONMENTAL SUSTAINABILITY COURSES
Nondepartmental, Interdisciplinary
School of Global Environmental Sustainability
Office of Provost and Executive Vice President

GES 101 03(3-0-0). Foundations of Environmental Sustainability. F.
Prerequisite: None.
Concepts, foundations, and metrics of global environmental sustainability applied to global challenges. (NT-O)

GES 192 Var[1-3]. Global Environmental Sustainability Seminar. F, S.
Prerequisite: None.
Critical interconnections of global environmental sustainability, the environment, economics, and society.

GES 470 03(3-0-0). Applications of Environmental Sustainability. S.
Prerequisite: GES 101; 12 credits of GES interdisciplinary minor; junior or senior standing.
Integration of dimensions of global environmental sustainability—environment, society, and economy—through case studies and team project.

GES 520 03(3-0-0). Issues in Global Environmental Sustainability.
F, S. Prerequisite: Graduate standing.
Analysis of the different major dimensions/definitions of sustainability in current issues involving environmental, social and economic systems.

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
GEOGRAPHY COURSES
Department of Anthropology
College of Liberal Arts

GR 100 03(3-0-0). Introduction to Geography. F, S. (GT-SS2, AUCC 3C) Prerequisite: None.
Major geographic themes applied to selected regions; physical environment, human-land relationships, regional analysis. (NT-O)

GR 210 03(3-0-0). Physical Geography. F, S. Prerequisite: None. Credit not allowed for both GR 210 and ESS 210.
Energy, mass budget, and human impacts on atmosphere, hydrosphere, and continental land surfaces.

GR 304/WR 304 03(3-0-0). Sustainable Watersheds. F, S. Prerequisite: Completion of the AUCC 1B mathematics requirement. Credit not allowed for both GR 304 and WR 304.
Effects of climate, land use, and water use on the sustainability of water quantity and quality.

GR 311 03(1-4-0). GIS for Social Scientists. F, S, SS. Prerequisite: GR 100.
Applications of GIS techniques useful to the social sciences. Mapping techniques and GIS toolkits are practiced in lab. (NT-O)

°GR 320 03(3-0-0). Cultural Geography. F. Prerequisite: GR 100.
Geographic analysis of cultural phenomena, elements emphasizing human-land relationships and spatial patterns of agriculture, cities, language, religion. (NT-O)

GR 323/NR 323 03(2-2-0). Remote Sensing and Image Interpretation. F. Prerequisite: None. Credit allowed for only one of the following: GR 323, NR 323, GR 503, NR 503.
Remote sensing systems and applications; characteristics of photographic, scanner and radar images; imagery interpretation.

GR 330 03(3-0-0). Urban Geography. F, S, SS. Prerequisite: GR 100.
Spatial distribution of urban areas and the geographic similarities and contrasts that exist between and within them. (NT-O)

+GR 342 03(3-0-0). Geography of Water Resources. F. Prerequisite: None. Required field trips.
Overview of spatial and temporal issues. ($)

°GR 345 03(3-0-0). Geography of Hazards. S. Prerequisite: ESS 210/GR 210.
Causes, effects, distributional patterns, and human adjustments to environmental hazards.

GR 410 03(3-0-0). Climate Change: Science, Policy, Implications. S. Prerequisite: 3 credits of geography (GR) course work.
Implications and consequences for earth systems including the cryosphere, hydrosphere, and biosphere.

GR 415 03(3-0-0). The Geography of Commodities. F, S, SS. Prerequisite: GR 100.
Social relations, international trade, and environmental impacts surrounding the production, transportation, exchange and consumption of commodities.

GR 420 04(3-2-0). Spatial Analysis with GIS. F. Prerequisite: 3 credits of geography (GR) course work. Credit not allowed for both GR 420 and NR 322.
Theory, application of geographic information systems for spatial analysis; conceptual basis of GIS, nature and use of geographic data, case studies.

*GR 430 03(3-0-0). Land Change Science and Remote Sensing. S. Prerequisite: GR 100.
Local case studies and global cases of land-use/land-cover changes in rural, peri-urban, and urban areas.

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GRADUATE SCHOOL COURSES

Nondepartmental

Graduate School

GRAD 510 03(2-2-0). Fundamentals of High Performance Computing. S. Prerequisite: None. UNIX; networks; scalar, vector, and parallel architectures; performance programming.

GRAD 511 03(2-2-0). High Performance Computing and Visualization. F. Prerequisite: GRAD 510. Interactive methods for linear systems; Monte Carlo methods; visualization and image processing.

GRAD 544 01(1-0-0). Ethical Conduct of Research. F, S. Prerequisite: None. This is a partial-semester course. Principles and practice of ethical conduct of research.

GRAD 550 01(1-0-0). STEM Communication. F. Prerequisite: None. Review and practice of key communication principles for Science, Technology, Engineering, and Mathematics (STEM) professionals.

GRAD 592 01(0-0-1). Water Resources Seminar. F. Prerequisite: None. Interdisciplinary seminar emphasizing issues important to water resources community. Content relates to a preselected theme each semester.

GRAD 596 Var[1-3]. Group Study-Graduate Education. SS. Prerequisite: Graduate School approval. Preparation for graduate education.

GRAD 792 02(0-0-2). Seminar on College Teaching. F, S. Prerequisite: None. Role of college teacher emphasizing applied principles and practices derived from empirical research and collective experience of teaching professors.

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
HUMAN DEVELOPMENT AND FAMILY STUDIES COURSES

Department of Human Development and Family Studies
College of Health and Human Sciences

HDFS 101 03(3-0-0). Individual and Family Development. (GT-SS3, AUCC 3C), F, S, SS. Prerequisite: None.
Principles of life-span human development in the context of the family. Theory and research on the influence of family systems on individuals. (NT-O)

HDFS 175/PSY 175 03. Developmental Psychology Across the Life Span. F, S, SS. Prerequisite: None. Credit not allowed for both HDFS 175 and PSY 175. Offered as telecourse only.
Theory and research on physical, cognitive, and psychosocial human development across the life span. (NT-T)

HDFS 217 03(3-0-0). Creative Experiences for Children. F, S, SS. Prerequisite: HDFS 101 or PSY 100; HDFS 277 or concurrent registration.
Theories of play; art, music, literature as related to child development. (NT-O)

HDFS 277 01(1-0-0). Professional Skills Development I. F, S, SS. Prerequisite: CO 150 or concurrent registration or HONR 193 or concurrent registration; Human Development and Family Studies or Early Childhood Education majors only.
Professional skills and opportunities relevant to contemporary issues with individuals, families and community. (NT-B)

HDFS 286 04(2-6-0). Practicum-Professional Skills. F, S, SS. Prerequisite: HDFS 101; completion of 30 credits; required background check through CBI, FBI; major in Human Development and Family Studies or Early Childhood Education only.
Observational and applied experience with children, adolescents, adults, or families. Exploration of professional skills and opportunities. (NT-O)

HDFS 302 03(3-0-0). Marriage and Family Relationships. F, S, SS. Prerequisite: HDFS 101 or SOC 100; completion of 30 credits.
Preparation for and adjustment to marital and family relationships throughout the life cycle. (NT-O)

HDFS 310 03(3-0-0). Infant and Child Development in Context. F, S, SS. Prerequisite: HDFS 101 or PSY 100; completion of 30 credits.
Physical, cognitive, and socioemotional development from conception through middle childhood in context of family, relationships, and culture. (NT-O)

HDFS 311 03(3-0-0). Adolescent/Early Adult Development in Context. F, S, SS. Prerequisite: HDFS 101 or PSY 100; completion of 30 credits.
Physical, cognitive, and socioemotional development of adolescents and young adults in context of family, relationships, and culture. (NT-O)

HDFS 312 03(3-0-0). Adult Development-Middle Age and Aging. F, S, SS. Prerequisite: HDFS 101 or PSY 100; completion of 30 credits.
Developmental issues and processes pertaining to middle and later adulthood. Contexts in which adult development and aging occur are emphasized. (NT-O)

HDFS 317 03(0-0-3). Special Needs in Early Childhood. F, S, SS. Prerequisite: HDFS 310 or PSY 260. Offered as an online course only through the Division of Continuing Education.
A typical development in early childhood and recommended practices for fostering development of young children with special needs. (NT-O)

HDFS 318 03(3-0-0). Infancy and Toddlerhood. F, S, SS. Prerequisite: HDFS 310 or PSY 260.
Physical, cognitive, language, and socio-emotional development from pre-birth through 36 months with an emphasis on applied settings. (NT-O)

HDFS 320 03(3-0-0). Cognitive and Language Development. F, S, SS. Prerequisite: HDFS 310 or PSY 260.
Cognitive and language development from birth to adulthood; including biological, social, and cultural influences. (NT-O)

HDFS 332 03(3-0-0). Death, Dying, and Grief. F, S, SS. Prerequisite: HDFS 101 or PSY 100.
Developmental processes of death and dying related to dying individuals and their families and for human service agencies. (NT-O)

HDFS 334 03(3-0-0). Parenting Across the Lifespan. F, S, SS. Prerequisite: HDFS 310 or PSY 260; completion of 60 credits.
Parenthood as a developmental process; child rearing as a function of variations in risk status, family systems, and ecological contexts. (NT-O)

HDFS 350 03(2-2-0). Applied Research Methods. F, S, SS. Prerequisite: HDFS 101 or PSY 100; STAT 201 or STAT 301 or STAT 311.
Interpret, apply and write about research findings in human development and family studies. (NT-O)

HDFS 351 03(0-0-3). Promoting Early Socioemotional Competence. F, S, SS. Prerequisite: HDFS 310. Offered only online.
Promoting positive socioemotional development and preventing challenging behaviors in early childhood, based on the Pyramid Model. (NT-O)

HDFS 375 03(3-0-0). Programming for Children and Families. F, S, SS. Prerequisite: HDFS 310 or PSY 260; completion of 60 credits.
Prevention and intervention programs for children and families. (NT-O)

HDFS 401 03(3-0-0). Childhood Socialization. F, S. Prerequisite: HDFS 310 or PSY 260; completion of 60 credits.
Socialization processes that influence human development within diverse family styles and cultures. (NT-O)

HDFS 402 03(3-0-0). Family Studies. F, S, SS. Prerequisite: HDFS 101 or SOC 100; completion of 60 credits.
Theory and research concerning relationships within families; interaction between family and other social institutions. (NT-O)

HDFS 403 03(3-0-0). Families in the Legal Environment. F, S, SS. Prerequisite: completion of 60 credits.
Legal issues related to families, including adoption, marriage, divorce, parent and child rights, consumer issues, disability, and estate planning. (NT-O)

HDFS 404 02(2-0-0). Child Life Theory and Practice. F, S, SS. Prerequisite: HDFS 310 or PSY 260.
Theories and skills related to effective child life practice in hospitals. (NT-O)

HDFS 439 03(3-0-0). Administration of Early Childhood Programs. F, S, SS. Prerequisite: HDFS 310 or PSY 260.
Center administration related to program development and operations, budgeting, state regulations and licensing, and personnel issues. (NT-O)

HDFS 445/FSHN 445 03(0-0-3). Early Childhood Health, Safety, and Nutrition. F. Prerequisite: HDFS 310. Credit not allowed for both HDFS 445 and FSHN 445. Offered only online.
Planning, promoting and maintaining healthy lifestyle and safe learning environment for preschool children. (NT-O)

HDFS 470 03(0-4-2). Campus Corps: Mentoring At-Risk Youth. F, S, SS. Prerequisite: Completion of AUCC 3C Social and Behavioral Sciences; required background check through CBI, FBI; Human Development and Family Studies majors only; written consent of instructor. Course may be taken for a maximum of 9 credits.

*-Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
Service-learning course engaging students as mentors with local at-risk youth.

HDFS 477 01(1-0-0). Professional Skills Development II. F, S, SS. Prerequisite: HDFS 277; completion of 75 credits; Human Development and Family Studies majors only. Applications and integration of human development and family background within professional settings. (NT-O)


HDFS 492 03(0-0-3). Seminar-Program Proposal Development. F, S, SS. Prerequisite: HDFS 350; HDFS 477 or concurrent registration or EDUC 400; major in Human Development and Family Studies or Early Childhood Education; completion of 90 credits. Research, development, and oral presentations of program proposals from a family systems and development perspective. (NT-O)

HDFS 493 03(0-0-3). Specialized Seminar. Prerequisite: Written consent of instructor. Advanced study of theory, research, and application in a specialized area.


HDFS 500 03(2-3-0). Issues in Human Development and Family Studies. F. Prerequisite: None. A selected, broad issue in human development and family studies emphasizing principles of research ($).

HDFS 501 01(1-0-0). Readings in the Discipline. S. Prerequisite: Admission to HDFS master’s program. Research in human development and family studies content areas; skills in writing an extended literature review.

HDFS 520 03(1-2-1). Family Therapy Practice: Treatment Planning. S. Prerequisite: Admission to the Marriage and Family Therapy Program. Integration of family/couple therapy theories and practice related to treatment planning and internal family systems therapy. ($)

HDFS 521 03(1-2-1). Family Therapy Practice: Common Factors. S. Prerequisite: Admission to the Marriage and Family Therapy Program. Application of common factors - e.g., therapeutic alliance - in family and couple therapy. ($)

HDFS 524 03(3-0-0). Family Theory. F. Prerequisite: One family studies course. Major theories and conceptual frameworks for family analysis.

HDFS 528 04(2-4-0). Child and Family Assessment. F. Prerequisite: Nine credits in human development and family studies or behavioral science at 300-400 level.

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**HDFS 636 03(3-0-0). Aging and the Family.** S. Prerequisite: One course in adult development or six credits of upper-division behavioral science.

Theory and research relating to topics on aging during middle and late years of family life cycle.

**HDFS 644 03(3-0-0). Foundations in Family Therapy.** F, SS. Prerequisite: HDFS 524.

Contemporary research and treatment strategies for parenting problems, family violence, and substance abuse.

**HDFS 650 03(2-0-1). Multivariate Research Methods I.** F. Prerequisite: HDFS 550.

Statistical concepts and analysis.

**HDFS 676 03(3-0-0). Professional Skills Development.** F. Prerequisite: Admission to Marriage and Family Therapy Program.

Fundamental skills of marriage and family therapy; clinic procedures; case assessment, planning, and management.

**HDFS 677 03(3-0-0). Ethical and Legal Issues.** S. Prerequisite: None.

Ethical and legal issues in the field of human development and family studies.

**HDFS 684 Var. Supervised College Teaching.** F, S.

**HDFS 686A-E Var[1-15]. Practicum.** Prerequisite: Nine credits in human development.


**HDFS 687A-C Var. Internship.**

Application of advanced human development skills in professional settings.

A) Human development. Prerequisite: Nine graduate credits in human development. B) Family studies. Prerequisite: Nine graduate credits in human development. C) Marriage and family therapy. Prerequisite: HDFS 677 or concurrent registration; HDFS 678 or concurrent registration; HDFS 688 or concurrent registration.

**HDFS 692 03(3-0-0). Seminar-Contemporary Family Issues.**

Prerequisite: Six credits in behavioral sciences. Current issues in the family with implications for intervention and therapy.

**HDFS 695A-C Var. Independent Study.**


**HDFS 697 Var[1-6]. Group Study.**

**HDFS 698A-B Var[1-3]. Research.**

A) Human development. B) Family studies.

**HDFS 699 Var. Thesis.** Prerequisite: HDFS 550.

**HDFS 710 03(3-0-0). Theories of Applied Developmental Science.** F. Prerequisite: HDFS 500.

Theories of applied developmental science, and implications for intervention and policy.

**HDFS 740 03(3-0-0). Family Policy and Programming.** F. Prerequisite: HDFS 500.

Social and family policy initiatives, with attention toward vulnerable populations, using a lifespan developmental perspective.

**HDFS 750 03(3-0-0). Multivariate Research Methods II.** S. Prerequisite: HDFS 650.

Applications of multivariate methods to research in applied developmental science.

**HDFS 772 03(2-0-1). Marriage and Family Therapy Supervision.** S, SS. Prerequisite: Written consent of instructor.

Prepares professionals to supervise marriage and family therapists in a variety of settings.

**HDFS 792 03(3-0-0). Issues in Applied Developmental Science.** S. Prerequisite: HDFS 500.

Current issues in applied developmental science involving a synthesis of theory, research, and application.

**HDFS 799 Var. Dissertation.**
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<tr>
<th>COURSES</th>
<th>HEALTH AND EXERCISE SCIENCE</th>
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<tbody>
<tr>
<td>HES 100A-P 01(0-3-0). Beginning Physical Education. F, S, SS.</td>
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<tr>
<td>Prerequisite: None.</td>
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<td>HES 102A-G 01(0-3-0). Physical Education Activities. F, S, SS.</td>
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<td>HES 106 01(0-3-0). Scuba Diving. F, S. Prerequisite: Intermediate ability.</td>
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<tr>
<td>HES 120 01(1-0-0). Introduction to Health and Exercise Science. F, S.</td>
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<td>Prerequisite: None.</td>
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<tr>
<td>Health and Exercise Science major, career options, campus resources, tools for academic success, various health-related topics.</td>
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<tr>
<td>HES 145 03(3-0-0). Health and Wellness. F, S, SS.</td>
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<tr>
<td>Prerequisite: None. Credit not allowed for both HES 143 and HES 145.</td>
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<tr>
<td>Personal health behaviors and personal choice in response to wellness. (NT-O)</td>
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<tr>
<td>HES 203 03(3-0-0). Motor Learning. F, S, SS. Prerequisite: PSY 100.</td>
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<tr>
<td>Motor skill acquisition as function of maturation and experience. Emphasis on strategies for facilitating skill learning in normal school-age population.</td>
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<tr>
<td>HES 207 03(2-2-0). Anatomical Kinesiology. F, S, SS.</td>
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<tr>
<td>Prerequisite: MATH 125 or concurrent registration.</td>
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<tr>
<td>Anatomical, physiological, and mechanical fundamentals of human movement.</td>
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<tr>
<td>HES 240 02(1-2-0). First Aid and Emergency Care. F, S.</td>
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<tr>
<td>Prerequisite: None.</td>
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<tr>
<td>Principles, applied techniques emphasizing emergency rescue and care. Meets requirements for Red Cross Advanced First Aid and Emergency Care Credential. ($)</td>
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<tr>
<td>HES 307 03(3-0-0). Biomechanical Principles of Human Movement. F, S, SS.</td>
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<tr>
<td>Prerequisite: BMS 301 or HES 207; PH 121 or PH 141.</td>
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<tr>
<td>Identify with and utilize biomechanical principles pertinent to human movement.</td>
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<td>HES 309 02(2-0-0). Methods of Coaching. SS.</td>
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<td>Prerequisite: None.</td>
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<td>Preparation to coach in an interscholastic athletic situation. (NT-O)</td>
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<td>HES 319 03(3-0-0). Neuromuscular Aspects of Human Movement. F, S.</td>
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<tr>
<td>Prerequisite: BMS 300 or BMS 360; BMS 301.</td>
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<tr>
<td>Neuromuscular anatomy and physiology of human movement. Applied/integrated topics: aging, muscle fatigue, training, and neuromuscular disease.</td>
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<tr>
<td>HES 332A-H 01(0-2-0). Techniques of Teaching Individual Sports. F, S.</td>
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<tr>
<td>Prerequisite: Corresponding laboratory or competency in area.</td>
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<tr>
<td>HES 340 01(1-0-0). Exercise Prescription. F, S, SS.</td>
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<tr>
<td>Prerequisite: Concurrent registration in HES 386A.</td>
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<tr>
<td>Theory and practice of exercise prescription for healthy individuals, cardiac patients, and other special populations.</td>
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$^o$Alternate year offering (odd); $^*$Alternate year offering (even); $^+$Field trips; $^S$Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
Interaction of physical activity with pathophysiology and treatment of chronic diseases and conditions.

HES 484 Var[1-5]. Supervised College Teaching. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

HES 486A-C Var[1-3]. Practicum.
A) Adaptive correctives. B) Wellness program management. Prerequisite: BMS 300 with a C or better; FSHN 150 with a C or better; HES 145 with a C or better; HES 207 with a C or better; HES 386B; 2.500 GPA. C) Coaching.

HES 487 15(0-0-40). Internship. Prerequisite: BMS 300 with a C or better; FSHN 150 with a C or better; HES 145 with a C or better; HES 207 with a C or better; HES 486B and all course work; 2.500 GPA.
Practical application of knowledge and skills in a professional situation.

HES 492 02(0-0-2). Health and Exercise Science Seminar. F, S.
Integration and reflection on health and exercise science disciplinary knowledge.

HES 495A-E Var. Independent Study.

HES 496A-E Var. Group Study.

HES 520 03(2-2-0). Advanced Exercise Testing and Prescription. S. Prerequisite: HES 405.
Theory and practice of exercise testing and prescription in apparently healthy and diseased populations. (S)

HES 530 03(3-0-0). Clinical Biomechanics. S. Prerequisite: BMS 301; HES 307.
Effect of external loads on internal tissues; concern for injury, injury prevention, and rehabilitation.

*HES 531 03(3-0-0). Muscle and Joint Mechanics. F. Prerequisite: BMS 301; HES 307.
Integrate muscle, tendon, and location of bone attachment into a comprehensive understanding of human movement at the single- and multi-joint level.

HES 545 03(3-0-0). Evolutionary Basis for Health and Fitness. S. Prerequisite: FSHN 350; HES 403.
Evolutionary basis for human health and fitness based upon dietary and exercise patterns of pre-agricultural humans.

HES 556 03(3-0-0). Wellness and Health Promotion Concepts. F. Prerequisite: None.
Discussion of theory and application of health promotion in various settings.

HES 600 03(3-0-0). Research Design in Health/Exercise Science. F. Prerequisite: One course in statistics.
The research process including design, implementation, proposal synthesis and statistical considerations applied to health and exercise science.

HES 602 03(3-0-0). Advanced Physiology of Exercise. F. Prerequisite: HES 403.
Integrative exercise physiology covering metabolism, cardiovascular physiology, pulmonary physiology, and neuromuscular physiology in humans.

HES 603 03(3-0-0). Advanced Topics in Exercise Physiology. F. Prerequisite: HES 403.
Advanced principles of theoretical and applied exercise physiology at molecular, cellular, and systemic levels.

HES 610 03(3-0-0). Exercise Bioenergetics. F. Prerequisite: HES 403.
Biology of energy transfer reactions related to human locomotion and exercise performance in both healthy individuals and disease states.

*HES 619 03(3-0-0). Advanced Neural Control of Movement. F. Prerequisite: BMS 300; BMS 301; HES 403.
Neuroanatomical, neurophysiological, and applied topics on the control of force and human movement.

HES 630/FSHN 630 03(3-0-0). Integrative Exercise and Nutrition Metabolism. S. Prerequisite: FSHN 551; HES 610. Credit not allowed for both HES 630 and FSHN 630.
Advances in integrative human metabolism under conditions of changing energy flux.

HES 645 03(3-0-0). Epidemiology of Health and Physical Activity. S. Prerequisite: HES 600.
Foundation in chronic disease epidemiology that will enable students to evaluate the current epidemiologic literature.

HES 650 03(3-0-0). Health Promotion Programming. F, S. Prerequisite: None.
Development of skills in health promotion program design, implementation and evaluation.

HES 656 03(3-0-0). Comprehensive Stress Management. F, S, SS.
Prerequisite: None.
Relationship between stress and illness emphasizing methods to impact its detrimental effects.

HES 684 Var. Supervised College Teaching.

HES 686A-E Var[1-3]. Practicum. Prerequisite: Current CPR certification.

HES 687 Var[3-9]. Internship. Prerequisite: HES 686A or HES 686B or HES 686C or HES 686D or HES 686E.
Practical application of knowledge and skills in a professional situation.

HES 692 01(0-0-1). Seminar.
Consideration of graduate education in health and exercise science.

HES 693 01(0-0-1). Seminar.
Maximum of 2 credits allowed in course.
Current topics and issues in health and exercise science.

HES 695A-D Var. Independent Study.


HES 698 Var. Research.
Non-thesis research in health and exercise science.


HES 700 03(2-0-1). Professional Skills in Bioenergetics. F. Prerequisite: Admission to doctoral program or admission to M.S. program and written consent of instructor.
Grant writing, authorship, peer review process, responsible conduct of science, research ethics, professional conduct, career opportunities.

HES 704A-B 03(3-0-0). Advanced Topics in Bioenergetics. F. Prerequisite: Graduate standing.

Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
Advanced topics in physiology, biochemistry, biomechanics, and neural control exploring pathogenesis and treatment of chronic disease.


°HES 710 03(3-0-0). Exercise in Disease Prevention. S. Prerequisite: HES 403; HES 520.
Role of exercise/physical activity in the prevention, pathophysiology and treatment of chronic diseases.

°HES 730 03(3-0-0). Cardiovascular Pathophysiology. F. Prerequisite: HES 403; HES 520.
Cardiovascular physiology with emphasis on the development, progression, and treatment of diseases of the cardiovascular system.

*HES 735 03(2-0-1). Human Cardiovascular Control. F. Prerequisite: HES 403.
Dynamics of cardiovascular control in human health and disease.

HES 784 Var[1-3]. Supervised College Teaching.

HES 786 Var[1-3]. Practicum.

HES 793 01(0-0-1). Bioenergetics Seminar. F, S.

HES 795 Var[1-3]. Independent Study.

HES 796 Var[1-3]. Group Study.

HES 798 Var[1-6]. Research.

HISTORY COURSES
Department of History
College of Liberal Arts

HIST 100 03(3-0-0), Western Civilization, Pre-Modern. (GT-H11, AUCC 3D). F, S, SS. Prerequisite: None.

Historical development of Western civilization from antiquity to the early modern era (c. 1600 C.E.).

HIST 101 03(3-0-0), Western Civilization, Modern. (GT-H11, AUCC 3D). F, S, SS. Prerequisite: None.

Historical development of Western civilization from c. 1600 C.E. to the contemporary era.

HIST 115 03(3-0-0), Islamic World to 1800. (GT-H11, AUCC 3D). F. Prerequisite: None.

Religion, society, and culture in the Islamic world from the time of Muhammad to 1800.

HIST 120 03(3-0-0), Asian Civilizations I. (GT-H11, AUCC 3D). F. Prerequisite: None.

Major traditional intellectual and cultural patterns of Asia during the formative years.

HIST 121 03(3-0-0), Asian Civilizations II. (GT-H11, AUCC 3D). S. Prerequisite: None.

Transformation of major intellectual and cultural patterns and the process of globalization in Asia.

HIST 150 03(3-0-0), U.S. History to 1876. (GT-H11, AUCC 3D). F, S, SS. Prerequisite: None.

Major issues and themes in the development of the United States from the colonial period through reconstruction.

HIST 151 03(3-0-0), U.S. History Since 1876. (GT-H11, AUCC 3D). F, S, SS. Prerequisite: None.

Major issues and themes in the historical development of the United States since reconstruction.

HIST 170 03(3-0-0), World History, Ancient-1500. (GT-H11, AUCC 3D). F, S, SS. Prerequisite: None.

Historical developments and interactions of world societies from the ancient to modern periods.

HIST 171 03(3-0-0), World History, 1500-Present. (GT-H11, AUCC 3D). F, S, SS. Prerequisite: None.

Historical developments and interactions of world societies from 1500 to the present.

HIST 250/ETST 250 03(3-0-0), African American History. (GT-H11, AUCC 3D). F. Prerequisite: None. Credit not allowed for both HIST 250 and ETST 250.

Slavery, emancipation, labor, political, socioeconomic, and cultural history of African Americans since colonial times.

HIST 252/ETST 252 03(3-0-0), Asian American History. (GT-H11, AUCC 3D). F. Prerequisite: None. Credit not allowed for both HIST 252 and ETST 252.

Asian-American historical experience in the United States from 1850s to the present time.

HIST 255/ETST 255 03(3-0-0), Native American History. (GT-H11, AUCC 3D). S. Prerequisite: None. Credit not allowed for both HIST 255 and ETST 255.

History of Native American peoples in the United States to the present, including origin stories.

HIST 300 03(3-0-0), Ancient Greece to 323 B.C.E. F. Prerequisite: HIST 100 or HIST 115 or HIST 120 or HIST 170; completion of 45 credits. Credit not allowed for both HIST 300 and HY 305.

From the Bronze Age to the death of Alexander the Great, emphasizing political, social, intellectual, and cultural developments.

HIST 301 03(3-0-0), Roman Republic. S. Prerequisite: HIST 100 or HIST 115 or HIST 120 or HIST 170; completion of 45 credits. Credit not allowed for both HIST 301 and HY 304.

Roman history from the monarchy to the fall of the republic; special emphasis on political, cultural, and social history.

HIST 302 03(3-0-0), Roman Empire. S. Prerequisite: HIST 100 or HIST 115 or HIST 120 or HIST 170; completion of 45 credits.

Roman history from the principate of Augustus to the reign of Constantine; special emphasis on political, intellectual, cultural, and social history.

HIST 303 03(3-0-0), Hellenistic World: Alexander to Cleopatra. S. Prerequisite: HIST 100 or HIST 115 or HIST 120 or HIST 170; completion of 45 credits. Credit not allowed for both HIST 303 and HY 306.

From Alexander the Great to Cleopatra VII, emphasizing intellectual, social, military, political, and cultural developments.

HIST 304 03(3-0-0), Women in Ancient Greece and Rome. F. Prerequisite: HIST 100 or HIST 115 or HIST 120 or HIST 170; completion of 45 credits. Credit not allowed for both HIST 304 and HY 309.

Comparative study of roles of women and gender in Ancient Greece and Rome.

HIST 308 03(3-0-0), Ancient Christianity to 500 A.D. F. Prerequisite: HIST 100 or HIST 115 or HIST 120 or HIST 170; completion of 45 credits. Credit not allowed for both HIST 308 and HY 451.

Growth of Christian Church from 1st to 5th century; emphasis on its role in Roman Empire; development of ecclesiastical institutions and literature.

HIST 309 03(3-0-0), Medieval Christianity, 500-1500. S. Prerequisite: HIST 100 or HIST 115 or HIST 120 or HIST 170; completion of 45 credits. Credit not allowed for both HIST 309 and HY 452.

Christian Church in Eastern and Western Christendom emphasizing its role in medieval society, relationship with the state, and its institutions.

HIST 310 03(3-0-0), Medieval Europe. F, S. SS. Prerequisite: HIST 100 or HIST 115 or HIST 120 or HIST 170; completion of 45 credits.

Political, legal, socioeconomic development of Europe from 300-1500 emphasizing emergence of major states.

HIST 311 03(3-0-0), Medieval England. S. Prerequisite: HIST 100 or HIST 115 or HIST 120 or HIST 170; completion of 45 credits. Credit not allowed for both HIST 311 and HY 410.

Political, social, and intellectual development of England from Romans to end of Middle Ages.

HIST 312 03(3-0-0), Women in Medieval Europe. F. Prerequisite: HIST 100 or HIST 115 or HIST 120 or HIST 170; completion of 45 credits.

Women in the European Middle Ages; political, social, economic, religious, and cultural developments.

HIST 315 03(3-0-0), Tudor Stuart England, 1485-1689. F, S. SS. Prerequisite: HIST 100 or HIST 101 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 315 and HY 414.

Political, economic, and social history of England from 1485-1689 emphasizing religious movements, revolution, and constitutional development.

HIST 317 03(3-0-0), Renaissance and Reformation Europe. F. Prerequisite: HIST 100 or HIST 101 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 317 and HY 310.

Development of European society during Renaissance and Reformation eras; religion, society, and the rise of nation-states.

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
HIST 318 03(3-0-0). The Age of the Enlightenment. S. Prerequisite: HIST 100 or HIST 101 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 318 and HY 312.

Development of European society from settlement of religious wars to French Revolution emphasizing political, economic, and intellectual trends.

HIST 319 03(3-0-0). Early Modern France, 1500-1789. S. Prerequisite: HIST 100 or HIST 101 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 319 and HY 415.

Political, social, economic, religious, and cultural developments in France (16th-18th centuries) emphasizing formation of the absolutist state.

HIST 320 03(3-0-0). Women and Gender in Europe, 1450-1789. F. Prerequisite: HIST 100 or HIST 101 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 320 and HY 417.

Women and gender in western Europe (15th-18th centuries); political, social, economic, religious, and cultural developments.

*HIST 321 03(3-0-0). Industrial Society in Europe, 1600-1871. F. Prerequisite: HIST 101 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 321 and HY 474.

Causes and consequences of European industrialization and its impact on society, 1600-1871; emphasis on northwest Europe.

HIST 322 03(3-0-0). Industrial Society in Europe, 1871-1989. S. Prerequisite: HIST 101 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 322 and HY 475.

Causes and consequences of industrialization and its impact on European societies between 1871 and 1989; completion of 45 credits.

HIST 323 03(3-0-0). Russia Before 1700. F. Prerequisite: HIST 100 or HIST 101 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 323 and HY 438.

Russia’s political predecessors; contacts with Byzantium, Western Europe, and the Mongol Empire, and resulting cultural, religious, and social change.

HIST 324 03(3-0-0). Imperial Russia. F, S, SS. Prerequisite: HIST 100 or HIST 101 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 324 and HY 440.

Tsarist Russia from its beginnings to November 1917 Revolution with emphasis on modern period. (NT-C)

HIST 328 03(3-0-0). Modern Europe, 1815-1914. F. SS. Prerequisite: HIST 101 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 328 and HY 316.

Europe in 19th century emphasizing growth of liberalism, nationalism, and industrialism.

HIST 329 03(3-0-0). Europe in Crisis, 1914-1941. F. Prerequisite: HIST 101 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 329 and HY 318.

Political, social, economic developments since 1914; consequences of world wars, Great Depression, spread of totalitarianism, decline of imperialism.

*HIST 330 03(3-0-0). Eastern Europe Since 1918. S. Prerequisite: HIST 101 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 330 and HY 423.

Breakup of Austrian, German, Russian, Turkish Empires; successor states between wars; communist revolutions and character of East European socialist regimes.

HIST 331 03(3-0-0). The Soviet Union. F, S, SS. Prerequisite: HIST 101 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 331 and HY 442.

Formation of Soviet system in 1918 to its demise in 1991 emphasizing emergence of an advanced socialist state.

HIST 332 03(3-0-0). Germany Since World War I. F. Prerequisite: HIST 101 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 332 and HY 435.

German history, culture, and everyday life from 1914 to present.

HIST 333 03(3-0-0). Contemporary Europe. F, SS. Prerequisite: HIST 101 or HIST 171. Credit not allowed for both HIST 333 and HY 319.

Political, economic, social, and cultural history of major European nations since World War II; completion of 45 credits.

HIST 334 03(3-0-0). European Culture in the 20th Century. S. Prerequisite: HIST 101 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 334 and HY 463.

Cultural developments since World War I emphasizing science, art, clash of ideologies, existentialism, youth culture, and environmental issues.

*HIST 335 03(3-0-0). Britain in the 20th Century. F. Prerequisite: HIST 101 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 335 and HY 418.

Political, economic, and social developments emphasizing role of Britain in world affairs and internal changes that led to welfare state.

*HIST 336 03(3-0-0). Germany from Napoleon to WWI. F. Prerequisite: HIST 101 or HIST 171; completion of 45 credits.

Modern Germany for the late eighteenth to the early twentieth centuries.

HIST 339 03(3-0-0). World War II in Europe. F. SS. Prerequisite: HIST 101 or HIST 171; completion of 45 credits.

WWII in Europe (1939-1945): military strategy, tactics; political and diplomatic events; economic and social impacts; ethnic and gender consequences.

HIST 340 03(3-0-0). Colonial North America, 1492-1800. F. SS. Prerequisite: HIST 101 or HIST 150 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 340 and HY 360.

New World encounters between native Americans, Europeans, and Africans, and the colonial societies they built.

HIST 341 03(3-0-0). Eighteenth Century America. S, SS. Prerequisite: HIST 101 or HIST 150 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 341 and HY 362.

Politics, culture, and society in Colonial British America and the new United States, 1700-1815.

*HIST 343 03(3-0-0). Early U.S. Republic. F. SS. Prerequisite: HIST 101 or HIST 150 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 343 and HY 364.

Major themes of U.S. cultural, economic, social, and political history, 1787 to 1815.

HIST 344 03(3-0-0). Antebellum America. S, SS. Prerequisite: HIST 101 or HIST 150 or HIST 171; completion of 45 credits.

National growth, 1800 to 1860, emphasizing political, social, and economic developments.

HIST 345 03(3-0-0). Civil War Era. F, S, SS. Prerequisite: HIST 100 or HIST 101 or HIST 150 or HIST 151 or HIST 170 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 345 and HY 370.

U.S. history between 1848 and 1865 emphasizing causes and results of the Civil War. (NT-O)

HIST 346 03(3-0-0). Reconstruction and the New South. F. Prerequisite: HIST 101 or HIST 150 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 346 and HY 372.

Reconstruction Era, 1865-1877, and the South to present with emphasis on purposes and results of Reconstruction.

*HIST 347 03(3-0-0). United States, 1876-1917. S. Prerequisite: HIST 101 or HIST 151 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 347 and HY 375.

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Victorian way of life; rise of industry; reform movements; imperialism; World War I.

HIST 348 03(3-0-0). United States, 1917-1945. F. SS. Prerequisite: HIST 101 or HIST 151 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 348 and HY 376.

World War I, the 1920s, the Great Depression, and World War II.

HIST 349 03(3-0-0). United States Since 1945. S, SS. Prerequisite: HIST 101 or HIST 151 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 349 and HY 377.

The Cold War, foreign and domestic affairs from Truman to present.

HIST 350 03(3-0-0). United States Foreign Relations Since 1914. S. Prerequisite: HIST 101 or HIST 151 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 350 and HY 457.

Main problems in U.S. foreign relations in the 20th century, especially causes and consequences of the two world wars, Great Depression, and the Cold War.

HIST 351 03(3-0-0). American West to 1900. F. Prerequisite: HIST 101 or HIST 150 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 351 and HY 470.

Social, political, economic, environmental developments and intercultural relations in trans-Mississippi West to 1900.

HIST 352 03(3-0-0). American West Since 1900. S. Prerequisite: HIST 101 or HIST 151 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 352 and HY 471.

Social, political, economic, environmental developments and intercultural relations in trans-Mississippi West since 1900.

HIST 353 03(3-0-0). U.S.-Mexico Borderlands. F, S. SS. Prerequisite: HIST 101 or HIST 150 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 353 and HY 472.

Borderlands, northern Mexico, southwestern U.S.; intercultural relationships among Indian, Spanish, Mexican, U.S. cultures.

HIST 354 03(3-0-0). American Architectural History. S. Prerequisite: HIST 101 or HIST 150 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 354 and HY 443.

Broad historical interpretation of the North American built environment from 1500 to present.

HIST 355 03(3-0-0). American Environmental History. S. Prerequisite: HIST 101 or HIST 150 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 355 and HY 464.

Interaction of humans and nature in American history with emphasis on relationships between environmental, social, and cultural change.

HIST 356 03(3-0-0). American Cultural and Intellectual History. F, S. SS. Prerequisite: HIST 101 or HIST 150 or HIST 171 or HIST 105 or HIST 120 or HIST 121 or HIST 150 or HIST 151 or HIST 170 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 356 and HY 466.

Role of American cultural and intellectual developments in American society and the world.

HIST 357/MLSC 357 03(3-0-0). The American Military Experience. F, S. SS. Prerequisite: HIST 100 or HIST 101 or HIST 115 or HIST 120 or HIST 121 or HIST 150 or HIST 151 or HIST 170 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 357 and MLSC 357.

Role of the armed forces in American society; development of military traditions, institutions, and practices.

HIST 358 03(3-0-0). American Women’s History to 1800. F. Prerequisite: HIST 100 or HIST 101 or HIST 150 or HIST 151 or HIST 170 or HIST 171; completion of 45 credits.

History of Indian, African, and European women in North America from early colonial contact through the American Revolution and into Early Republic.

HIST 359 03(3-0-0). American Women’s History Since 1800. S. Prerequisite: HIST 101 or HIST 150 or HIST 151 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 359 and HY 468.

Social, cultural, economic, and political history of women in the United States since 1800.

HIST 360 03(3-0-0). United States Immigration History. S. Prerequisite: HIST 101 or HIST 150 or HIST 151 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 360 and HY 469.

Examines central themes of U.S. immigration from perspective of major immigrant groups and within context of U.S. immigration policy.

HIST 361 03(3-0-0). American Indians in the Age of Conquest. S. Prerequisite: HIST 101 or HIST 150 or HIST 171 or HIST 255; completion of 45 credits. Credit not allowed for both HIST 361 and HY 461.

American Indian history from pre-contact to the era of Indian removal (1840s) focused on the impact of colonization.

HIST 362 03 (3-0-0). American Indian Renaissance in Modern America. S. Prerequisite: HIST 101 or HIST 151 or HIST 171 or HIST 255; completion of 45 credits. Credit not allowed for both HIST 362 and HY 462.

American Indian history from the reservation era to the present with a focus on cultural and political renewal.

HIST 363 03(3-0-0). Colorado History. F, S, SS. Prerequisite: HIST 100 or HIST 150 or HIST 151 or HIST 170 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 363 and HY 260.

History of Colorado from pre-history to present. (NT-O), ($)...

HIST 364/ETST 364 03(3-0-0). Asian American Social Movements, 1945-Present. F. S. Prerequisite: HIST 151 or HIST 252/ETST 252; completion of 45 credits. Credit not allowed for both HIST 364 and ETST 364.

Historical relationships between Asian Americans and social movements for social, economic, and political equity in the U.S. since 1945.

HIST 365 03(2-3-0). American West Field Study. SS. Prerequisite: None. Students may take course only once for credit toward degree completion. Required field trips.

Explore western U.S. history through primary sources and field trips to sites in Colorado and the West. Topic varies by semester and instructor. ($)

HIST 366 03(3-0-0). African-American History to 1865. F, S. Prerequisite: HIST 150 or HIST 151; completion of 45 credits.

African-American history from the colonial era to the end of the Civil War.

HIST 367 03(3-0-0). African-American History Since 1865. F, S. Prerequisite: HIST 150 or HIST 151; completion of 45 credits.

African-American history from the end of the Civil War to the late twentieth century.

HIST 368 03(3-0-0). The American South. S. Prerequisite: HIST 150 or HIST 151; completion of 45 credits.

The American South, 1607 to the present; plantation system, slave culture, secession, Civil War, Reconstruction, Jim Crow, civil rights, and the modern South.

HIST 379/ECON 379 03(3-0-0). Economic History of the United States. F. Prerequisite: AREC 202 or ECON 101 or ECON 202 or any two courses in American history; completion of 45 credits. Credit not allowed for both HIST 379 and ECON 379.

Economic analysis of growth and welfare from beginning of industrialization to present.

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HIST 410 03(3-0-0). Colonial Latin America. F, S. Prerequisite: HIST 101 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 410 and HY 354.

- Spanish and Portuguese America from pre-Columbian times through independence (c. 1825).

HIST 411 03(3-0-0). Latin America Since Independence. F, S. SS. Prerequisite: HIST 101 or HIST 151 or HIST 171; completion of 45 credits.

- Major trends in the social, cultural, political, and economic evolution of Spanish America and Brazil since independence.

HIST 412 03(3-0-0). Mexico. S. Prerequisite: HIST 101 or HIST 151 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 412 and HY 350.

- Social, economic, and political development of Mexican people from pre-Columbian times to present.

HIST 414 03(3-0-0). Revolutions in Latin America. F, S. Prerequisite: HIST 101 or HIST 151 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 414 and HY 444.

- Historical and theoretical issues arising from revolutionary episodes in Latin America, with emphasis on 20th century case studies.

HIST 420 03(3-0-0). Africa-Precolonial States and Empires. F, S. Prerequisite: HIST 100 or HIST 101 or HIST 115 or HIST 120 or HIST 170 or HIST 171; completion of 45 credits.

- Origins of societal and political development in Africa before 1800; technology, the environment, human migrations, and trade.

HIST 421 03(3-0-0). Africa: Colonialism to Independence. S. Prerequisite: HIST 101 or HIST 151 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 421 and HY 330.

- Africa from abolition of the slave trade to independence, focusing on economic, social, and political change under colonialism.

HIST 422 03(3-0-0) Modern Africa. S. Prerequisite: HIST 101 or HIST 151 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 422 and HY 429.

- Colonial roots of modern Africa focusing on the period since 1935. Case studies of social and political change in Africa since World War II.

HIST 423 03(3-0-0). South African History. F. Prerequisite: HIST 101 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 423 and HY 425.

- South African history from human origins to the end of Apartheid.

HIST 424 03(3-0-0). East African History. F, S. Prerequisite: HIST 100 or HIST 101 or HIST 115 or HIST 120 or HIST 121 or HIST 170 or HIST 171.

- Overview of east African history from human origins to modern times, focusing on Kenya, Tanzania, and Uganda.

HIST 430 03(3-0-0). Ancient Near East. S. Prerequisite: HIST 100 or HIST 115 or HIST 120 or HIST 121 or HIST 170 or HIST 171.

- Neolithic period to 500 B.C.E., emphasizing political, social, intellectual, and cultural developments.

HIST 431 03(3-0-0). Ancient Israel. F. Prerequisite: HIST 100 or HIST 115 or HIST 120 or HIST 170; completion of 45 credits. Credit not allowed for both HIST 431 and HY 303.


HIST 432 03(3-0-0). Sacred History in the Bible and the Qur'an. F, S, SS. Prerequisite: HIST 100 or HIST 115 or HIST 120 or HIST 170; completion of 45 credits. Credit not allowed for both HIST 432 and HY 342.

- Conceptions of sacred history in the Biblical and Qur'anic traditions, emphasizing pre-modern historiography and exegesis.

HIST 433 03(3-0-0). Muhammad and the Origins of Islam. F. Prerequisite: HIST 100 or HIST 115 or HIST 120 or HIST 170; completion of 45 credits. Credit not allowed for both HIST 433 and HY 344.

- Emergence of Islam and growth of the Islamic community from time of Muhammad to decline of the Arab Caliphate.

HIST 435 03(3-0-0). Jihad and Reform in Islamic History. F. Prerequisite: HIST 100 or HIST 101 or HIST 115 or HIST 120 or HIST 121 or HIST 170 or HIST 171; completion of 45 credits.

- Jihad and reform in classical and modern Islamic thought and practice.

HIST 438 03(3-0-0). The Modern Middle East. S. Prerequisite: HIST 101 or HIST 115 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 438 and HY 348.

- Historical developments in the Middle East in 19th and 20th centuries.

HIST 440 03(3-0-0). Modern South Asia. F, S. Prerequisite: HIST 101 or HIST 120 or HIST 121 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 440 and HY 331.

- Major political, social, economic and cultural developments in South Asia from the seventeenth century to the present.

HIST 441 03(3-0-0). South Asia Since Independence. S. Prerequisite: HIST 101 or HIST 120 or HIST 121 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 441 and HY 332.

- Major political, social, economic, and cultural developments in South Asia since independence.

HIST 450 03(3-0-0). Ancient China. F. Prerequisite: HIST 100 or HIST 115 or HIST 120 or HIST 170; completion of 45 credits. Credit not allowed for both HIST 450 and HY 337.

- Development of civilization in China from Neolithic times to 200 B.C.E.

HIST 451 03(3-0-0). Medieval China and Central Asia. S. Prerequisite: HIST 100 or HIST 115 or HIST 120 or HIST 121 or HIST 170; completion of 45 credits. Credit not allowed for both HIST 451 and HY 339.

- Historical developments in China and Central Asia from 200 B.C.E. to 1300 A.D.

HIST 452 03(3-0-0). China in the Modern World, 1600-Present. S, SS. Prerequisite: HIST 101 or HIST 120 or HIST 121 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 452 and HY 341.

- Historical developments in China since 1600.

HIST 455 03(3-0-0). Tokugawa and Modern Japan, 1600-Present. F, S. Prerequisite: HIST 101 or HIST 120 or HIST 121 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 455 and HY 335.

- Historical developments in Japan since1600.

HIST 456 03(3-0-0). East Asia in the Age of Empire, 1800-Present. F. Prerequisite: HIST 120 or HIST 121 or HIST 171; completion of 45 credits.

- Rise of modern imperialism in East Asia, both from without (the “West”) and from within (Japan), 1800-present.

HIST 460 03(3-0-0). Slavery in the Americas. F. Prerequisite: HIST 101 or HIST 150 or HIST 171 or HIST 250; completion of 45 credits.

- Slave labor; Atlantic world economy; African contributions to American culture; gender and racial dynamics; emancipation movements.

*HIST 461 03(3-0-0). Rise and Fall of British Empire. S. Prerequisite: HIST 100 or HIST 101 or HIST 121 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 461 and HY 416.

- Beginnings of globalization; its origins in the spread of the British Empire; major causes of expansion, forms of control, long-term effects.
HIST 463 03(3-0-0).  Science and Technology in Modern History. S. Prerequisite: HIST 101 or HIST 121 or HIST 150 or HIST 151 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 463 and HY 447.

Impact of science and technology on industry, agriculture, medicine, education, etc. Issues in science and technology policy.

HIST 464 03(3-0-0). Pacific Wars: Philippines-WWII. F, S. Prerequisite: HIST 101 or HIST 121 or HIST 151 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 464 and HY 402.

Diplomatic, ideological, political, cultural, and military aspects of war in the Pacific from the Philippines war through WWII.

HIST 465 03(3-0-0). Pacific Wars: Korea and Vietnam. S. Prerequisite: HIST 101 or HIST 121 or HIST 151 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 465 and HY 403.

Diplomatic, ideological, political, cultural, and military aspects of war in the Pacific from the war in Korea through the war in Vietnam.

HIST 466 03(3-0-0). U.S. China Relations Since 1800. F, S. Prerequisite: HIST 120 or HIST 121 or HIST 171; completion of 45 credits. Credit not allowed for both HIST 466 and HY 460.

United States-China relations as represented in travel narratives, memoirs, journalistic and diplomatic writing, biography, and autobiography.

HIST 467 03(3-0-0). Modern Jewish History. S. Prerequisite: HIST 101 or HIST 150 or HIST 151 or HIST 171; completion of 45 credits.

Political, social, cultural and economic dimensions of modern Jewish history from both a regional and global perspective.

HIST 469 03(3-0-0). The Crusades. S. Prerequisite: HIST 100 or HIST 115 or HIST 120 or HIST 170; completion of 45 credits. Credit allowed for only one of the following: HIST 434, HIST 469, or HY 346.

The Crusades, emphasizing religion, politics, and warfare in Western Europe, Byzantium, the Near East, and the Mongol world empire, c. 1050-1300.

HIST 470 03(3-0-0). World Environmental History, 1500-Present. F. Prerequisite: HIST 101 or HIST 121 or HIST 150 or HIST 151 or HIST 171; completion of 45 credits.

World environmental history since 1500, emphasizing the dynamic interaction of nature, culture, and human activity.

HIST 471 03(3-0-0). History of Antarctica, 1800-Present. F, S, SS. Prerequisite: HIST 100 or HIST 101 or HIST 150 or HIST 151 or HIST 170 or HIST 171; completion of 45 credits.

History of Antarctica from discovery in the early nineteenth century to the present. (NT-O)

HIST 476 03(3-0-0). History of America’s National Parks. S. Prerequisite: HIST 101 or HIST 150 or HIST 151 or HIST 171; completion of 45 credits.

The national park system and its development from concept to design to implementation.

HIST 477 03(3-0-0), Teaching History. F. Prerequisite: HIST 100 or HIST 101 or HIST 115 or HIST 120 or HIST 121 or HIST 150 or HIST 151 or HIST 170 or HIST 171; completion of 45 credits.

Teaching history, emphasizing teaching historical literacy, research, and writing at the middle and high school levels.

"HIST 478/ANTH 478 03(3-0-0). Heritage Resource Management. S. Prerequisite: Junior or senior standing. Credit not allowed for both HIST 454 and ANTH 454. Credit not allowed for both HIST 478/ANTH 478 and HY 454/ANTH 454.

Cultural resource laws and policy; practices commonly employed in the management and preservation of these diverse resources.

"HIST 479 03(3-0-0). Practice of Public History. F. Prerequisite: HIST 101 or HIST 150 or HIST 151 or HIST 171; completion of 45 credits.

"HIST 484 Var[1-3] Supervised College Teaching. F, S, SS. Prerequisite: Completion of 45 credits. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

Assisting the instructor in teaching introductory history courses; relevant readings and discussions.

HIST 487 Var [1-3]. Internship. Prerequisite: Completion of 45 credits. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

Application of historical methods in museums, libraries, and at historic sites.

HIST 492 03(0-0-3), Capstone Seminar. F, S. Prerequisite: Senior status. History majors only. To count toward the major, the course must be completed with a C or better.

Seminars involving critical reading, writing, research, and discussion. Topics vary by instructor.

HIST 495 Var [1-3]. Independent Study. Prerequisite: Completion of 45 credits.

HIST 497 Var [1-3]. Group Study. Prerequisite: Completion of 45 credits.

HIST 501 03(0-0-3). Historical Method: Historiography. F, S, SS. Prerequisite: Written consent of instructor.

Historiographical skills and methods; emphasis on research, writing, and interpretation.

HIST 502 03(0-0-3). Historical Method: Archives. F, S, SS. Prerequisite: Written consent of instructor.

Historiographical skills and methods; emphasis on fundamentals of archival science.

HIST 503 03(0-0-3). Historical Method: Preservation. F, S, SS. Prerequisite: Written consent of instructor.

Historiographical skills and methods; emphasis on theory and practice of historic preservation.

HIST 504 03(0-0-3). Historical Method: Museums. F, S, SS. Prerequisite: Written consent of instructor.

Historiographical skills and methods; emphasis on philosophy and practices of history museums.

HIST 511 03(0-0-3). Reading Seminar-U.S. to 1877. F, S, SS. Prerequisite: HIST 501.

Readings on United States history to 1877.

HIST 512 03(0-0-3). Reading Seminar-U.S. Since 1877. F, S, SS. Prerequisite: HIST 501.

Readings on United States history since 1877.

"HIST 515 03(3-0-0). Records Management. S. Prerequisite: HIST 501.

Basic records management techniques and concepts such as retention, vital records, disaster planning, and electronic records.

HIST 520 03(0-0-3). Reading Seminar-Europe to 1815. F, S, SS. Prerequisite: HIST 501.

Readings on European history to 1815.

HIST 521 03(0-0-3). Reading Seminar-Europe Since 1815. F, S, SS. Prerequisite: HIST 501.

Readings on European history since 1815.

HIST 530 03(0-0-3). Reading Seminar-Africa. F, SS. Prerequisite: HIST 501.

Readings on major historiographical issues in African history.

HIST 531 03(0-0-3). Reading Seminar-Latin America. F, SS. Prerequisite: HIST 501.

Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCsubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
Readings on major historiographical issues in Latin American history.

HIST 532 03(0-0-3). Reading Seminar-Middle East. F, S, SS.
Prerequisite: HIST 501.
Readings on major historiographical issues in Middle East history.

HIST 533 03(0-0-3). Reading Seminar-East Asia. F, S, SS.
Prerequisite: HIST 501.
Readings on major historiographical issues in East Asian history.

HIST 534 03(0-0-3). Reading Seminar-South Asia. S. Prerequisite: HIST 501.
Major historiographical issues in South Asian history.

HIST 539 03(0-0-3). Reading Seminar - World Environmental History. S. Prerequisite: Graduate standing.
Major works in the field of world environmental history and the major historiographical debates.

HIST 540 03(0-0-3). Material Culture. F, S, SS. Prerequisite: HIST 501.
Social, cultural, economic, and political developments in history as interpreted through artifacts.

HIST 586 Var. Practicum. Prerequisite: HIST 501.

HIST 587 Var [1-6]. Internship. Prerequisite: HIST 501.
Work-oriented instruction involving implementation of classroom or laboratory experiences coordinated by faculty member.

HIST 611 03(0-0-3). Research Seminar: United States. F, S, SS.
Prerequisite: HIST 501.
Research on United States history.

HIST 621 03(0-0-3). Research Seminar: Europe. F, S, SS.
Prerequisite: HIST 501.
Research on European history.

HIST 640 03(0-0-3). Research Seminar: State and Local History. F, S, SS. Prerequisite: Written consent of instructor.
Research in and interpretation of state and local history within the broader context of United States history.

HIST 684 Var. Supervised College Teaching.
Discussions and readings to enhance teaching proficiency.

HIST 695 Var. Independent Study. Prerequisite: HIST 501.

HIST 697 Var [1-3]. Group Study.


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HONORS COURSES
Nondepartmental
University Honors Program
Office of Provost and Executive Vice President

HONR 192 04(3-0-1). Honors First Year Seminar. F, S. Prerequisite: Participation in University Honors Program.
Humanistic and scientific studies; emphasis on literate activities, written communication; student development and transition to university life.

HONR 193 03(0-0-3). Honors Seminar. (AUCC 1A). F, S. Prerequisite: HONR 192; participation in University Honors Program.
Humanistic and scientific studies with emphasis on rigorous literate activities, especially written communication.

HONR 195 Var[1-3]. Honors Independent Study. Prerequisite: Participation in University Honors Program.

HONR 197 Var[1-4]. General Honors Colloquium. Prerequisite: Participation in University Honors Program. Limited to qualified freshmen and sophomores.
Students from all major fields meet in small groups to focus on a problem of concern to all.

HONR 384 Var. Supervised College Teaching. F, S. Prerequisite: Participation in University Honors Program. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

HONR 392 03(0-0-3). Honors Seminar. (AUCC 3B). F, S. Prerequisite: HONR 193, participation in University Honors Program.
Various topics in humanistic and scientific studies.

HONR 397 Var[1-4]. General Honors Colloquium. Prerequisite: Participation in University Honors Program. Normally limited to qualified juniors and seniors.
Students from all major fields meet in small groups to focus on a problem of concern to all.

HONR 399 01(0-0-1). Pre-thesis. F, S. Prerequisite: Participation in University Honors Program.
Preparation for Honors senior thesis.

HONR 492 03(0-0-3). Honors Senior Seminar. (AUCC 3C). Prerequisite: HONR 392; participation in University Honors Program.
Variable topics on humanistic and scientific studies.

HONR 495 Var[1-5]. Independent Study. Prerequisite: Participation in University Honors Program.
Individual projects developed by the student and the major adviser at the upper-division level but which transcends basic course content.

HONR 498 Var[1-4]. Honors Undergraduate Research. F. Prerequisite: Junior standing; participation in University Honors program.

HONR 499 03(0-0-3). Senior Honors Thesis. Prerequisite: HONR 399; participation in University Honors Program.

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
HORT 100 04(3-2-0). Horticultural Science. (AUCC 3A). F, S, SS. Prerequisite: None. Principles of plant science and related disciplines as the base and context for the introduction of horticulture practices. ($)

HORT 171/SOCR 171 03(2-0-1). Environmental Issues in Agriculture. (GT-SS3, AUCC 3E). F. Prerequisite: None. Credit not allowed for both HORT 171 and SOCR 171. Historical development of agriculture, environmental consequences of modern food production, and other cultural approaches to agriculture.

+HORT 221 04(2-4-0). Landscape Plants. F, S. Prerequisite: None. Required field trips. Identification, landscape features, cultural requirements, and landscape use of coniferous and deciduous trees and shrubs, vines, and evergreens. ($)

HORT 231 04(2-4-0). Landscape Graphics Studio. F. Prerequisite: None. Mechanical and freehand graphic techniques for landscape design. Use of pencil, ink, and colored markers. Plan, sectional, and perspective views.

HORT 232 04(2-4-0). Principles of Landscape Design. S. Prerequisite: HORT 231. Basic concepts in the art and process of landscape design. ($)

HORT 260 04(3-2-0). Plant Propagation. S. Prerequisite: BZ 120 or concurrent registration or HORT 100 or concurrent registration or LIFE 103 or concurrent registration. Theories, principles, and techniques of sexual and asexual propagation. ($)

HORT 270 02(2-0-0). Fundamentals of Horticultural Therapy. F. Prerequisite: None. Theory and practice of horticultural therapy in health care and human services; applications, settings, and professional career topics. (NT)

*HORT 277 01(1-0-0). Introduction to Enology. F. Prerequisite: None. Methods/criteria to evaluate, compare, and describe aroma and flavor characteristics in sound commercial wines; identification of common wine defects.

HORT 310 04(3-2-0). Greenhouse Management. F, S. SS. Prerequisite: None. Design and use of enclosed structures to manipulate controlled environments, effects on growth as applied to crops, production, and marketing crops. (S, NT-O)

+HORT 321 04(3-2-0). Nursery Production and Management. S. Prerequisite: BZ 120 or HORT 100 or LIFE 103. Required field trips. Nursery industry organization, management, equipment, field and container production, storage, shipping, marketing, and business management practices. ($)

+HORT 322 03(2-2-0). Herbaceous Plants. F. Prerequisite: None. Required field trips. Identification, landscape features, cultural requirements, and uses of ornamental annual, perennial, and bulb plants. ($)

HORT 330 02(1-2-0). Computers for Landscape Design. S. Prerequisite: None. Applications and techniques of computer software utilized in small-scale landscape design-build.

HORT 331 02(2-0-0). Landscape Design. S. SS. Prerequisite: None. For non-design majors only. Fundamentals of landscape design theory and plant composition as presented in simple problems. For non-design majors only.

+HORT 335 04(2-4-0). Landscape Structures. F. Prerequisite: CON 131; HORT 232. Required field trips. Design and construction methods for structures commonly used in residential landscaping. Preparation of construction documents. ($)

HORT 336 04(2-4-0). Landscape Grading and Drainage Studio. S. Prerequisite: HORT 221; HORT 322; HORT 335; MATH 118. Basic design principles for grading, drainage, and earth forms for small-scale projects. ($)

+HORT 341 03(2-2-0). Turfgrass Management. F. Prerequisite: HORT 100 or concurrent registration. Required field trips. Principles and practices of turfgrass propagation and maintenance. ($)

*HORT 344 01(1-0-0). Organic Greenhouse Production. S. Prerequisite: HORT 310. Fundamentals of greenhouse production using organic production methods. ($)

*HORT 345/*SOCR 345 02(0-4-0). Diagnosis and Treatment in Organic Fields. SS. Prerequisite: BSPM 302 or BSPM 308 or BSPM 361; HORT 100 or SOCR 100; SOCR 240. Credit not allowed for both HORT 345 and SOCR 345. Field experience in diagnosis of pest and nutrient problems on organic farms and development of treatment recommendations. ($)

HORT 367 03(2-2-0). Landscape Irrigation. S. Prerequisite: None. Credit allowed for only one of the following: HORT 367, HORT 368, LAND 368. Practical design of sprinkler and trickle irrigation systems for commercial and residential landscapes.

HORT 368/LAND 368 03(2-2-0). Landscape Irrigation and Water Conservation. F, S. Prerequisite: HORT 100 or LAND 110. Credit allowed for only one of the following: HORT 367, HORT 368, LAND 368. Practical approaches and methods of irrigation, water conservation, and water management in the designed landscape.

HORT 370 01(1-0-0). Landscape Irrigation. S. Prerequisite: HORT 100 or concurrent registration. Necessary skills to design and manage irrigation systems commonly used in the landscape industry.

HORT 377 01(1-0-0). Horticultural Methods for Therapy Programs. S. Prerequisite: HORT 100; HORT 270. Horticultural methods for health care and human service settings, including indoor and outdoor growing techniques, management and plant selection. (NT)

HORT 382 03(0-0-3). Origins of Agriculture in the Andes of Peru, SS. Prerequisite: HORT 100 or BZ 120 or LIFE 103. Study abroad experience focused on understanding the agricultural, biological, cultural and geographical diversity of the Andes region of Peru.

HORT 384 Var[1-5]. Supervised College Teaching. F, S. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

*HORT 401 03(3-0-0). Medicinal and Value-Added Uses of Plants. S. Prerequisite: BZ 120 or HORT 100 or LIFE 103. Chemical, biochemical and ethnobotanical perspective on the medicinal and value-added uses of plants.

+HORT 412 04(3-0-1). Floriculture Crops. F, S, SS. Prerequisite: None. Required field trips. Commercial production and marketing of bedding plants, potted container crops, and cut flowers. (NT-O)

*Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontradional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
HORT 421 02(2-0-0). Horticulural Therapy Techniques. S. Prerequisite: HORT 270.

Clinical skills in horticultural therapy; communication, safety, leadership, therapeutic relationships, adaptation of tools and activities. (NT)

HORT 423 02(2-0-0). Horticulural Therapy Programming. S. Prerequisite: HORT 421.

Methods for individual treatment planning, intervention, documentation, and reporting within therapy, social, and vocational HT programs. (NT)

*HORT 424*/SOCR 424 03(3-0-0). Topics in Organic Agriculture. S. Prerequisite: AREC 202 or ECON 202; AREC 328; HORT 100 or SOCR 100; HORT 171/SOCR 171; SOCR 240. Credit not allowed for both HORT 424 and SOCR 424.

Examination of issues specific to organic food production systems and marketing.

HORT 425 03(2-0-1). Horticulural Therapy Management. F. Prerequisite: HORT 423.

Horticultural therapy program and site design, proposals, funding, marketing, management, and evaluation. (NT)

HORT 431 04(2-4-0). Planting Design Studio. F. Prerequisite: HORT 221; HORT 322; HORT 336.

Functional and aesthetic values of plant materials; their creative use in landscape design. ($)

+HORT 432 05(2-6-0). Intensive Landscape Design Studio. S. Prerequisite: HORT 431; HORT 487. Required field trips.

Site planning and design for landscape projects of a limited scale. Problems of increasing complexity. Emphasis on real sites and clients. ($)

+HORT 441 03(3-0-0). Turfgrass Science. F. Prerequisite: BZ 120 or HORT 100 or SOCR 240. Required field trips.

Examination of turfgrass management practices from a scientific perspective; discussion of advanced turfgrass management technologies.

+HORT 450A-D 01(1-0-0). Horticulural Food Crops. F. Prerequisite: BZ 120 or HORT 100 or LIFE 103 or SOCR 100. Required field trips.

*A Cool season vegetable production. ($) *B Warm season vegetable production. ($) *C Small fruit production. ($) *D Tree fruit production. ($)

+HORT 452 01(1-0-0). Viticulture-Grape Production. F. Prerequisite: BZ 120 or HORT 100 or LIFE 103 or SOCR 100.

Grape production in temperate zone climates. ($)

HORT 454 02(2-0-0). Horticulural Crop Production and Management. S. Prerequisite: HORT 310 or HORT 450A-B.

Production and management of horticultural crops.

*HORT 460*/SOCR 460 03(2-0-1). Plant Breeding. F. Prerequisite: BZ 350 or concurrent registration or LIFE 201A or concurrent registration or SOCR 330 or concurrent registration. Credit not allowed for both SOCR 460 and HORT 460.

Theory and practice of plant breeding using principles of genetics and related sciences.

*HORT 461*/SOCR 461 01(0-2-0). Plant Breeding Laboratory. S. Prerequisite: HORT 460/SOCR 460 or concurrent registration. Credit not allowed for both HORT 461 and SOCR 461.

Techniques and procedures used in public and commercial plant breeding programs.

*HORT 462 03(3-0-0). Viticulture Practices in Grape Production. F. Prerequisite: None.

Biology of grape vines and cultural practices including planning, training, pest control, pruning, and harvesting; special emphasis on Colorado.

+HORT 464 03(2-2-0). Arboriculture. F. Prerequisite: HORT 100; SOCR 240. Required field trips.

Care of trees in the landscape including planting, pruning, appraisal, and diagnosis.

HORT 465 03(2-2-0). Landscape Estimating. F. Prerequisite: MATH 117; MATH 118; MATH 124 or MATH 125 or MATH 141 or MATH 155; HORT 221.

Landscape construction estimating and bidding, contract documentation, and other business practices relevant to landscape design-build and contracting. ($)
HORT 675 03(3-0-0). Plant Stress Physiology. F. Prerequisite: BZ 440.
Research concepts based on physiological, biochemical, and molecular mechanisms controlling environmental stresses in plants.

HORT 698 Var. Research.


HORT 784 Var. Supervised College Teaching.

HORT 792 01(0-0-1). Seminar. F, S.

HORT 795 Var. Independent Study.

INTERNATIONAL EDUCATION COURSES
Nondepartmental, Interdisciplinary
Office of Provost and Executive Vice President

IE 116/AGRI 116 03(2-0-1). Plants and Civilizations. (GT-SS3, AUCC 3E). F, S. Prerequisite: None. Credit not allowed for both IE 116 and AGRI 116.
Plant origins and their relationships with cultures/civilizations as food, spices, perfumes, and medicines and in art, religion, wars, slavery, etc.

Analysis and implications of social, cultural, economic, and political change in the context of globalization and transnational relationships.

IE 270/AGRI 270 03(3-0-0). World Interdependence-Population and Food. (GT-SS3, AUCC 3E). S. Prerequisite: None. Credit not allowed for both IE 270 and AGRI 270.
Survey of world population and food; emphasis on understanding the problems and opportunities in a world context.

IE 271 03(3-0-0). India. S. Prerequisite: None.
Interdisciplinary interpretation of philosophical, historical, cultural, physical, social, and technological influences shaping modern India.

IE 272 Var[1-3]. World Interdependence-Current Global Issues. F. Prerequisite: None.
Current global issues, using guest speakers and focusing on global/international topics that are in the news.

IE 370 03(3-0-0). Model United Nations. (AUCC 3E) F. Prerequisite: None.
Structure and function of the United Nations; role of international organizations in international relations; opportunity to practice modeling role of UN representatives.

IE 450/SOWK 450 03(2-0-1). International Social Welfare and Development. F. Prerequisite: None. Credit not allowed for both IE 450 and SOWK 450.
Framework of social welfare and development in international area; social need with focus on cultures/countries in transition.

IE 470 03(3-0-0). Women and Development. F. Prerequisite: None.
Research and policy issues related to women in developing countries.

IE 471 03(3-0-0). Children and Youth in Global Context. S. Prerequisite: None.
Global issues affecting children and youth are examined in cultural context. (NT-O)

IE 472 03(3-0-0). Education for Global Peace. F, S. Prerequisite: Upper-division status.
Peacekeeping, peacemaking and peace-building on micro and macro levels, and education’s role in them, as key components for sustaining global peace.

IE 479/ANTH 479 03(3-0-0). Applications of International Development. F, S. Prerequisite: Graduate standing.
In-depth interdisciplinary analysis of theoretical and practical issues in implementing economic and community-based international development programs.

IE 492 Var[1-3]. International Education Seminar. F, S, SS.
Topics in international education. (NT-O)

IE 517/*PSY 517 03(0-0-3). Perspectives in Global Health. S. Prerequisite: None. Credit not allowed for both IE 517 and PSY 517.
Science, skills, and beliefs directed at the maintenance and improvement of health for all people.

IE 550/PHIL 550 03(3-0-0). Ethics and International Development. F. Prerequisite: Written consent of instructor. Credit not allowed for both IE 550 and PHIL 550.
Ethical reflection applied to development goals, strategies of Third World countries; relations between developed and developing countries.

IE 679/ANTH 679 03(3-0-0). Applications of International Development. F, S. Prerequisite: Graduate standing.
In-depth interdisciplinary analysis of theoretical and practical issues in implementing economic and community-based international development programs.

IE 692 Var[1-3]. International Education Seminar. F, S, SS.
Topics in international education. (NT-O)

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
INST 300 03(0-0-3). Approaches to International Studies. F.
Prerequisite: GR 100.
Interdisciplinary and comparative analytical approaches to the field of international studies.

INST 484 Var[1-5]. Supervised College Teaching. F, S, SS.
A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

INST 487 Var[1-3]. Internship. F, S, SS.

INST 492 03(0-0-3). Seminar. F, S. Prerequisite: INST 300;
International Studies major students only.

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
INTD 129 03(3-0-0). Introduction to Interior Design. F, S, SS. Prerequisite: None.
Interior design discipline’s professional values with emphasis on elements and principles of design. (NT-O)

INTD 166 03(0-6-0). Visual Communication/Sketching. F, S, SS. Prerequisite: None.
Hand drafting, free-hand sketching and conceptualization to communicate interior design concepts visualizing 2 and 3 dimensional representations.

INTD 200 03(3-0-0). Housing Values in America. F, S. Prerequisite: None.
Housing issues in the U.S.; values, norms, roles of government and building professions; interaction of issues with U.S. public values to meet housing needs.

INTD 201 03(0-6-0). Two-Dimensional Fundamentals—Interior Design. F. Prerequisite: INTD 129; INTD 166; design scenario advancement.
Demonstration of 2-dimensional elements and principles of design incorporating creative thinking, design fundamentals, design communication skills.

+INTD 210 03(3-0-0). Interior Design Anatomy. F. Prerequisite: INTD 129; INTD 166; design scenario advancement. Required field trips.
Applying basic concepts of human behavior, anthropometrics, and space planning to residential interiors.

Principles and procedures required in interpreting and producing building site plans, floor plans, elevations, sections, and interior details.

INTD 236 03(0-6-0). Three Dimensional Thinking. F. Prerequisite: INTD 129; INTD 166; design scenario advancement.
Demonstration and application in visualizing interior space in three dimensions.

INTD 255 03(3-0-0). Residential Interiors. F, S, SS. Prerequisite: None. Offered as an online course only.
Theories, issues, and planning elements that impact the design of residential interiors. (NT-O)

+INTD 256 03(1-4-0). Computer-Aided Design for Interior Designers. F. Prerequisite: INTD 129; INTD 166; design scenario advancement. Required field trips.
Use of computer-aided design (CAD), specifically two-dimensional and three-dimensional drafting using PC software.

INTD 266 03(0-6-0). Visual Communication-Multi-Media. S. Prerequisite: INTD 210; INTD 236.
Visual communication using advanced sketching rendering, manually and with technology, and alternative presentation methods.

+INTD 276 03(0-6-0). Interior Design I. S. Prerequisite: INTD 235; INTD 210; INTD 236; INTD 256. Required field trips.
Application of design process to small interior design projects. Design solutions communicated using manual and technology tools.

INTD 296A-B Var[1-3]. Group Study. F, S, SS. Prerequisite: Design scenario advancement.
A) Space planning and application. B) Design application.

+INTD 330 03(2-2-0). Lighting Design. F. Prerequisite: CON 371 or concurrent registration; INTD 276 with a C or better. Required field trips.
Application of lighting design in interior environments. (S)

INTD 336 03(3-0-0). Color. F, S, SS. Prerequisite: None. Offered only through the Division of Continuing Education.
Color theories, principles, trends and application in design. (NT-O)

INTD 340 03(3-0-0). Interior Materials and Finishes. F. Prerequisite: DM 120; INTD 276 with a C or better.
Analysis of materials and resources for interiors.

INTD 350 03(3-0-0). Codes-Health and Safety. S. Prerequisite: INTD 210; INTD 276 or concurrent registration or INTD 376 or concurrent registration.
Health and safety issues in interior design, including codes, regulations, and universal design.

INTD 356 03(3-0-0). Professional Communications-Interior Design. S. Prerequisite: CO 150 or HONR 193; INTD 276 with a C or better.
Mastery of written communication skills required in the field of interior design.

INTD 359 03(3-0-0). History of Interior Design. S. Prerequisite: INTD 276 with grade of C or better.
Survey of interior design history from ancient through the present.

INTD 376 03(0-6-0). Interior Design II. S. Prerequisite: CON 371; INTD 330; INTD 340.
Application of design components to medium-scale residential and non-residential interior design projects.

INTD 384 Var. Supervised College Teaching. F, S. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

+INTD 400 04(1-4-1). Interior Design Research Proposal. F. Prerequisite: INTD 376 with a C or better. Required field trips.
Research, development, and presentation of a programming proposal for a large scale interior design project with service learning component.

INTD 450/CON 450 03(3-0-0). Travel Abroad-Sustainable Building. SS. Prerequisite: None. Credit not allowed for both INTD 450 and CON 450.
Major components of sustainable design and construction, energy, healthy buildings, natural resources, and other environmental issues.

INTD 476 04(0-8-0). Interior Design Project. S. Prerequisite: INTD 400 with a C or better.
Large scale projects representing research-based design solutions, illustrating synthesis and analysis of entry-level concepts, portfolio development. (S)

INTD 487 Var. Internship. Prerequisite: INTD 356; INTD 376 with a C or better.

INTD 495 Var. Independent Study. Maximum of 10 credits allowed in course.

INTD 496A-B Var[1-3]. Group Study. Maximum of 10 credits allowed in course.
A) Program skills. B) Design application.

+INTD 550 03(3-0-0). Universal Design. F. Prerequisite: INTD 376 with a C or better. Required field trips.
Analysis and evaluation of universal design as it applies to diverse population segments and interior environments.

INTD 575 Var[1-8]. Problems-Interior Design. F, S, SS. Prerequisite: INTD 376 with a C or better or undergraduate degree in interior design or related field. (NT-O)

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INTD 578 03(2-0-1). Trends/Issues in Interior Design. F, S, SS.
Prerequisite: INTD 376 with a C or better. (NT-O)

INTD 675 Var[1-8]. Problems-Interior Design. F, S, SS. Prerequisite:
Three credits of INTD 575. (NT-O)
INTRA-UNIVERSITY COURSES
Nondepartmental
Office of Provost and Executive Vice President

IU 150 02(2-0-0). Diverse Students in Higher Education. S.
Prerequisite: None.
   Issues surrounding educational opportunity and social mobility through direct mentoring with high school students.

IU 170 02(1-0-1). A Call to Lead I: Theories and Skills. F.
Prerequisite: Must be a member of the President’s Leadership Program; written consent of instructor.
   Fundamentals of leadership theories and skills.

IU 171 02(1-0-1). A Call to Lead II: Social Change Model. S.
Prerequisite: Must be a member of the President’s Leadership Program; IU 170; written consent of instructor.
   Social change model of leadership development.

IU 193 01(0-0-0-1). Freshman Seminar. F, S, SS.
Prerequisite: Students who have earned fewer than 30 credits (CSU and transfer) only. Maximum of 1 credit allowed.
   Academic study in small-class setting. Topics vary by instructor.

IU 198 01(0-3-0). Freshman Laboratory Research. Prerequisite: Freshmen only; written consent of instructor.
   Hands-on research on an academic research project.

IU 270 02(1-0-1). Leadership Styles I: Personal Application. F.
Prerequisite: Must be a member of the President’s Leadership Program; written consent of instructor.
   Leadership styles and contexts for personal application.

IU 271 02(1-0-1). Leadership Styles II: Prominent Leaders. S.
Prerequisite: Must be a member of the President’s Leadership Program; IU 270; written consent of instructor.
   Leadership styles and contexts of prominent leaders for personal application.

IU 273 02(1-0-1). Leadership Techniques for Greeks. F, S.
Prerequisite: None.
   Critical elements of analytical and intellectual examination and reflection of certain core issues in the practice of leadership.

IU 470 03(2-0-1). Effective Leadership I: Success as a Leader. F.
Prerequisite: Must be a member of the President’s Leadership Program; written consent of instructor.
   Personal leadership skill development and its relationship to success as a leader.

IU 471 03(2-0-1). Effective Leadership II: Vision and Change. S.
Prerequisite: Must be a member of the President’s Leadership Program; IU 470; written consent of instructor.
   Individual personal leadership styles; relationship between personal skill development and successful leadership.

IU 486 Var[1-4]. Practicum for Interdisciplinary Leadership. F, S, SS.
Prerequisite: IU 171; IU 271; written consent of advisor.
   Field experience applying leadership theories/principles through professional projects.

IU 487 Var[1-4]. Internship for Interdisciplinary Leadership. F, S, SS.
Prerequisite: IU 171; IU 271; written consent of advisor.
   Internship applying leadership theories/principles in a professional setting.

IU 498 Var[1-4]. Research for Interdisciplinary Leadership. F, S, SS.
Prerequisite: IU 171; IU 271; written consent of advisor.
   Research exploring leadership and one’s academic discipline.

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JTC 100 03(3-0-0). Media in Society. (GT-SS3, AUCC 3C). F, S. Prerequisite: None.
Role of media in American democracy; impact of media on individuals and society.

JTC 192 03(1-4-0). Freshman Seminar. F, S. Prerequisite: Admission to major. Credit not allowed for both JTC 192 and JTC 210.
Basic journalism skills; newspapering and newswriting.

JTC 200 03(1-0-2). Professional Writing. F, S. Prerequisite: CO 150 or HONR 193.
Basic elements of writing for professional and specialized audiences.

JTC 210 03(1-4-0). Newswriting. F, S, SS. Prerequisite: None. Credit not allowed for both JTC 210 and JTC 192.
Theory and practice in newswriting.

Theory, techniques for using computer-related techniques for visual presentation of news, specialized, and technical information. ($, NT-O)

JTC 300 03(3-0-0). Professional and Technical Communication. (AUCC 2). F, S, SS. Prerequisite: CO 150 or HONR 193.
Professional writing and presentation skills applied to students’ major fields. (NT-O)

JTC 301 03(2-0-1). Corporate and Professional Communication. (AUCC 2) F, S, SS. Prerequisite: CO 150 or HONR 193.
Principles and practice of effective corporate communication with emphasis on written professional reports. (NT-O)

JTC 310 03(2-2-0). Copy Editing. F, S. Prerequisite: JTC 100; JTC 210.
Theory of copy preparation and editing; publication layout.

JTC 311 03(3-0-0). History of Media. F, S. Prerequisite: None.
Media development, growth, trends within context of political, social, and economic change. (NT-O)

JTC 316/ETST 316 03(3-0-0). Multiculturalism and the Media. S. Prerequisite: None. Credit not allowed for both JTC 316 and ETST 316.
Media and multiculturalism with emphasis on race, ethnicity, and other protected groups.

JTC 320 03(1-4-0). Reporting. F, S. Prerequisite: JTC 210.
Theory, methods, and practice of gathering information and reporting news.

JTC 326 03(2-2-0). Online Writing and Journalism. F, S. Prerequisite: JTC 210; JTC 211.
Website and message design and creation for media practitioners based on understanding of online attributes and technological context of journalism. (NT-O)

JTC 328 03(3-0-0). Feature Writing. S. Prerequisite: JTC 210.
Theory, methods and practice of reporting and writing feature stories, including human-interest, travel/adventure, reflective and in-depth articles.

JTC 335 03(2-2-0). Digital Photography. F, S. Prerequisite: JTC 211.
Basic photographic theory and practice using digital camera and image processing technology. ($)

+JTC 340 03(2-2-0). Digital Video Editing. F, S. Prerequisite: JTC 210. Required field trips.
Theory and technique of editing picture and sound on digital platforms. ($) (NT-O)

Practical application of principles, theory, and methods used in television newswriting, reporting, and producing. ($)

Audience and subject research; script structure and development; narrative techniques; visual story and role of visual media as change agents.

JTC 343 03(2-2-0). Advanced Television News Production. F, S. Prerequisite: JTC 341.
Advanced theory and practice of reporting and producing television news; basics of television news management. ($)

+JTC 345 03(2-2-0). Electronic Field Production. F, S. Prerequisite: JTC 340. Required field trips.
Theory and techniques of video field production emphasizing news, current affairs, and special interest programs. ($)

JTC 350 03(3-0-0). Public Relations. F, S. Prerequisite: None.
Public relations principles and practices of business, industry, education, and public agencies. (NT-O)

JTC 351 03(2-2-0). Publicity and Media Relations. F. Prerequisite: JTC 210; JTC 211.
Public relations techniques to gain exposure in news and entertainment media.

JTC 353 03(3-0-0). Communications Campaigns. F, S. Prerequisite: JTC 210; JTC 350 or JTC 355 or JTC 365.
Development of professional communications programs, including analysis and research, strategy, implementation and evaluation.

JTC 355 03(3-0-0). Advertising. F, S. Prerequisite: None.
Advertising principles and techniques used to develop effective advertising campaigns. (NT-O)

JTC 356 03(3-0-0). Advertising Creativity and Copywriting. F, S. Prerequisite: JTC 211; JTC 355.
Principles and practices producing advertising materials-print, broadcast, digital, out-of-home media, direct response, and collateral.

JTC 358 03(3-0-0). Advertising Media Buying and Selling. F, S. Prerequisite: JTC 211; JTC 355.
Principles of advertising planning, assessment and sales for client, agency and media organization personnel.

JTC 361 03(2-2-0). Writing for Specialized Magazines. S. Prerequisite: JTC 210.
Writing articles for agricultural, business, hobby, technical, trade, and other specialized periodicals whose readers use information to make decisions. (NT-O)

JTC 365 03(3-0-0). Computer Mediated Communication Foundations. F. Prerequisite: JTC 210. Issues and research in computer mediated communication relating to individuals, groups, community, and society.

JTC 371 03(2-2-0). Publications Design and Production. F, S. Prerequisite: JTC 211.
Principles of producing publications for print and electronic delivery, including newspapers, magazines, newsletters, brochures, and printed ephemera.

JTC 372 03(2-2-0). Web Design and Management. F, S. Prerequisite: JTC 210; JTC 211.

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Design, development, and management of World Wide Web content. 

(NT-O)

JTC 373 03(3-0-0). Digital Promotion Management. F. Prerequisite: JTC 211. How organizations use digital technologies for advertising, publicity, promotional, and information purposes.

JTC 386 Var[1-3]. Communication Practicum. F, S, SS. Practicum in using the different communication tools that comprise student media.

JTC 410 02(2-0-0). Newspaper Editing. F. Prerequisite: JTC 310. Editorial techniques, responsibilities, news evaluation.

JTC 411 03(3-0-0). Media Ethics and Issues. F, S. Prerequisite: Junior or senior status. Professional ethics, issues of media performance and of the relation of media systems to the social systems. (NT-O)

JTC 412 03(3-0-0). International Mass Communication. S. Prerequisite: None. Media communication systems, their roles throughout the world; news flow; propaganda in national development; role of foreign correspondents.

JTC 413 03(3-0-0). New Communication Technologies and Society. F, S. Prerequisite: None. Political, economic, social, philosophical, legal, and educational impacts of new technologies. (NT-O)

JTC 414 03(3-0-0). Media Effects. F, S. Prerequisite: None. Perspectives on audience processes and media effects on individuals and society.

JTC 415 03(3-0-0). Communications Law. F, S, SS. Prerequisite: Junior or senior standing. Constitutional, statutory law of political speech, obscenity, advertising, libel; privacy, copyright, information ownership and access. (NT-O)

JTC 416 03(3-0-0). New Communication Technologies in the U.S. SS. Prerequisite: Written consent of instructor. Broad-based survey of evolving and emergent communication technologies in the United States.

JTC 420 03(1-4-0). Advanced Reporting. F, S. Prerequisite: JTC 211; JTC 310; JTC 320. Advanced techniques for gathering and evaluating information; interpretive reporting of public affairs issues.

JTC 430 03(2-2-0). Advanced Digital Documentary Photography. S. Prerequisite: JTC 326; JTC 335. Conceptualization, production, and editing of photographic documentaries.

JTC 433 03(3-0-0). Advanced Video Editing. S. Prerequisite: JTC 345. Professional video editing practices, theories, and techniques with practical applications using current hardware and software.

JTC 435 03(2-3-0). Documentary Video Production. F. Prerequisite: JTC 345. Writing, directing, and editing of long-form television documentaries. ($)

JTC 440 03(2-2-0). Advanced Electronic Media Production. F, S. Prerequisite: JTC 341; JTC 345. Techniques and concepts used in advanced media production for television. ($)

JTC 450 03(2-2-0). Public Relations Cases S. Prerequisite: JTC 351; JTC 353; JTC 371 or JTC 372 or JTC 373. Preparation of materials, use of media to achieve objectives with target audiences; work with nonprofit organizations in actual campaigns.

JTC 454 03(2-0-1). Travel Abroad – Media Studies in Europe. SS. Prerequisite: Junior or senior standing; written consent of instructor. Field survey of international media systems, technologies, and providers in diverse national and regional cultures.

JTC 456/LB 456 03(2-2-0). Documentary Film as a Liberal Art. F. Prerequisite: Junior or senior standing. Credit not allowed for both JTC 456 and LB 456. Documentary film and its role in human history, culture, and social interaction.

JTC 460 03(3-0-0). Senior Capstone. F. S. Prerequisite: JTC 326; 27 additional credits of JTC. Integration and reflection for seniors with a career component that will prepare them for the job market. (NT-O)

JTC 461 03(2-2-0). Writing about Science, Health, and Environment. F. Prerequisite: JTC 210 or JTC 300 or LB 300. Writing about science, health, and the environment for lay audiences from a journalistic perspective.

JTC 464 03(2-2-0). Technical Communication. F, S. Prerequisite: JTC 210 or JTC 300 or LB 300. Writing and producing technical and scientific information for electronic and print media for professionals.

JTC 465 03(2-2-0). Specialized and Technical Editing. S. Prerequisite: JTC 210 or JTC 300 or LB 300; JTC 211; JTC 326 or JTC 335 or JTC 341 or JTC 342 or JTC 351 or JTC 361 or JTC 371 or JTC 372; JTC 461; JTC 464. Editorial purpose, techniques, and evaluation of specialized and technical print and online information.

JTC 468 03(3-0-0). Convergence and Hypermedia. S. Prerequisite: JTC 310; JTC 365; 9 credits selected from JTC 326, JTC 372, JTC 373, or JTC 487. Applications of theories of convergence, hypermedia, and social practices in computer-mediated communication. Development of a professional portfolio.

JTC 471 03(3-0-0). Communication Research Methods. F. Prerequisite: One statistics course. Credit not allowed for both JTC 471 and JTC 500. Quantitative, qualitative methods of analyzing process and effects of mass and interpersonal communication.

JTC 484 Var[1-3]. Supervised College Teaching. F, S. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

JTC 487 Var[1-3]. Internship. Prerequisite: Written consent of department.

JTC 490 Var[1-3]. Workshop.

JTC 495A-G Var[1-3]. Independent Study. 

JTC 496 Var[1-3]. Group Study.

JTC 500 04(4-0-0). Communication Research and Evaluation Methods. F. Prerequisite: None. Credit not allowed for both JTC 500 and JTC 471. Theory and applied communication research and evaluation methodologies for assessing and improving communication in technological environment.

JTC 501 04(4-0-0). Process and Effects of Communication. F. Prerequisite: Written consent of instructor.

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Examination of communication theory including communicator credibility, messages, channels, audiences, and information, behavior, and attitude change.

**JTC 511 03(3-0-0). Corporate Media Ethics and Issues.** F, S. Prerequisite: Graduate standing. Offered online only. Professional ethics in corporate and media settings. (NT-O)

**JTC 513 Var[1-2]. Impacts of New Communication Technologies.** F, S. Prerequisite: None. Current topics and issues regarding uses and impacts of video and computer-based communication technologies.

**JTC 526 03(3-0-0). Digital Media Writing and Production.** SS. Prerequisite: Graduate standing. Writing and producing media content that will be delivered via a variety of communication channels to diverse publics.

**JTC 535 03(3-0-0). Electronic Media Regulation and Policy.** F. Prerequisite: None. Role of legislators, regulatory agencies, judiciary and public in the evolution of U.S. broadcast and digital media. Implications for free press.

**JTC 540 03(3-0-0). Corporate Digital Video Editing.** F, S, SS. Prerequisite: Graduate standing. Advanced theory and techniques of digital video editing in a corporate setting. (NT-O)

**JTC 544 03(2-3-0). Corporate and Institutional Media Production.** S. Prerequisite: None. Advanced techniques in media production and management in corporate and institutional settings. ($)

**JTC 545 3(3-0-0). Organizational Media Production.** SS. Prerequisite: Graduate standing. Incorporation of multimedia content in video production in governmental, corporate and institutional media production.

**JTC 550 03(3-0-0). Public Relations.** F, S, SS. Prerequisite: Graduate standing. Contemporary public relations principles and practices. (NT-O)

**JTC 560 03(3-0-0). Managing Communications Systems.** S. Prerequisite: Written consent of instructor. Examination of role, responsibilities of communication managers in translating theory into effective, applied communication programs.


"**JTC 570 03(3-0-0). Political Economy of Global Media.** F. Prerequisite: Written consent of instructor. Examination of the changing media information system worldwide and the role of social, political, legal and economic forces upon it.

**JTC 571 03(3-0-0). Digital Media Research and Evaluation Methods.** F. Prerequisite: Graduate standing. Basic conceptual processes and tools for conducting applied research in the field of communication; research tools in real-world professions.

**JTC 572 03(3-0-0). Corporate Web Design and Management.** F, S. Prerequisite: Graduate standing. Offered only online. Design, development, and management of corporate digital media content. (NT-O)

**JTC 573 03(3-0-0). Strategic Digital Communication.** F. Prerequisite: Graduate standing. Development, implementation and assessment of digital communication projects and campaigns/programs.

**JTC 601 03(3-0-0). Cognitive Communication Theory.** F. Prerequisite: JTC 501 or written consent of graduate advisor. Theories of information technology and communication as they relate to cognitive and social cognitive processing.

**JTC 602 03(3-0-0). Social and Cultural Communication Theory.** F. Prerequisite: JTC 501 or written consent of graduate advisor. Theories of information technology and communication as they relate to the field of media systems, organizations, and culture.

**JTC 614 03(3-0-0). Public Communication Campaigns.** F. Prerequisite: Written consent of advisor. Role of health communication in public health programs and campaigns.

**JTC 640 03(3-0-0). Public Communication Technologies.** S. Prerequisite: Written consent of instructor. Analysis of evolving and emergent communication technologies.

**JTC 650 03(3-0-0). Strategic Communications.** F, S. Prerequisite: Graduate standing. Theoretical/practical management issues in public relations, advertising/promotional communications including behavioral, societal, ethical, legal.

**JTC 660 03(3-0-0). Communication and Innovation.** F. Prerequisite: JTC 501 or written consent of graduate advisor. Communication’s role in the process of innovation as well as the diffusion of new technologies, products, ideas, behaviors and attitudes.

**JTC 661 03(3-0-0). Information Design.** S. Prerequisite: Written consent of instructor. Theoretical and empirical review of creation, presentation, storage, and distribution of information.

**JTC 662 03(3-0-0). Communicating Science and Technology.** F. Prerequisite: Written consent of instructor. Examination of theoretical and empirical studies concerning communication of science and technology subject matter.

**JTC 664 03(3-0-0). Quantitative Research in Communication.** F. Prerequisite: JTC 500 or written consent of graduate advisor. Advanced quantitative research methods used in communication research.

**JTC 665 03(3-0-0). Qualitative Methods in Communication Research.** S. Prerequisite: JTC 500 or written consent of graduate advisor. Techniques for collecting; interpreting; analyzing qualitative communication data.

**JTC 670 03(0-0-3). Communication in the Social Processes of Risk.** S. Prerequisite: Graduate standing. Communication and psychological, sociological, and cultural factors shaping risk involving technology, health, environment, disasters, sustainability.

**JTC 684 Var. Supervised College Teaching.** Prerequisite: Written consent of instructor. Philosophy, techniques, and approaches to teaching journalism skills courses, as supervised by faculty.

**JTC 687 Var[1-3]. Internship.** Prerequisite: Written consent of instructor.

**JTC 690 Var[1-3]. Workshop.** Prerequisite: Written consent of instructor.
JTC 695 Var[1-3]. Independent Study. Prerequisite: Written consent of instructor.

JTC 698 03(0-0-3). Research. Prerequisite: JTC 500; JTC 501. Development of theoretical basis and methodology for thesis or research project.


JTC 701 01(1-0-0). Colloquium in Communication and IT. F, S. Course may be taken up to four times for credit.
    Orientation to graduate studies; communication theories, processes, media, and technology.

JTC 784 Var. Supervised College Teaching. F, S.

JTC 790 Var. Workshop. F, S.

JTC 792A-F 03(0-0-3). Seminar. F, S. Prerequisite: Graduate standing.
    E) Strategic communication. F) Media Technology and Society.

JTC 793A-F 03(0-0-3). Seminar. F, S. Prerequisite: Graduate standing.
    A) Experimental design. Prerequisite: JTC 500 or written consent of graduate advisor. B) Survey design. Prerequisite: JTC 500 or written consent of graduate advisor. C) Content analysis. Prerequisite: JTC 500 or written consent of graduate advisor. D) Qualitative methods. Prerequisite: Written consent of advisor. E) Human factors. Prerequisite: JTC 500 or written consent of graduate advisor. F) Critical and cultural methods. Prerequisite: Written consent of advisor.

JTC 795 Var. Independent Study.

JTC 798 03(0-0-3). Research. F, S. Prerequisite: Written consent of advisor.

KEY ACADEMIC COMMUNITY COURSES
Nondepartmental
Office of Provost and Executive Vice President

KEY 192A-C. Key Community Seminar. F, S. Prerequisite: Concurrent registration in companion courses in the Key Course Cluster. Examination of an intellectual problem or theme. Topics vary by instructor. A) 01(0-0-1). B) 02(0-0-2). C) 03(0-0-3).

KEY 263 01(0-0-1). Academic and Career Decision-Making. F, S, SS. Prerequisite: Participation in the Key Plus Learning Community. Enhance academic and career development and decision-making through self-authorship, critical thinking, and reflection.

KEY 272 01(0-0-1). Leadership—Higher Education Environment. F, S. Prerequisite: Participation in the KEY Plus Learning Community. Personal leadership and diversity theories.

*Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
LANDSCAPE ARCHITECTURE COURSES
Department of Horticulture and Landscape Architecture
College of Agricultural Sciences

LAND 110 03(1-2-1). Introduction to Landscape Architecture. F. Prerequisite: None.
  Introductory theories, methods, and applications of landscape studies.

LAND 120 03(3-0-0). History of the Designed Landscape. S. Prerequisite: None.
  Major monuments and spaces from ancient Middle East through classical antiquity, the Renaissance, and Western tradition.

LAND 220/LIFE 220 03(3-0-0). Fundamentals of Ecology. (GT-SC2, AUCC 3A). F. Prerequisite: Three credits of 100-level biology or HORT 100; three credits of 100-level mathematics. Credit allowed for only one of the following: BIO 220, BIO 320, LAND 220, LIFE 220, LIFE 320, SOCR 320.
  Interrelationships among organisms and their environments. (S, NT-O)

LAND 230 04(2-4-0). Drawing the Landscape. F. Prerequisite: None.
  Visual communication techniques; exploration of symbology, model building, design development drawing, and construction documentation draughting.

LAND 240 04(1-4-1). Fundamentals of Landscape Design Process. S. Prerequisite: LAND 230.
  Initiation of formal exploration of design elements, materials, and principles, and introduction of design process as a defensible methodology. ($)

LAND 241 03(1-4-0). Environmental Analysis. S. Prerequisite: LAND 230; concurrent registration in LAND 240.
  Exploration and understanding of natural and cultural landscapes through analytical simulation techniques. ($)  

LAND 357 04(0-8-0). Omnibus Field Studies. SS. Prerequisite: Three credits in landscape drawing and analysis.
  Theories and methods for the analysis, design, and planning of garden and landscape scale environments. ($)

LAND 360 03(0-6-0). Basic Landscape Design and Construction. F. Prerequisite: LAND 240.
  Site programming, analysis, design, and construction, including skill development in specifying earthwork, drainage, and vegetative composition. ($)  

LAND 361 03(2-2-0). Digital Methods. F. Prerequisite: LAND 360 or concurrent registration.
  Landscape research, analysis, and design with ARCVIEW, AutoCAD, Microstation, and Photoshop. ($)  

LAND 362 03(0-6-0). Form and Expression in Garden Design. S. Prerequisite: LAND 361.
  Formal decision making for site scale environments, including creative processes for form-giving, and generation of experimental solutions. ($)  

LAND 363 04(2-4-0). Advanced Landscape Site Engineering. S. Prerequisite: LAND 360.
  Understanding and documenting the built environment with emphasis on construction and surveying as integral parts of design process. ($)  

LAND 364 04(1-6-0). Design and Nature. F. Prerequisite: LAND 361.
  Computer-aided processes for siting, organizing, and evaluating cultural activities within ecologically fragile, landscape-scale environments. ($)  

  Construction details, design development, and construction documentation emphasizing implementation of design projects.  

LAND 366 04(0-8-0). Landscape Design Expression. S. Prerequisite: LAND 365. Credit not allowed for both LAND 366 and LAND 376.
  Idea, values, and process landscape form applied to interactions of natural, cultural systems at the site and community scale; design competitions. ($)  

LAND 368/HORT 368 03(2-2-0). Landscape Irrigation and Water Conservation. F. S. Prerequisite: HORT 100 or LAND 110. Credit not allowed for both LAND 368 and HORT 368.
  Practical approaches and methods of irrigation, water conservation, and water management in the designed landscape. ($)  

LAND 376 04(0-8-0). Landscape Design and Visualization. SS. Prerequisite: LAND 362. Credit not allowed for both LAND 376 and LAND 366. Required field trips.
  Precedents, ideas, values and processes of landscape form applied to landscape systems at the site and community scale; design competitions.  

LAND 384 Var[1-5]. Supervised College Teaching. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

LAND 392 02(0-0-2). Seminar-Designed Landscapes-Theory and Criticism. F. Prerequisite: LAND 365.
  Readings, discussions, and writing in landscape architectural design theory; critical analysis of the designed and constructed landscape. ($)

LAND 444 03(3-0-0). Ecology of Landscapes. S. Prerequisite: LAND 220/LIFE 220; LIFE 320. Required field trips.
  Theories, methods, and practices for interpreting, describing, and representing natural and human modified landscapes. ($)

LAND 446 04(0-8-0). Urban Design. F. Prerequisite: LAND 366.
  Designing the urban landscape, including precedent exploration about overall image, materials, and structure of the city and its components. ($)  

LAND 447 04(0-8-0). Comprehensive Landscape Design. S. Prerequisite: LAND 446.
  Terminal studio; research, analysis, and synthesis for comprehensive project identified by student and approved in advance by faculty committee. ($)

LAND 449 01(1-0-0). Professional Practice. S. Prerequisite: LAND 447 or concurrent registration.
  Theory and skills of landscape architectural professional practice including functional, human, business, legal, and political aspects.  

LAND 454 05(1-6-1). Landscape Field Studies. SS. Prerequisite: LAND 366.
  Field observation of spatial and temporal landscape patterns resulting from natural and cultural processes and interactions. ($)  

LAND 455 05(1-6-1). Travel Abroad-European Landscape Architecture. SS. Prerequisite: LAND 362.
  Exploration of major theoretical platforms in design through drawing, photographing, and measuring landscape architecture precedents in Europe.  

  A) Design projects. B) Field service.  

LAND 496 Var[1-8]. Group Study. Maximum of 8 credits allowed in course.  

LAND 510 03(2-2-0). Virtual Design Methods. F. Prerequisite: None.
  Exploration and application of advanced computing technology and methods for analyzing and organizing natural and cultural landscapes.  

* Alternate year offering (odd);  * Alternate year offering (even);  + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT subcode = State Guarantee Transfer course and AUCC subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
LAND 520 03(1-4-0). Geographic Information Systems. S.
Prerequisite: LAND 241.
Theories and applications of geographic information systems in
spatial analysis and land planning.

LAND 560 03(2-2-0). Structure of Landscape Patterns. S.
Prerequisite: 300-level ecology course.
Mechanisms and concepts in landscape structure for planning, design,
and environmental management.

LAND 610 04(2-6-0). Topics in Garden Design. F. Prerequisite:
Graduate standing.
Garden design theories, methods, and operations. ($)  

LAND 620 04(2-6-0). Topics in Park Design. S. Prerequisite: Graduate
standing.
Ideas, values, and processes of landscape form applied to interactions
of natural and cultural systems for park and recreation applications.

LAND 630 04(2-6-0). Topics in Urban Design. F. Prerequisite:
Graduate standing.
History and application of urban design principles, practices, and
policies.

LAND 640 04(2-6-0). Major Landscape Change. S. Prerequisite:
Graduate standing.
Addresses social and ecological resilience of large-scale landscapes
through theory and application. ($)  

LAND 670 04(1-6-1). Landscape Architecture Studio Option. F. S.
Prerequisite: Graduate standing. Course may be taken up to 5 times for
credit.
Ideas, values, and processes of landscape architectural studio practice.

LAND 695A-B Var[1-4]. Landscape Architectural Independent
Study. F, S, SS. Prerequisite: Graduate Standing.
A) Design projects. B) Field service.

LAND 698 Var[1-5]. Research. F, S, SS. Prerequisite: Graduate
standing.
Guided research experience in landscape architecture.

*Alternate year offering (odd); °Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B =
bленд, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All
University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Type</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LARA 105</td>
<td>First-Year Arabic I</td>
<td>F, S, SS</td>
<td>5-0-0</td>
<td>Essentials of Arabic for the beginner: aural comprehension, speaking, reading, writing.</td>
</tr>
<tr>
<td>LARA 107</td>
<td>First-Year Arabic II</td>
<td>F, S, SS</td>
<td>5-0-0</td>
<td>Essentials of Arabic for the continuing student: aural comprehension, speaking, reading, writing.</td>
</tr>
<tr>
<td>LARA 200</td>
<td>Second-Year Arabic I</td>
<td>F, S</td>
<td>4-0-0</td>
<td>Grammar review and extensive practice in conversation, reading, and writing.</td>
</tr>
<tr>
<td>LARA 201</td>
<td>Second-Year Arabic II</td>
<td>F, S</td>
<td>4-0-0</td>
<td>Grammar review and extensive practice in conversation, reading, and writing.</td>
</tr>
<tr>
<td>LARA 250</td>
<td>Arabic Language, Literature, Culture in Translation</td>
<td>F, S</td>
<td>3-0-0</td>
<td>Selected works in translation from different periods and genres which represent the interrelationship of language, literature, and culture.</td>
</tr>
<tr>
<td>LARA 296 Var[1-5]</td>
<td>Group Study-Arabic</td>
<td>F, S</td>
<td>1-5</td>
<td></td>
</tr>
<tr>
<td>LARA 300</td>
<td>Third Year Arabic</td>
<td>F</td>
<td>3-0-0</td>
<td>Develop reading and writing skills.</td>
</tr>
<tr>
<td>LARA 301</td>
<td>Oral Communication-Arabic</td>
<td>S</td>
<td>3-0-0</td>
<td>In-depth language study to improve proficiency, emphasizing oral communication.</td>
</tr>
<tr>
<td>LARA 495 Var[1-6]</td>
<td>Independent Study-Arabic</td>
<td></td>
<td>1-6</td>
<td>Prerequisite: Three years of college-level Arabic.</td>
</tr>
</tbody>
</table>
LIBERAL ARTS COURSES
Nondepartmental
College of Liberal Arts

LB 170 03(3-0-0). World Literatures to 1500. (GT-AH2, AUCC 3E). F, S. Prerequisite: None.
Culturally significant literary texts from the beginnings of writing to 1500 from Europe, Asia, and Africa.

LB 171 03(3-0-0). World Literatures-The Modern Period. (GT-AH2, AUCC 3E). F, S. Prerequisite: None.
Culturally significant literary texts from 1500 to the present from Europe, Asia, Africa, the Americas.

LB 192 03(0-0-3). College of Liberal Arts First-Year Seminar. F. Prerequisite: None.
Traditions, concepts, and topics integral to the liberal arts; cultivates reading, communication, and critical thinking.

LB 193 01(0-0-1). Concepts/Critical Thinking in Liberal Arts. F, S. Prerequisite: Declared majors within the College of Liberal Arts; written consent of instructor.
Concepts and success strategies essential to the Liberal Arts. Students create a comprehensive academic plan. ($)

LB 200 01(1-0-0). Liberal Arts Research Methods. F, S. Prerequisite: None.
Research methods for the liberal arts, evaluation of sources, various style manuals (MLA/APA), essay format, note cards, and selected reference works. (NT-O)

+LB 205 03(3-0-0). Contemporary Legal Studies. F, S, SS. Prerequisite: None. Required field trips.
Introduction to sources and contemporary principles of law in the United States and to the study and practice of law.

LB 300 03(2-0-1). Specialized Professional Writing. (AUCC 2) F, S, SS. Prerequisite: CO 150 or HONR 193.
Emphasizes specialized writing skills used in professional letters, resumes, manuals, critiques complaints, and interest-specific research projects. (NT-O)

LB 386A-E Var[1-3]. Practicum. F, S. Prerequisite: None.
Practicum at CTV, KCSU, The Collegian, College Avenue, or in Arts Production. A) CTV. B) KCSU. C) Collegian. D) College Avenue. E) Arts Production.

LB 455/SPCM 455 03(2-3-0). Narrative Fiction Film as a Liberal Art. S. Prerequisite: Senior standing. Credit not allowed for both LB 455 and SPCM 455.
Narrative fiction film and its role in human history, culture, and social interaction.

LB 456/JTC 456 03(2-2-0). Documentary Film as a Liberal Art. F. Prerequisite: Junior or senior standing. Credit not allowed for both LB 456 and JTC 456.
Documentary film and its role in human history, culture, and social interaction.

LB 484 Var[1-5]. Supervised College Teaching. F, S, SS.
A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

LB 487 Var[1-3]. Internship. F, S, SS.

LB 492 03(0-0-3). Liberal Arts Capstone Seminar. F, S, SS. Prerequisite: LB 200; senior standing.
Integration and reflection for liberal arts majors with an emphasis on core competencies and academic, professional and/or career transitions. (NT-O)

⁰Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
CHINESE LANGUAGE COURSES
Department of Foreign Languages and Literatures
College of Liberal Arts

LCHI 105 05(5-0-0). First-Year Chinese I. F, S, SS. Prerequisite: No previous study in Chinese. Essentials of Chinese for the beginner: aural comprehension, speaking, reading, writing.

LCHI 107 05(5-0-0). First-Year Chinese II. F, S, SS. Prerequisite: LCHI 105. Essentials of Chinese for the continuing student: aural comprehension, speaking, reading, writing.

LCHI 200 05(5-0-0). Second-Year Chinese I. (GT-AH4, AUCC 3B). F, S. Prerequisite: LCHI 107 or placement exam. Credit not allowed for both LCHI 200 and LCHI 228A. Grammar review and extensive practice in conversation, reading, and writing.

LCHI 201 05(5-0-0). Second-Year Chinese II. (GT-AH4, AUCC 3B). F, S. Prerequisite: LCHI 200 or placement exam. Grammar review and extensive practice in conversation, reading, and writing.

LCHI 205 03(3-0-0). Intermediate Written Chinese. S. Prerequisite: LCHI 200 or placement exam. Development of fundamental language skills emphasizing writing and reading.

LCHI 250 03(3-0-0). Chinese Language, Literature, Culture in Translation-Chinese. (GT-AH2, AUCC 3B). F, S. Prerequisite: None. Selected works in translation from different periods and genres which represent the interrelationship of Chinese literature, and culture.


LCHI 304 03(3-0-0). Third-Year Chinese I. F. Prerequisite: LCHI 201 or placement exam. Development of reading comprehension, communicative competence, and cultural understanding.

LCHI 305 03(3-0-0). Third-Year Chinese II. S. Prerequisite: LCHI 304 or placement exam. Development of reading comprehension, communicative competence, and cultural understanding.

LCHI 309 03(3-0-0). Contemporary Chinese Literature and the Arts. S. Prerequisite: None. Trends resulting from traditional Chinese and contemporary foreign influences in Chinese literature and the arts.


LCHI 408 01(1-0-0). Chinese Calligraphy. F, S. Prerequisite: LCHI 304. History of Chinese calligraphy and basic Chinese calligraphy skills.

LCHI 495 Var[1-6]. Independent Study-Chinese. Prerequisite: Three years of college-level Chinese.

LCHI 496 Var[1-5]. Group Study-Chinese. F.

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
LEADERSHIP, ENTREPRENEURSHIP, ARTS ADVOCACY, AND THE PUBLIC COURSES
Nondepartmental College of Liberal Arts

LEAP 200 03(0-0-3). Advocacy in the Visual and Performing Arts. F. Prerequisite: Music, Theatre, Dance or Art major.
   The importance of the role of advocacy for the arts, issues of censorship, public funding, arts education, and artists’ advocacy through the arts.

LEAP 220 03(2-2-0). Technology and the Arts in the 21st Century. S. Prerequisite: LEAP 200; Music, Theatre, and Dance major.
   Utilizing technology to better serve arts creation, arts marketing and promotion.

+LEAP 300 03(3-0-0). Arts Outreach and Community Engagement. F. Prerequisite: LEAP 220. Required field trips.
   Research, development and production of arts outreach projects; team projects for community engagement.

LEAP 310 03(3-0-0). Creating and Managing a Career in the Arts. S. Prerequisite: LEAP 300.
   Training artists to create careers as entrepreneurs through self-promotion, career development, media, networking, and fiscal awareness/understanding.

LEAP 487 Var[3-12]. Internship. F, S, SS. Prerequisite: Enrollment in LEAP minor, Music, Theatre, Dance or Art major; junior or senior standing.
   Weekly seminar with 8 hours per week of involvement with the in-field internship.

LEAP 500 03(3-0-0). Leadership in the Arts. F, SS. Prerequisite: Senior or graduate standing.
   Theoretical and applied knowledge about concepts of leadership, leadership styles as applied to arts-related organizations. (NT-O)

LEAP 600 03(0-0-3). Arts Policy and Advocacy. F. Prerequisite: Admission to the Master in Arts Leadership and Administration program.
   Discussion of the role of artist as citizen and how we affect public policy.

LEAP 650 03(3-0-0). Arts Events Management. S. Prerequisite: LEAP 600.
   Technical aspects of events, season and festival management for arts related organizations.

+LEAP 660 03(1-4-1). Arts Collaboration and the Community. F. Prerequisite: LEAP 600. Required field trips.
   Research, development and production of outreach projects; team projects for community engagement.

LEAP 670 03(3-0-0). Law and the Arts. S. Prerequisite: LEAP 600.
   Examines the legal foundations of artistic creation including copyright, freedom of expression, public domain laws, and contract negotiation.

LEAP 687 Var[3-12]. Internship. F, S, SS. Prerequisite: LEAP 600; LEAP 692 or concurrent registration.
   Field internship at local, regional or national arts organization (45 hours per credit).

LEAP 692 01(0-0-1). Internship Seminar. F, S, SS. Prerequisite: LEAP 600.

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FRENCH LANGUAGE COURSES  
*Department of Foreign Languages and Literatures  
**College of Liberal Arts

LFRE 105 05(5-0-0), First-Year French I. F, S, SS. Prerequisite: No previous study in French. Credit not allowed for both LFRE 105 and LFRE 106. Essentials of French for the beginner: aural comprehension, speaking, reading, writing.

LFRE 106 03(3-0-0), First-Year French Review. F, S, SS. Prerequisite: Placement exam or instructor placement. For students with minimal proficiency. Credit not allowed for both LFRE 106 and LFRE 105. Basic review of essential skills: aural comprehension, speaking, reading, writing.

LFRE 107 05(5-0-0), First-Year French II. F, S, SS. Prerequisite: LFRE 105 or LFRE 106. Essentials of French for the continuing student: aural comprehension, speaking, reading, writing.

LFRE 108 05(5-0-0), Intensive French I. F. Prerequisite: Grade of A in LFRE 105 or LFRE 106 with written consent of instructor; or placement by exam. Accelerated practice in speaking, reading, writing, and aural comprehension.

LFRE 120 03(3-0-0), Reading for Proficiency. F, S, SS. Prerequisite: None. Credit for LFRE 120 not allowed if LFRE 107 or LFRE 108 has been completed. Essentials of language for developing reading proficiency.

LFRE 200 03(3-0-0), Second-Year French I. (GT-AH4, AUCC 3B). F, S. Prerequisite: LFRE 107 or LFRE 108 or placement exam. Credit not allowed for both LFRE 200 and LFRE 228A. Grammar review and extensive practice in conversation, reading, and writing.

LFRE 201 03(3-0-0), Second-Year French II. (GT-AH4, AUCC 3B). F, S. Prerequisite: LFRE 200 or placement exam. Grammar review and extensive practice in conversation, reading, and writing.

LFRE 208 05(5-0-0), Intensive French II. S. Prerequisite: LFRE 108 or placement exam. Accelerated practice in speaking, reading, writing, and aural comprehension.

LFRE 250 03(3-0-0), French Language, Literature, Culture in Translation-French. (GT-AH2, AUCC 3B). F, S. Prerequisite: None. Selected works in translation from different periods and genres which represent the interrelationship of language, literature, and culture.

LFRE 296 Var[1-5]. Group Study-French. F, S.

LFRE 300 03(3-0-0), Reading and Writing for Communication-French. F, S, SS. Prerequisite: LFRE 201 or LFRE 208 or placement. Development of reading and writing proficiency through an in-depth examination of contemporary writing.

LFRE 301 03(3-0-0), Oral Communication-French. F, S. Prerequisite: LFRE 201. In-depth language study to improve proficiency in all language skills emphasizing oral.

LFRE 310 03(3-0-0), Approaches to French Literature. F, S. Prerequisite: LFRE 300. Appreciation and critical readings of representative works in prose, drama, and poetry.

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LFRE 460 03(3-0-0). French/Francophone Women Writers. S. Prerequisite: LFRE 300; LFRE 310. May be taken up to 3 times for credit. Selected French and Francophone women writers in a variety of genres emphasizing relationships among gender, culture, and writing.

*LFRE 470 03(3-0-0). French Grammatical Constructions. S. Prerequisite: LFRE 312. Linguistic analysis of selected French grammatical constructions (word order, word formation, and sentence structure), their relationship to meaning.

LFRE 492 03(0-0-3). Seminar-French Language, Literature, and Society. F, S. Prerequisite: LFRE 310; two 400-level L*** courses; senior status. Integrative study of language, literature, and society.

LFRE 495 Var[1-6]. Independent Study-French. Prerequisite: Three years of college-level French.

LFRE 500 03(3-0-0). Language Analysis/Stylistics-French. F. Prerequisite: LFRE 400. Analysis of language structure through the examination of style in literary and non-literary texts.

LFRE 508 04(3-3-0). Intensive French-Graduate Review. SS. Prerequisite: Admission to Summer Institute for Foreign Language Teaching. Immersion review of language for the teacher, developing intermediate-level proficiency in culture and the four skills.

LFRE 514 01(1-0-0). Issues in Teaching Language-French. F, S. Prerequisite: Concurrent graduate teaching assistantship. Current theory and practice in second-language instruction; technological applications.

LFRE 525 03(3-0-0). History of the French Language. S. Prerequisite: LFRE 400. Investigation of both internal (strictly linguistic) and external (sociolinguistic) factors in development of the language.

LFRE 536 03(3-0-0). Topics in French Linguistics. F, S. Prerequisite: LFRE 500. Acquisition, discourse analysis, and language change and variation over time and space.

LFRE 551 03(3-0-0). Selected French Literary Movements/Periods. F. Prerequisite: Undergraduate degree in French. Advanced studies in and critical approaches to selected literary movements or periods.

LFRE 552 03(3-0-0). Advanced Studies in French Literary Genres. F. Prerequisite: Undergraduate degree in French. Advanced studies in and critical approaches to literary genres through study of major works in foreign literatures.

LFRE 553 03(3-0-0). Advanced French Author Studies. S. Prerequisite: Undergraduate degree in French. Critical approaches to the study of selected authors through appreciation and analysis of their major works.

LFRE 554 03(3-0-0). Advanced Topic Studies-French. S. Prerequisite: Undergraduate degree in French. Selected topics (theme, topoi, and interdisciplinary subjects) in foreign literatures.

LFRE 692 03(0-0-3). Seminar-French. F, S. Prerequisite: Undergraduate degree in French. Treatment of selected topics in seminar.

LFRE 695 Var[1-6]. Independent Study-French.

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</tr>
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<tbody>
<tr>
<td>LGEN 114 Var[1-10]</td>
<td>First-Year Language I</td>
<td>SS. Prerequisite: None.</td>
<td>Offered only through the Division of Continuing Education. Critical language immersion courses taught abroad by members of the Council of American Overseas Research Centers.</td>
</tr>
<tr>
<td>LGEN 115 Var[1-10]</td>
<td>First-Year Language II</td>
<td>SS. Prerequisite: None.</td>
<td>Offered only through the Division of Continuing Education. Critical language immersion courses taught abroad by members of the Council of American Overseas Research Centers.</td>
</tr>
<tr>
<td>LGEN 192 03(3-0-0)</td>
<td>Modern Languages/Cultures: Italian and Japanese</td>
<td>S. Prerequisite: None.</td>
<td>Language, cultural issues, and historical heritage of modern Italian and Japanese societies.</td>
</tr>
<tr>
<td>LGEN 214 Var[1-10]</td>
<td>Second-Year Language I</td>
<td>SS. Prerequisite: None.</td>
<td>Offered only through the Division of Continuing Education. Critical language immersion courses taught abroad by members of the Council of American Overseas Research Centers.</td>
</tr>
<tr>
<td>LGEN 215 Var[1-10]</td>
<td>Second-Year Language II</td>
<td>SS. Prerequisite: None.</td>
<td>Offered only through the Division of Continuing Education. Critical language immersion courses taught abroad by members of the Council of American Overseas Research Centers.</td>
</tr>
<tr>
<td>LGEN 290 Var[1-3]</td>
<td>Theatre Workshop in a Foreign Language</td>
<td>F, S. Prerequisite: LARA 105 or LCHI 105 or LFRE 105 or LGER 105 or LITA 105 or LPN 105 or LKOR 105 or LRUS 105 or LSPA 105.</td>
<td>Application of communication skills in a foreign language through informal staging of dramatic scripts.</td>
</tr>
<tr>
<td>LGEN 314 Var[1-10]</td>
<td>Third-Year Language I</td>
<td>SS. Prerequisite: None.</td>
<td>Offered only through the Division of Continuing Education. Critical language immersion courses taught abroad by members of the Council of American Overseas Research Centers.</td>
</tr>
<tr>
<td>LGEN 315 Var[1-10]</td>
<td>Third-Year Language II</td>
<td>SS. Prerequisite: None.</td>
<td>Offered only through the Division of Continuing Education. Critical language immersion courses taught abroad by members of the Council of American Overseas Research Centers.</td>
</tr>
<tr>
<td>LGEN 365 03(3-0-0)</td>
<td>Introduction to Foreign Cinema Studies</td>
<td>F, S. Prerequisite: LCHI 305 or LFRE 310 or LFRE 335 or LGER 310 or LGER 335 or LJPN 305 or LRUS 310 or LSPA 310 or LSPA 335.</td>
<td>Terminology, techniques, and approaches specific to foreign cinema. Taught in English.</td>
</tr>
<tr>
<td>LGEN 414 Var[1-10]</td>
<td>Fourth-Year Language I</td>
<td>SS. Prerequisite: None.</td>
<td>Offered only through the Division of Continuing Education. Critical language immersion courses taught abroad by members of the Council of American Overseas Research Centers.</td>
</tr>
<tr>
<td>LGEN 415 Var[1-10]</td>
<td>Fourth-Year Language II</td>
<td>SS. Prerequisite: None.</td>
<td>Offered only through the Division of Continuing Education. Critical language immersion courses taught abroad by members of the Council of American Overseas Research Centers.</td>
</tr>
</tbody>
</table>

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GERMAN LANGUAGE COURSES
Department of Foreign Languages and Literatures
College of Liberal Arts

LGER 105 05(5-0-0). First-Year German I. F, S, SS. Prerequisite: No previous study in German.
  Essentials of German for the beginner: aural comprehension, speaking, reading, writing.

LGER 107 05(5-0-0). First-Year German II. F, S, SS. Prerequisite: LGER 105.
  Essentials of German for the continuing student: aural comprehension, speaking, reading, writing.

LGER 108 05(5-0-0). Intensive German I. F. Prerequisite: Grade of A in LGER 105 and written consent of instructor; or placement by exam.
  Accelerated practice in speaking, reading, writing, and aural comprehension.

LGER 120 03(3-0-0). Reading for Proficiency. F, S, SS. Prerequisite: None. Credit for LGER 120 not allowed if LGER 107 or LGER 108 has been completed.
  Essentials of language for developing reading proficiency.

LGER 200 03(3-0-0). Second-Year German I. (GT-AH4, AUCC 3B). F, S. Prerequisite: LGER 107 or LGER 108 or placement exam. Credit not allowed for both LGER 200 and LGER 228A.
  Grammar review and extensive practice in conversation, reading, and writing.

LGER 201 03(3-0-0). Second-Year German II. (GT-AH4, AUCC 3B). F, S. Prerequisite: LGER 200 or placement exam.
  Grammar review and extensive practice in conversation, reading, and writing.

LGER 208 05(5-0-0). Intensive German II. S. Prerequisite: LGER 108 or placement exam.
  Accelerated practice in speaking, reading, writing, and aural comprehension.

LGER 250 03(3-0-0). German Language, Literature, Culture in Translation. (GT-AH2, AUCC 3B). F, S. Prerequisite: None.
  Selected works in translation from different periods and genres which represent the interrelationship of language, literature, and culture.

LGER 296 Var[1-5]. Group Study-German.
  Group study in language/literature/culture.

LGER 300 03(3-0-0). Reading and Writing for Communication-German. F, S, SS. Prerequisite: LGER 201 or LGER 208 or placement.
  Development of reading and writing proficiency through an in-depth examination of contemporary writing.

LGER 301 03(3-0-0). Oral Communication-German. S. Prerequisite: LGER 201 or placement exam.
  In-depth language study to improve proficiency in all language skills emphasizing oral.

LGER 310 03(3-0-0). Approaches to German Literature. F, S. Prerequisite: LGER 201 or LGER 208.
  Appreciation and critical readings of representative works in prose, drama, and poetry.

LGER 313 03(3-0-0). Introduction to German Translation and Interpreting. F, S. Prerequisite: LGER 300.
  Translation and interpreting of written and oral texts into and from German.

LGER 326 03(3-0-0). German Phonetics. F, S. Prerequisite: LGER 300.
  Phonetic principles and their application to language sound system; intensive practice in pronunciation, intonation.

LGER 335 03(3-0-0). Issues in German Culture. S. Prerequisite: LGER 300.
  Historical context of contemporary issues in the culture of German-speaking countries.

LGER 336 03(3-0-0). Issues in Swiss and Austrian Culture. S. Prerequisite: LGER 300.
  Swiss and Austrian culture focusing on the development of their respective cultures from the medieval to the modern periods. Taught in German.

LGER 345 03(3-0-0). Business German. F, S, SS. Prerequisite: LGER 300.
  Business and commercial aspects of the German language and culture.

LGER 355 03(3-0-0). 20th Century German Literature. F, S. Prerequisite: LGER 310.
  Representative literary works from the 20th century.

LGER 365 03(3-0-0). Introduction to German Cinema Studies. F, S. Prerequisite: LGER 310 or LGER 335.
  Terminology, techniques, and approaches specific to German cinema. Taught in German.

LGER 400 03(3-0-0). Advanced German Communication Skills. F. Prerequisite: LGER 300.
  Development of speaking, reading, and writing proficiency through an in-depth examination of representative writings and media communications.

LGER 401 03(3-0-0). Advanced German Oral Communication. S. Prerequisite: LGER 300.
  Advanced language study to improve proficiency in German language skills, with an emphasis on oral communication.

LGER 413 03(3-0-0). Advanced German Translation and Interpreting. F, S. Prerequisite: LGER 313.
  Advanced practice in translation and interpreting of written and oral texts into and from German.

LGER 434 03(3-0-0). Advanced German Culture. F, S. Prerequisite: LGER 335.
  Critical examination of selected topics in culture and cultural history of German-speaking countries.

LGER 441 03(3-0-0). Advanced Business German. F. S. Prerequisite: LGER 345.
  Advanced business and commercial aspects of the German language and culture.

LGER 450 03(3-0-0). Selected German Literary Movements and Periods. F, S. Prerequisite: LGER 300; LGER 310. May be taken up to 3 times for credit.
  Studies in selected literary movements and periods of Germany such as classicism, realism, naturalism, existentialism.

LGER 452 03(3-0-0). Genre Studies in German. F, S. Prerequisite: LGER 300; LGER 310. May be taken up to 3 times for credit.
  Development of critical approaches to major works in literature through selected literary genres and subgenres.

LGER 453 03(3-0-0). Author Studies in German. F, S. Prerequisite: LGER 300; LGER 310. May be taken up to 3 times for credit.
  Development of critical approaches to authors through the appreciation and analysis of selected works.

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LGER 454 03(3-0-0). Topic Studies in German. F, S. Prerequisite: LGER 300; LGER 310. May be taken up to 3 times for credit.
Selected topic studies such as themes, topics, and interdisciplinary subjects in literature.

LGER 465 03(3-0-0). Advanced Studies in German Film. S. Prerequisite: LGER 365.
Representation of German society and culture through film. Taught in German.

LGER 492 03(0-0-3). Seminar-German Language, Literature, and Society. F S. Prerequisite: LGER 310; two 400-level LGER courses; senior status.
Integrative study of language, literature, and society.

LGER 495 Var[1-6]. Independent Study-German. Prerequisite: Three years of college-level German.

LGER 500 03(3-0-0). Language Analysis/Stylistics-German. F. Prerequisite: LGER 400.
Analysis of language structure through the examination of style in literary and non-literary texts.

LGER 508 04(3-3-0). Intensive German-Graduate Review. SS. Prerequisite: Admission to Summer Institute for Foreign Language Teaching.
Immersion review of language for the teacher, developing intermediate-level proficiency in culture and the four skills.

LGER 514 01(1-0-0). Issues in Teaching German. F, S. Prerequisite: Concurrent graduate teaching assistantship.
Current theory and practice in second-language instruction; technological applications.

LGER 525 03(3-0-0). History of the German Language. S. Prerequisite: LGER 400.
Investigation of both internal (strictly linguistic) and external (sociolinguistic) factors in development of the language.

LGER 551 03(3-0-0). Selected German Literary Movements/Periods. F. Prerequisite: Undergraduate degree in German.
Advanced studies in and critical approaches to selected literary movements or periods.

LGER 552 03(3-0-0). Advanced Studies in German Literary Genres. F. Prerequisite: Undergraduate degree in German.
Advanced studies in and critical approaches to literary genres through study of major works in foreign literatures.

LGER 553 03(3-0-0). Advanced German Author Studies. S. Prerequisite: Undergraduate degree in German.
Critical approaches to the study of selected authors through appreciation and analysis of their major works.

LGER 554 03(3-0-0). Advanced German Topic Studies. S. Prerequisite: Undergraduate degree in German.
Selected topics (theme, topoi, and interdisciplinary subjects) in foreign literatures.

LGER 692 03(0-0-3). Seminar-German. F, S. Prerequisite: Undergraduate degree in German.
Treatment of selected topics in seminar.

LGER 695 Var[1-6]. Independent Study-German.

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GREEK LANGUAGE COURSES
Department of Foreign Languages and Literatures
College of Liberal Arts

*LGRK 152 03(3-0-0). Classical Greek I. S. Prerequisite: None.
Essentials of the language, reading, and translation.

*LGRK 153 03(3-0-0). Classical Greek II. S. Prerequisite: LGRK 152.
Essentials of the language, reading, and translation.
LI 301 01(1-0-0). Research in the Information Age. F, S, SS.
Prerequisite: None.
Developing strategies for library research; locating appropriate resources; and selecting, evaluating, and recording relevant information. (NT-O)
LIFE SCIENCE COURSES  
Nondepartmental, Interdisciplinary  
Office of Provost and Executive Vice President  

LIFE 102 04(3-3-0). Attributes of Living Systems. (GT-SC1, AUCC 3A)  F, S, SS. Prerequisite: High school chemistry. Intended for students requiring additional courses in biology or areas related to biological science.  
Levels of organization, stability, and change in living systems. ($)  

LIFE 103 04(3-3-0). Biology of Organisms-Animals and Plants.  F, S, SS. Prerequisite: LIFE 102.  
Diversity of animals and plants; their structural and functional characteristics. ($)  

LIFE 162 02(2-0-0). Bridging Biol/Chem Gulf for Pre-Health Majors.  F. Prerequisite: Enrollment in the KEY Health Professions Learning Community.  
Connections between chemistry and biology through inquiry-based exercises centered around societal and health issues.  

LIFE 201A-B 03(3-0-0). Introductory Genetics. (GT-SC2, AUCC 3A)  F, S. Prerequisite: LIFE 102. Credit not allowed for both LIFE 201A and LIFE 201B.  
A) Emphasis on applied genetics, population genetics, and conservation/ecological genetics.  
B) Emphasis on molecular, immunological, and developmental genetics.  

LIFE 202A-B 01 (0-0-1). Introductory Genetics Recitation.  F. S. Credit not allowed for both LIFE 202A and LIFE 202B.  
Case studies and problems solving in:  
A) Applied genetics, population genetics, and conservation/ecological genetics. Prerequisite: LIFE 201A or concurrent registration.  
B) Honors Recitation. Molecular genetics. Prerequisite: LIFE 201B or concurrent registration; participation in University Honors program.  

LIFE 203 02(0-3-1). Introductory Genetics Laboratory.  S. Prerequisite: LIFE 201A or concurrent registration or LIFE 201B or concurrent registration.  
Basic molecular genetics and molecular aspects of development laboratory.  

LIFE 205 03(3-0-0). Microbial Biology.  S. Prerequisite: (BZ110; BZ 111) or LIFE 102; CHEM 107 or CHEM111.  
General principles of microbiology focused on human-microbial interactions.  

LIFE 206 02(0-4-0). Microbial Biology Laboratory.  F, S. Prerequisite: LIFE 205 or concurrent registration.  

LIFE 210 03(3-0-0). Introductory Eukaryotic Cell Biology.  F, S. Prerequisite: CHEM 111; CHEM 112; LIFE 102.  
Solid understanding of a cell, different cell types, molecular aspects of cellular and subcellular biology and biochemistry.  

LIFE 211 01(0-0-1). Introductory Cell Biology Honors Recitation.  F, S. Prerequisite: LIFE 210 or concurrent registration; participation in University Honors program.  
Molecular aspects of cellular and subcellular biology and introductory biochemistry recitation.  

LIFE 212 02(0-3-1). Introductory Cell Biology Laboratory.  F, S. Prerequisite: CHEM 112 or concurrent registration.; LIFE 210 or concurrent registration.  
Molecular aspects of cellular and subcellular biology and introductory biochemistry laboratory. ($)  

LIFE 220/LAND 220 03(3-0-0). Fundamentals of Ecology. (GT-SC2, AUCC 3A). F. Prerequisite: Three credits of 100-level biology or HORT 100; three credits of 100-level mathematics. Credit allowed for only one of the following: BIO 220, BIO 320, LAND 220, LIFE 220, LIFE 320, SOCR 220.  
Interrelationships among organisms and their environments. (S, NT-O)  

LIFE 320 03(3-0-0). Ecology.  F, S. Prerequisite: BZ 101 or BZ 104 or BZ 110 or BZ 120 or LIFE 102; MATH 141 or MATH 155 or MATH 160. Credit allowed for only one of the following: BIO 220, BIO 320, LAND 220, LIFE 220, LIFE 320, SOCR 220.  
Interrelationships among organisms and their environments using conceptual models and quantitative approaches.  

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<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Terms</th>
<th>Prerequisites</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LITA 105</td>
<td>First-Year Italian I</td>
<td>5-0-0</td>
<td>F, S, SS</td>
<td>No previous study in the language.</td>
<td>Essentials of Italian for the beginner: aural comprehension, speaking, reading, writing.</td>
</tr>
<tr>
<td>LITA 107</td>
<td>First-Year Italian II</td>
<td>5-0-0</td>
<td>F, S, SS</td>
<td>LITA 105</td>
<td>Essentials of Italian for the continuing student: aural comprehension, speaking, reading, writing.</td>
</tr>
<tr>
<td>LITA 200</td>
<td>Second-Year Italian I</td>
<td>3-0-0</td>
<td>F, S</td>
<td>LITA 107 or placement exam.</td>
<td>Grammar review and extensive practice in conversation, reading, and writing.</td>
</tr>
<tr>
<td>LITA 201</td>
<td>Second-Year Italian II</td>
<td>3-0-0</td>
<td>F, S</td>
<td>LITA 200 or placement exam.</td>
<td>Grammar review and extensive practice in conversation, reading, and writing.</td>
</tr>
<tr>
<td>LITA 365</td>
<td>Studies in Foreign Film-Italian</td>
<td>3-0-0</td>
<td>F, S</td>
<td>None</td>
<td>Representation of Italian society through film. Taught in Italian.</td>
</tr>
<tr>
<td>LITA 495</td>
<td>Independent Study-Italian</td>
<td>Var[1-6]</td>
<td></td>
<td>Three years of college-level Italian.</td>
<td></td>
</tr>
</tbody>
</table>

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JAPANESE LANGUAGE COURSES  
Department of Foreign Languages and Literatures  
College of Liberal Arts


LJPN 200 05(5-0-0). Second-Year Japanese I. (GT-AH4, AUCC 3B). F, S. Prerequisite: LJPN 107 or placement exam. Credit not allowed for both LJPN 200 and LJPN 228A. Grammar review and extensive practice in conversation, reading, and writing.

LJPN 201 05(5-0-0). Second-Year Japanese II. (GT-AH4, AUCC 3B). F, S. Prerequisite: LJPN 200 or placement exam. Grammar review and extensive practice in conversation, reading, and writing.

LJPN 208 01(1-0-0). Kanji Study. F, S. Prerequisite: LJPN 105. May be taken up to 4 times for credit. Kanji (Chinese characters) learning strategies, through examination and analysis of Kanji characters.

LJPN 250 03(3-0-0). Japanese Language, Literature, Culture in Translation. (GT-AH2, AUCC 3B). F, S. Prerequisite: None. Selected works in translation from different periods and genres which represent the interrelationship of Japanese language, literature, and culture.


LJPN 304 03(3-0-0). Third-Year Japanese I. F. Prerequisite: LJPN 201 or placement exam. Development of reading comprehension, communicative competence, and cultural understanding.

LJPN 305 03(3-0-0). Third-Year Japanese II. S. Prerequisite: LJPN 304 or placement exam. Enhanced development of reading comprehension, communicative competence, and cultural sensitivity.


LJPN 404 03(3-0-0). Historical Aspects of the Language and Society. F. Prerequisite: LJPN 305. Advanced Japanese language course designed to further enhance proficiency through a variety of activities.

LJPN 405 03(3-0-0). Integrated Japanese: Beyond Words. S. Prerequisite: LJPN 305. Advanced Japanese language course designed to further enhance proficiency through a variety of activities for the continuing student.

LJPN 408 01(1-0-0). Advanced Kanji Study. F, S. Prerequisite: LJPN 201. May be taken up to four times for credit. Kanji learning strategies and acquisition of advanced Kanji characters.

LJPN 495 Var[1-6]. Independent Study-Japanese. Prerequisite: Three years of college-level Japanese.


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KOREAN LANGUAGE COURSES

Department of Foreign Languages and Literatures

College of Liberal Arts

LKOR 105 05(5-0-0). First-Year Korean I. F, S, SS. Prerequisite: No previous study in Korean.
Essentials of Korean for the beginner: aural comprehension, speaking, reading, writing.

LKOR 107 05(5-0-0). First-Year Korean II. F, S, SS. Prerequisite: LKOR 105.
Essentials of Korean for the continuing student: aural comprehension, speaking, reading, writing.

LKOR 202 03(3-0-0). Intermediate Korean and Culture I. F, S, SS. Prerequisite: LKOR 107.

LKOR 203 03(3-0-0). Intermediate Korean and Culture II. F, S, SS. Prerequisite: LKOR 202.

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
## LATIN LANGUAGE COURSES

*Department of Foreign Languages and Literatures*

*College of Liberal Arts*

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Prerequisite</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLAT 105(5-0-0)</td>
<td>First Year Latin I  F.</td>
<td>None.</td>
<td>Essentials of Latin grammar, vocabulary, and phonology.</td>
</tr>
<tr>
<td>LLAT 107(5-0-0)</td>
<td>First-Year Latin II S.</td>
<td>LLAT 105.</td>
<td>Six tenses of verbs, active and passive; use subjunctive review of the five declensions of nouns and adjectives; new vocabulary.</td>
</tr>
</tbody>
</table>

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RUSSIAN LANGUAGE COURSES
Department of Foreign Languages and Literatures
College of Liberal Arts

LRUS 105 05(5-0-0). First-Year Russian I. F, S, SS. Prerequisite: No previous study in Russian.
Essentials of Russian for the beginner: aural comprehension, speaking, reading, writing.

LRUS 107 05(5-0-0). First-Year Russian II. F, S, SS. Prerequisite: LRUS 105.
Essentials of Russian for the continuing student: aural comprehension, speaking, reading, writing.

LRUS 200 04(4-0-0). Second-Year Russian I. (GT-AH4, AUCC 3B). F, S. Prerequisite: LRUS 107 or placement exam. Credit not allowed for both LRUS 200 and LRUS 228A.
Grammar review and extensive practice in conversation, reading, and writing.

LRUS 201 04(4-0-0). Second-Year Russian II. (GT-AH4, AUCC 3B). F, S. Prerequisite: LRUS 200 or placement exam.
Grammar review and extensive practice in conversation, reading, and writing.

LRUS 250 03(3-0-0). Russian Literature, Culture in Translation. (GT-AH2, AUCC 3B). F, S. Prerequisite: None.
Selected works in translation from different periods and genres which represent the interrelationship of language, literature, and culture.

LRUS 296 Var[1-5]. Group Study-Russian. Prerequisite: One semester of Russian.
Group study in language/literature/culture.

LRUS 304 03(3-0-0). Third-Year Russian I. F. Prerequisite: LRUS 201 or placement exam.
Development of reading comprehension, communicative competence, and cultural understanding.

LRUS 305 03(3-0-0). Third-Year Russian II. S. Prerequisite: LRUS 304 or placement exam.
Enhanced development of reading comprehension, communicative competence, and cultural sensitivity.

LRUS 350 03(3-0-0). Russian Culture. S. Prerequisite: LRUS 201.
Russian culture and its development through literature, as well as geography, history, and music.

LRUS 365 03(3-0-0). Introduction to Russian Cinema Studies. F, S. Prerequisite: LRUS 305.
Terminology, techniques, and approaches specific to Russian cinema. Taught in Russian.

LRUS 495 Var[1-6]. Independent Study-Russian. Prerequisite: Three years of college-level Russian.

LRUS 496 Var[1-5]. Group Study-Russian. Prerequisite: LRUS 305 or placement exam.
Group study in language/literature/culture.

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
SIGN LANGUAGE COURSES
Department of Foreign Languages and Literatures
College of Liberal Arts

LSGN 109 05(5-0-0). American Sign Language I. F. Prerequisite: None.
   Vocabulary, grammar and basic conversational skill in ASL, with information on deaf culture.

LSGN 110 05(5-0-0). American Sign Language II. F, S, SS. Prerequisite: LSGN 109.
   Development of communicative competence in ASL skill and expansion of knowledge of deaf culture.

LSGN 296 Var[1-5]. Group Study–American Sign Language. F, S.
In-depth language study to improve proficiency in all language skills emphasizing oral.

LSPA 310 03(3-0-0). Approaches to Spanish Literature. F, S. Prerequisite: LSPA 300 or placement exam.
- Appreciation and critical readings of representative works in prose, drama, and poetry.

LSPA 312 03(3-0-0). Introduction to Spanish Linguistics. F. Prerequisite: LSPA 300 or concurrent registration.
- Phonetics, phonology, morphology, syntax, semantics, and pragmatics.

LSPA 313 03(3-0-0). Introduction to Spanish Translation and Interpreting. F, S. Prerequisite: LSPA 300.
- Translation and interpreting of written and oral texts into and from the foreign language.

LSPA 326 03(3-0-0). Spanish Phonetics. F, S. Prerequisite: LSPA 300 or concurrent registration.
- Phonetic principles and their application to Spanish sound system; intensive practice in pronunciation, intonation.

LSPA 335 03(3-0-0). Issues in Hispanic Culture. F. Prerequisite: LSPA 300.
- Historical context of contemporary issues in the culture of Spanish-speaking countries.

LSPA 345 03(3-0-0). Business Spanish. F, S, SS. Prerequisite: LSPA 300.
- Business and commercial aspects of the Spanish language and culture.

LSPA 346 03(3-0-0). Spanish for Health Care. F, S. Prerequisite: LSPA 300.
- Specific linguistic and cultural issues necessary to function in the Hispanic health care world.

LSPA 365 03(3-0-0). Studies in Foreign Film-Spanish. F, S. Prerequisite: LSPA 310.
- Representation of Spanish society through film. Taught in Spanish. (NT-O)

LSPA 379 01(0-2-0). Service Learning-Spanish. F, S, SS. Prerequisite: Concurrent registration with 300-level Spanish course with written consent of instructor.
- Language-related voluntary community work.

LSPA 400 03(3-0-0). Advanced Spanish Communication Skills. F, S, SS. Prerequisite: LSPA 300.
- Development of speaking, reading, and writing proficiency through an in-depth examination of representative writings and media communications.

* LSPA 401 03(3-0-0). Advanced Spanish Oral Communication. S. Prerequisite: LSPA 300.
- Advanced language study to improve proficiency in Spanish language skills, with an emphasis on oral communication.

LSPA 413 03(3-0-0). Advanced Spanish Translation and Interpreting. F, S. Prerequisite: LSPA 313.
- Advanced practice in translation and interpreting of written and oral texts into and from Spanish.

* LSPA 435 03(3-0-0). Caribbean Culture in Hispanic Literature. S. Prerequisite: LSPA 335.
- Hispanic-Caribbean cultures with emphasis on African heritage and cultural identity.

LSPA 436 03(3-0-0). Advanced Latin American Culture. F, S, SS. Prerequisite: LSPA 335.
- Latin American cultural identities and their history.

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LSPA 437 03(3-0-0). Advanced Spanish Culture. F, S. Prerequisite: LSPA 335.
   Cultural characteristics of Spanish society through the ages.

LSPA 441 03(3-0-0). Advanced Business Spanish. F, S. Prerequisite: LSPA 345.
   Advanced business and commercial aspects of the Spanish language and culture.

LSPA 442 03(3-0-0). Colonial Latin American Literature. F. Prerequisite: LSPA 300; LSPA 310.
   Literature and literary culture of colonial Latin America.

LSPA 443 03(3-0-0). Spanish Theatre. F, S. Prerequisite: LSPA 300; LSPA 310.
   Major authors and works of Spanish theatre.

LSPA 445 03(3-0-0). Women Writers in the Hispanic Worlds. F. Prerequisite: LSPA 300; LSPA 310.
   Selected Hispanic women writers in a variety of genres emphasizing relationships among gender, culture, and writing.

LSPA 449 03(3-0-0). Spanish-American Literary Movements and Periods. F. Prerequisite: LSPA 300; LSPA 310.
   Studies in selected literary movements and periods of Spanish America such as classicism, realism, naturalism, existentialism.

LSPA 450 03(3-0-0). Selected Spanish Literary Movements and Periods. F. Prerequisite: LSPA 300; LSPA 310.
   Studies in selected literary movements and periods of Spain, such as classicism, realism, naturalism, existentialism.

LSPA 452 03(3-0-0). Genre Studies in Spanish. F, S. Prerequisite: LSPA 300; LSPA 310. May be taken up to 3 times for credit.
   Development of critical approaches to major works in literature through selected literary genres and subgenres.

LSPA 453 03(3-0-0). Author Studies in Spanish. F, S. Prerequisite: LSPA 300; LSPA 310. May be taken up to 3 times for credit.
   Development of critical approaches to authors through the appreciation and analysis of selected works.

LSPA 454 03(3-0-0). Topic Studies in Spanish. F, S. Prerequisite: LSPA 300; LSPA 310. May be taken up to 3 times for credit.
   Selected topic studies such as themes, topoi, and interdisciplinary subjects in literature.

LSPA 465A 03(3-0-0). Studies in Foreign Film—Spain. S, SS. Prerequisite: LSPA 310 and LSPA 335.
   Representation of Spanish society or specific topics through film. Taught in Spanish.

LSPA 465B 03(3-0-0). Studies in Foreign Film—Latin America. S, SS. Prerequisite: LSPA 310 and LSPA 335.
   Representation of Latin American societies or specific topics through film. Taught in Spanish.

LSPA 468 03(3-0-0). Spanish Vocabulary and Word Formation. F, S. Prerequisite: LSPA 312.
   Spanish vocabulary: meaning relations, word formation through prefixation, suffixation, and composition, and meaning change over time and space.

LSPA 470 03(3-0-0). Spanish Grammatical Constructions. S. Prerequisite: LSPA 400.
   Linguistic analysis of selected Spanish grammatical constructions (word order, word formation, and sentence structure), their relationship to meaning.

LSPA 479 01(0-2-0). Service Learning-Spanish. F, S, SS. Prerequisite: Concurrent registration with 400-level Spanish course. May be taken up to 3 times for credit.

LSPA 492 03(0-0-3). Seminar-Spanish Language, Literature, and Society. F. Prerequisite: LSPA 310; two 400-level Spanish courses; senior status.
   Integrative study of language, literature, and society.

LSPA 495 Var[1-6]. Independent Study-Spanish. Prerequisite: Three years of college-level Spanish.

LSPA 500 03(3-0-0). Language Analysis/Stylistics-Spanish. F. Prerequisite: LSPA 400.
   Analysis of language structure through the examination of style in literary and non-literary texts.

LSPA 508 04(3-3-0). Intensive Spanish-Graduate Review. SS. Prerequisite: Admission to Summer Institute for Foreign Language Teaching.
   Immersion review of language for the teacher, developing intermediate-level proficiency in culture and the four skills.

LSPA 514 01(1-0-0). Issues in Teaching Spanish. F, S. Prerequisite: Concurrent graduate teaching assistantship.
   Current theory and practice in second-language instruction; technological applications.

LSPA 525 03(3-0-0). History of the Spanish Language. F. Prerequisite: LSPA 400.
   Investigation of both internal (strictly linguistic) and external (sociolinguistic) factors in development of the language.

LSPA 536 03(3-0-0). Topics in Spanish Linguistics. F, S. Prerequisite: LSPA 500.
   Acquisition, discourse analysis, and language change and variation over time and space.

LSPA 540 03(3-0-0). Literary Periods of Spanish America. F. Prerequisite: Undergraduate degree in Spanish.
   Advanced studies in critical approaches to selected literary movements or periods of Spanish America.

LSPA 551 03(3-0-0). Selected Spanish Literary Movements/Periods. F. Prerequisite: Undergraduate degree in Spanish.
   Advanced studies in and critical approaches to selected literary movements or periods.

LSPA 552 03(3-0-0). Advanced Studies in Spanish Literary Genres. F. Prerequisite: Undergraduate degree in Spanish.
   Advanced studies in and critical approaches to literary genres through study of major works in foreign literatures.

LSPA 553 03(3-0-0). Advanced Spanish Author Studies. S. Prerequisite: Undergraduate degree in Spanish.
   Critical approaches to the study of selected authors through appreciation and analysis of their major works.

LSPA 554 03(3-0-0). Advanced Spanish Topic Studies. S. Prerequisite: Undergraduate degree in Spanish.
   Selected topics (theme, topoi, and interdisciplinary subjects) in foreign literatures.

LSPA 692 03(0-0-3). Seminar-Spanish. F, S. Prerequisite: Undergraduate degree in Spanish.
   Treatment of selected topics in seminar.

LSPA 695 Var[1-6]. Independent Study-Spanish.

°Alternate year offering (odd); * Alternate year offering (even); † Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
# MATH 117 01(1-0-0). College Algebra in Context I. (GT-MA1, AUCC 1B). F, S, SS. Prerequisite: Mathematics Placement Examination or Mathematics Challenge Examination.

Functions as mathematical models. Linear, quadratic, and polynomial functions considered symbolically, graphically, numerically, and contextually. (NT-O)

# MATH 118 01(1-0-0). College Algebra in Context II. (GT-MA1, AUCC 1B). F, S, SS. Prerequisite: MATH 117 or Mathematics Placement Examination or Mathematics Challenge Examination.

Reciprocals of linear functions, rational functions, and power functions considered symbolically, graphically, numerically, and contextually. (NT-O)

# MATH 122/CS 122 01(0-0-1). Theory for Introductory Programming. F, S. Prerequisite: MATH 118; concurrent registration in CS 161. Credit not allowed for both MATH 122 and CS 122. Credit not allowed for students who have completed CS 160.

Set theory, definitions operations, Venn diagrams, power sets, propositional logic and proofs. Functions; loop invariants. (NT-O)

# MATH 124 01(1-0-0). Logarithmic and Exponential Functions. (GT-MA1, AUCC 1B). F, S, SS. Prerequisite: MATH 118 or Mathematics Placement Examination or Mathematics Challenge Examination.

Definition and graphs of exponential and logarithmic functions, properties of logarithmic functions, exponential and logarithmic equations, applications. (NT-O)

# MATH 125 01(1-0-0). Numerical Trigonometry. (GT-MA1, AUCC 1B). F, S. SS. Prerequisite: MATH 118 or Mathematics Placement Examination or Mathematics Challenge Examination.

Definition and graphs of trigonometric functions, laws of sines and cosines, solutions of right and oblique triangles, applications. (NT-O)

# MATH 126 01(1-0-0). Analytic Trigonometry. (GT-MA1, AUCC 1B). F, S, SS. Prerequisite: MATH 125 or Mathematics Placement Examination or Mathematics Challenge Examination.

Inverse trigonometric functions, trigonometric identities, solving trigonometric equations. (NT-O)

# MATH 130 03(2-2-0). Math in the Social Sciences. (GT-MA1, AUCC 1B). F, S. SS. Prerequisite: Mathematics Placement Examination.

Voting theory, power indices, fair division, apportionment, circuits and trees, list processing, descriptive statistics, probability.

# MATH 133 03(2-2-0). Financial Mathematics. (GT-MA1, AUCC 1B). F. Prerequisite: Mathematics Placement Examination. Calculator required.

Pricing, taxes, insurance, interest, annuities, amortization, investments using financial calculators and spreadsheets.

# MATH 135 03(2-0-1). Patterns of Phenomena. (GT-MA1, AUCC 1B). S. Prerequisite: Mathematics Placement Examination.

Applications of mathematical ideas and mode of thought in the arts and humanities, focusing on classification, recognition.

# MATH 141 03(3-0-0). Calculus in Management Sciences. (GT-MA1, AUCC 1B). F, S, SS. Prerequisite: MATH 118. Credit allowed for only one of the following courses: MATH 141, MATH 155, or MATH 160.

Analytic geometry, limits, equilibrium of supply and demand, differentiation, integration, applications of the derivative, integral.

# MATH 151 01(0-0-2). Mathematical Algorithms in Matlab I. S. Prerequisite: MATH 141 or MATH 155 or MATH 160.

Statements, expressions and variable assignments, scripts, control statements and logical statements. Newton’s method, Simpson’s rule, recursion.

# MATH 152 01(0-0-2). Mathematical Algorithms in Maple. S. Prerequisite: MATH 141 or MATH 155 or MATH 160.

Iteration and recursion, control and logical statements, expressions, functions, data types, binary numbers, symbolic manipulation of terms.

# MATH 155 04(4-0-0). Calculus for Biological Scientists I. (GT-MA1, AUCC 1B). F, S, SS. Prerequisite: MATH 124; MATH 125. Credit allowed for only one of the following courses: MATH 141, MATH 155, or MATH 160.

Limits, continuity, differentiation, and integration of elementary functions with applications in the biosciences. Programmable graphing calculator required.

# MATH 158/CS 158 01(0-2-0). Mathematical Algorithms in C. S. Prerequisite: CS 156; MATH 151; MATH 160. Credit not allowed for both MATH 158 and CS 158.

Compilers, expressions, variable types, control statements, pointers, logical statements, plotting, secant method, trapezoidal rule, recursion.

# MATH 160 04(3-2-0). Calculus for Physical Scientists I. (GT-MA1, AUCC 1B). F, S, SS. Prerequisite: MATH 124; MATH 126. Credit allowed for only one of the following: MATH 141; MATH 155; MATH 160.

Limits, continuity, differentiation, and integration of elementary functions with applications; conic sections. (NT-O)

# MATH 161 04(3-2-0). Calculus for Physical Scientists II. (GT-MA1, AUCC 1B). F, S, SS. Prerequisite: MATH 124; MATH 160.

Transcendental functions, integration techniques, polar coordinates, sequences and series, with mathematical software.

# MATH 192 01(0-0-1). First-Year Seminar in Mathematical Sciences. F. Prerequisite: None.

Introduction to the richness and variety of problems addressed by mathematical language and techniques; resources and available careers.

# MATH 229 02(2-2-0). Matrices and Linear Equations. F, S, SS. Prerequisite: MATH 141 or MATH 155 or MATH 160.

Linear systems, matrix arithmetic, homogeneous coordinates, complex numbers, eigenvalues, eigenvectors, applications to discrete dynamical systems.

# MATH 230 03(2-2-0). Discrete Mathematics for Educators. F. Prerequisite: EDUC 275 or concurrent registration; MATH 161. Credit allowed for only one of the following: MATH 230, MATH 301, MATH 330.

Voting theory, fair division, graph theory, linear programming, probability, teaching in small groups, proof techniques, mathematical technology.

# MATH 235 02(2-2-0). Introduction to Mathematical Reasoning. S. Prerequisite: MATH 161.

Mathematical statements and proof techniques, induction, set theory, inequalities, number systems, functions.

# MATH 255 04(4-0-0). Calculus for Biological Scientists II. (GT-MA1, AUCC 1B). F. S. Prerequisite: Concurrent registration in MATH 126; MATH 155. Credit not allowed for both MATH 255 and MATH 261.

Derivatives and integrals of functions of several variables, differential and difference equations, matrices, applications in the biosciences. Programmable graphing calculator required.

# MATH 261 04(4-0-0). Calculus for Physical Scientists III. F, S, SS. Prerequisite: MATH 161. Credit not allowed for both MATH 261 and MATH 255.

Vector functions, partial differentiation, cylindrical and spherical coordinates, multiple integrals, line integrals, Green’s theorem.

# MATH 301 03(3-0-0). Introduction to Combinatorial Theory. F. Prerequisite: MATH 160. Credit not allowed for both MATH 301 and MATH 330.

*Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
MATH 317 04(4-0-0). Advanced Calculus of One Variable. F, S. SS. Prerequisite: MATH 161. Convergence of sequences, series; limits, continuity, differentiation, integration of one-variable functions; development of skills for proving theorems.

MATH 331 03(3-0-0). Introduction to Mathematical Modeling. F. Prerequisite: MATH 161 or concurrent registration; MATH 229 or concurrent registration or MATH 369 or concurrent registration. Problem formulation. Modeling, theoretical and empirical, Variable selection. Derivation and simulation of solutions. Model testing including predication.

MATH 332 03(3-0-0). Partial Differential Equations. S. Prerequisite: MATH 340 or MATH 345. Credit not allowed for both MATH 332 and MATH 530. Partial differential equations, separation of variables, Fourier series and transforms, Laplace, heat, and wave equations.

MATH 340 04(3-2-0). Introduction to Ordinary Differential Equations. F, S, SS. Prerequisite: MATH 255 or MATH 261. Credit not allowed for both MATH 340 and MATH 345.

First and second order equations, series, Laplace transforms, linear algebra, eigenvalues, first order systems of equations, numerical techniques.

MATH 345 04(3-2-0). Differential Equations. F. S. Prerequisite: MATH 229 or MATH 369; MATH 255 or MATH 261. Credit not allowed for both MATH 345 and MATH 340.

First and second order equations, Laplace transforms, first order systems of equations, numerical methods, applied linear algebra, linearization.

MATH 348/BZ 348 04(3-3-0). Theory of Population and Evolutionary Ecology. F. Prerequisite: MATH 155 or MATH 160. Credit allowed for only one of the following: MATH 348, BZ 348, BZ 548. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

Principles and methods for building, analyzing, and interpreting mathematical models of ecological and evolutionary problems in biology.

MATH 360 03(3-0-0). Mathematics of Information Security. F. Prerequisite: MATH 229 or MATH 369.

Codes, ciphers, Chinese remainder theorem, primality testing, public key ciphers, RSA, finite fields, discrete algorithms, advanced encryption standard.

MATH 366 03(3-0-0). Introduction to Abstract Algebra. F, S, SS. Prerequisite: MATH 161.

Sets, integers, polynomials, real and complex numbers, groups, integral domains, and fields; development of skills for proving theorems.

MATH 369 03(3-0-0). Linear Algebra. F, S, SS. Prerequisite: MATH 161 or MATH 255.

Linear systems, matrices, subspaces of Euclidean spaces, linear transformations on Euclidean spaces, eigenvalues, eigenvectors.

MATH 384 01(1-0-0). Supervised College Teaching. F. S. Prerequisite: Written consent of instructor. May not be used to satisfy Mathematics degree requirements. Maximum of 1 credit allowed in course.

Skills for effective tutoring of precalculus mathematics; design and implementation of the Individualized Mathematics Program.

*MATH 405 03(3-0-0). Introduction to Number Theory. S. Prerequisite: MATH 360 or MATH 366.

Diophantine equations; distribution of primes; multiplicative functions; finite fields; quadratic reciprocity; quadratic number fields.

*MATH 417 03(3-0-0). Advanced Calculus I. F. Prerequisite: MATH 369.


*MATH 418 03(3-0-0). Advanced Calculus II. S. Prerequisite: MATH 417.

Line and surface integrals, series, sequences and series of functions.

MATH 419 03(3-0-0). Introduction to Complex Variables. F. Prerequisite: MATH 261.

Analyticity, Cauchy integral theorem and formula, Taylor and Laurent series, residue calculus, conformal mapping and harmonic functions.

MATH 425 03(3-0-0). History of Mathematics. F. Prerequisite: ED 331; two of the following courses: MATH 317, MATH 366, MATH 369.

Historical development of geometry, arithmetic, algebra, and calculus from ancient times to 20th century.

MATH 430/ECE 430 03(3-0-0). Fourier and Wavelet Analysis with Apps. S. Prerequisite: MATH 345. Credit not allowed for both MATH 430 and ECE 430.

Fourier analysis and transforms, FFTs; sampling theorems, computational algorithms; wavelets; applications to communication, imaging, and compression.

MATH 435 03(1-4-0). Projects in Applied Mathematics. S. Prerequisite: CS 156 or CS 160 or CS 253 or MATH 151; MATH 229 or MATH 369; MATH 340 or MATH 345.

Open-ended projects with emphasis on problem identification and formulation, team approach, and reporting results.

MATH 450 03(3-0-0). Introduction to Numerical Analysis I. F. Prerequisite: CS 156 or CS 160 or CS 253 or MATH 151; MATH 255 or MATH 261.

Solutions of systems of linear and nonlinear equations, interpolation, approximation.

MATH 451 03(3-0-0). Introduction to Numerical Analysis II. S. Prerequisite: CS 156 or CS 160 or CS 253 or MATH 151; MATH 340 or MATH 345.

Numerical computation of eigenvalues, numerical solution of ordinary and partial differential equations.

*MATH 455 03(3-0-0). Mathematics in Biology and Medicine. F. Prerequisite: MATH 255 or MATH 348/BZ 348 or MATH 340 or MATH 345.

Models in population biology, cell division, host-parasite systems, bacterial growth and predator-prey systems.

MATH 460 03(3-0-0). Information and Coding Theory. S. Prerequisite: MATH 360 or MATH 366; MATH 369.

Entropy, mutual information, channel capacity, channel coding theorem, syndrome decoding, BCH codes, recent developments.

MATH 466 03(3-0-0). Abstract Algebra I. F. Prerequisite: MATH 360 or MATH 366 or MATH 369.

Comprehensive introduction to groups, rings, and fields

*MATH 467 03(3-0-0). Abstract Algebra II. S. Prerequisite: MATH 369 or concurrent registration; MATH 466.

Advanced topics in abstract algebra: Euclidean domains, abstract vector spaces, extension fields, Galois theory.

MATH 469 03(3-0-0). Linear Algebra II. S. Prerequisite: MATH 369.

Abstract vector spaces, general theory of linear transformations, theory of determinants, canonical forms.

MATH 470 03(3-0-0). Euclidean and Non-Euclidean Geometry. S. Prerequisite: MATH 229 or MATH 369; MATH 261.

Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
Topics from real Euclidean, affine metric and non-Euclidean geometries emphasizing methods and connections with other areas of mathematics.

*MATH 472 03(3-0-0). Introduction to Topology. F. Prerequisite: MATH 317.
Topologies on sets, continuous functions, homeomorphisms, sequences and convergence, metric spaces, Connectedness, path-connectedness. Separation properties. Compactness, Countability axioms.

*MATH 474 03(3-0-0). Introduction to Differential Geometry. F. Prerequisite: MATH 261; MATH 369.
Local and global geometry of curves and surfaces in Euclidean space, curvature, covariant differentiation, geodesics and the Gauss-Bonnet theorem.

MATH 476 03(3-0-0). Topics in Mathematics. F, S, SS. Prerequisite: Written consent of instructor.
Study experiences which deal with established content areas in mathematics.

MATH 484 Var[1-3]. Supervised College Teaching. F, S. Prerequisite: Written consent of instructor. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

MATH 487 Var[1-16]. Internship. Prerequisite: Written consent of instructor.
A work-learn experience integrating classroom theory with practical experience.

MATH 495 Var. Independent Study. Prerequisite: Written consent of instructor.

MATH 498 Var[1-3]. Undergraduate Research in Mathematics. Prerequisite: Written consent of instructor.
Research skills and techniques taught to suit student’s level and interests. Includes both oral and written communication of results.

MATH 501 03(3-0-0). Combinatorics I. F. Prerequisite: MATH 301; MATH 360 or MATH 366.
Puzzles, numbers and counting, subsets, recurrence relations, generating functions, inversion, counting with symmetry, networks, matchings.

MATH 502 03(3-0-0). Combinatorics II. S. Prerequisite: MATH 501.
Graph algorithms, external set theory; partitions, Hadamard matrices, q-binomials, finite geometries, strongly regular graphs, triple systems, designs.

MATH 505 03. Teaching Problem Solving in Mathematics K-12. F, S. Prerequisite: Teacher licensure. Offered as telecourse only.
Problem-solving strategies, cooperative learning, and manipulatives for K-12 classroom. (NT-T)

MATH 510 03(3-0-0). Linear Programming and Network Flows. F, S, SS. Prerequisite: MATH 261 or MATH 315. Credit not allowed for both MATH 510 and ENGR 510.
Optimization methods; linear programming, simplex algorithm, duality, sensitivity analysis, minimal cost network flows, transportation problem. (NT-V)

MATH 517 03(3-0-0). Introduction to Real Analysis. F. Prerequisite: MATH 417; MATH 369.
Euclidean and metric spaces, compactness, continuity, sequences, series, multivariable differentiation, inverse and implicit function theorems.

MATH 519 03(3-0-0). Complex Variables I. S. Prerequisite: MATH 317.
Analytic functions, complex integration theory, singularities, elementary functions, and mappings.

*MATH 520 03(3-0-0). Nonlinear Programming. S. Prerequisite: MATH 510.
Theoretical, computational, practical aspects of nonlinear programming (NLP); unconstrained, constrained NLP; quadratic programming; large-scale NLP.

*MATH 525 03(3-0-0). Optimal Control. S. Prerequisite: MATH 340 or MATH 345.
Theory and application of optimal control and optimal estimation theory; continuous and discrete time systems; Pontryagin maximum principle.

MATH 530 04(4-0-0). Mathematics for Scientists and Engineers. F. Prerequisite: MATH 340 or MATH 345. Not for mathematics graduate students. Credit not allowed for both MATH 530 and MATH 332.
Proof-oriented linear algebra, ordinary and partial differential equations.

MATH 532 03(3-0-0). Mathematical Modeling of Large Data Sets. S. Prerequisite: MATH 369 or MATH 530.
Mathematical theory and algorithms for modeling large data sets. Application to real world problems. Emphasis on geometric ideas.

MATH 535 03(3-0-0). Foundations of Applied Mathematics. F. Prerequisite: MATH 340 or MATH 345.
Calculus of variations, perturbation methods, models of continuum, dimensional analysis, stochastic models, integral equations, diffusion.

MATH 540 03(3-0-0). Dynamical Systems. F. Prerequisite: MATH 340 or MATH 345 or MATH 530.
Linear and nonlinear systems, orbits, phase space, flows of vector fields, stability, bifurcation theory, chaos, strange attractors and applications.

MATH 545 03(3-0-0). Partial Differential Equations I. F. Prerequisite: MATH 340 or MATH 345 or MATH 530.
Second order linear PDEs, elliptic and parabolic equations, equations of math physics, separation of variables, Fourier series.

MATH 546 03(3-0-0). Partial Differential Equations II. S. Prerequisite: MATH 545.
Distribution theory, Green’s functions, Sobolev spaces, elliptic and parabolic equations.

MATH 550/ENGR 550 03(3-0-0). Numerical Methods in Science and Engineering. F. S. Prerequisite: MATH 340 or MATH 345 or MATH 530. Credit not allowed for both MATH 550 and ENGR 550.
Finite elements, finite differences, spectral methods, method of lines, conservation laws; stability and convergence analysis for PDEs.

MATH 560 03(3-0-0). Linear Algebra. F. Prerequisite: MATH 369.
Finite dimensional vector spaces, inner products, dual spaces, transformations, projections, adjoints, norms, eigenvalues, eigenvectors.

MATH 561 04(4-0-0). Numerical Analysis I. S. Prerequisite: CS 156 or CS 160 or CS 253 or MATH 151; MATH 560.
Numerical linear algebra, solving nonlinear systems, least squares, and minimization.

MATH 566 03(3-0-0). Introduction to Abstract Algebra I. F. Prerequisite: MATH 366.
Analysis of algebraic structures including groups, rings, fields, and vector spaces.

MATH 567 03(3-0-0). Introduction to Abstract Algebra II. S. Prerequisite: MATH 566.
Field theory, Galois theory, and advanced linear algebra.

*MATH 570 03(3-0-0). Topology I. F. Prerequisite: MATH 417 or MATH 472.
Point-set topology including basic set theory, continuity, product and quotient spaces, metrization, compactness, and connectedness.
**MATH 571 03(3-0-0). Topology II.** S. Prerequisite: MATH 566; MATH 570.
Fundamental group, free groups and presentations, and manifolds.

**MATH 584 01(1-0-0). Supervised College Teaching.** F.
S. Prerequisite: Written consent of instructor.

**MATH 592 01(0-0-1). Seminar in Mathematics.** Prerequisite: Written consent of instructor.

**MATH 601 03(3-0-0). Advanced Combinatorics I.** F.
Prerequisite: MATH 502; MATH 566.
Special numbers, mobius inversions, transversals, partial orders, different sets, codes, t-designs.

**MATH 602 03(3-0-0). Advanced Combinatorics II.** S.
Prerequisite: MATH 601.
Hypergeometric functions, graph algorithms, hadamard matrices, strongly regular graphs, association schemes.

**MATH 605A-C 03(3-0-0). Number Theory.** S.
Prerequisite: MATH 519 or concurrent registration; MATH 566; MATH 567.

**MATH 617 04(4-0-0). Integration and Measure Theory.** S.
Prerequisite: MATH 517.
Riemann-Cauchy integration theory, sigma-algebras, Lebesgue theory of measure and integration, Fabini’s Theorem, radon-Nikodym Theorem, L\(^p\) spaces.

**MATH 618 03(3-0-0). Advanced Real Analysis.** F.
Prerequisite: MATH 560; MATH 617.
Normed linear spaces, Banach and Hilbert spaces, elements of functional analysis.

**MATH 619 03(3-0-0). Complex Variables II.** S.
Prerequisite: MATH 519.
Infinite products, entire functions, analytic continuation, Riemann surfaces, other topics.

**MATH 620 03(3-0-0). Variational Methods and Optimization I.** F.
Prerequisite: MATH 517; MATH 560.
Unconstrained and constrained infinite dimensional optimization, calculus of variations, applications.

**MATH 621 03(3-0-0). Variational Methods and Optimization II.** S.
Prerequisite: MATH 620.
Unconstrained and constrained infinite dimensional optimization, variational inequalities, Lagrange multipliers, control, applications.

**MATH 633 03(2-2-4). Industrial and Applied Mathematics.** S.
Prerequisite: MATH 530 or MATH 560 or MATH 561; preparedness to do programming in a standard language.
Team solution of problems arising in industrial and applied mathematics. Problem formulation, solution proposal, implementation and analysis.

**MATH 640 03(3-0-0). Ordinary Differential Equations I.** F.
Prerequisite: MATH 340 or MATH 345 or MATH 530; MATH 369; MATH 517.
Existence and uniqueness, continuation, continuous dependence, linear systems, and stability.

**MATH 641 03(3-0-0). Ordinary Differential Equations II.** S.
Prerequisite: MATH 640.
Topics selected from nonlinear boundary value problems, periodic phenomena, differential operators, and others.

**MATH 645 03(3-0-0). Advanced Partial Differential Equations I.** F.
Prerequisite: MATH 546.
Abstract methods for linear partial differential equations.

**MATH 646 03(3-0-0). Advanced Partial Differential Equations II.** S.
Prerequisite: MATH 645.
Problems in nonlinear partial differential equations.

**MATH 651 04(4-0-0). Numerical Analysis II.** F.
Prerequisite: CS 156 or CS 160 or CS 253 or MATH 151; MATH 340 or MATH 345 or MATH 369 or MATH 530.
Interpolation, approximation, quadrature, initial and boundary value problems.

**MATH 652 03(3-0-0). Advanced Numerical Methods for PDEs.** F.
Prerequisite: MATH 617 or MATH 456 or MATH 560.
Theory of numerical methods for solution of PDEs: convergence and stability properties; error estimation; approximation theory.

**MATH 666 03(3-0-0). Advanced Algebra I.** F.
Prerequisite: MATH 567.
Theory of rings and algebras with applications.

**MATH 667 03(3-0-0). Advanced Algebra II.** S.
Prerequisite: MATH 666.
Advanced topics from algebra: representation theory, Wedderburn theory, bilinear forms, multilinear and homological algebra.

**MATH 670 03(3-0-0). Introduction to Differential Manifolds.** S.
Prerequisite: MATH 517 or MATH 570.
Finite-dimensional differential manifolds, submanifolds, vector fields and flows, Lie groups and algebras.

**MATH 672 03(3-0-0). Projective Geometry I.** F.
Prerequisite: MATH 567.
Algebraic sets in projective space, the Nullstellensatz, rational maps and functions, coordinate rings, Hilbert functions, dimension, degree.

**MATH 673 03(3-0-0). Projective Geometry II.** S.
Prerequisite: MATH 672.
Topics selected from curves and surfaces, sheaf theory, algebraic geometry, singularity theory, vector bundles.

**MATH 676 03(3-0-0). Topics in Mathematics.** F. S. SS.
May be taken up to 5 times for credit.
Advanced study experiences which deal with established content areas in mathematics.

**MATH 687 Var[1-9]. Internship.**
A work-learn experience integrating classroom theory with practical experience.

**MATH 693 03(0-0-3). Seminar in Mathematics.**

**MATH 695 Var. Independent Study.**

**MATH 699 Var. Thesis.**

**MATH 717 03(3-0-0). Functional Analysis I.** F.
Prerequisite: MATH 618.
Topological vector spaces; Banach and Hilbert spaces.

**MATH 718 03(3-0-0). Functional Analysis II.** S.
Prerequisite: MATH 717.
Spectral theory, operator theory, semigroups of transformations, and distribution theory.

**MATH 750 03(3-0-0). Numerical Methods and Models I.** F.
Prerequisite: MATH 561.
Derivation of model equations, introduction to solution techniques and computing.

**MATH 751 03(3-0-0). Numerical Methods and Models II.** S.
Prerequisite: MATH 561.
Convergence, stability, error estimates and computing.

**MATH 793 Var. Seminar in Mathematics.**

*Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCSubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
MATH 798 Var. Research.

MATH 799 Var. Dissertation.

*Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
### MECHANICAL ENGINEERING COURSES

**Department of Mechanical Engineering**

**College of Engineering**

**MECH 103 03(3-0-0)**. Introduction to Mechanical Engineering. F. Prerequisite: None.
- The discipline of Mechanical Engineering as described in problems and problem solving methods – energy, materials, motion, fluids.

**MECH 105 03(3-0-0)**. Mechanical Engineering Problem Solving. F, S. Prerequisite: MECH 103 with a C or better; MATH 160; PH 141 or concurrent registration. Credit not allowed for both MECH 105 and MECH 102.
- Programming and engineering problem solving techniques, algorithms and processes from physics and calculus first principles.

**MECH 200 03(2-2-0)**. Introduction to Manufacturing Processes. F. Prerequisite: Mechanical engineering and engineering science majors only.
- Engineering drawings, materials, manufacturing, and safety. Hand tools, cutting, drilling, the lathe, mill and numerical control. ($)

**MECH 201 02(1-2-0)**. Engineering Design I. F. Prerequisite: MECH 105 with a C or better.
- Engineering design process and the roles of visual communication with emphasis on 3D physical solid models and Pro/ENGINEER.

**MECH 202 03(2-2-0)**. Engineering Design II. S. Prerequisite: MECH 200 with a C or better or concurrent registration; MECH 201 with a C or better.
- Engineering design process with emphasis on teamwork, ideation, decision-making, project planning applied to a group design project. ($)

**MECH 231 03(2-2-0)**. Engineering Experimentation. F, S. Prerequisite: MECH 105 with a grade of C or better; PH 142 with a grade of C or better.
- Measurement systems; experimental design; data acquisition and analysis techniques. ($)

**MECH 237 03(3-0-0)**. Introduction to Thermal Sciences. F, S. Prerequisite: MATH 160; PH 141.
- First and second laws of thermodynamics, properties of materials, energy conversion, statistical aspects, heat transfer.

**MECH 262 04(4-0-0)**. Engineering Mechanics. F. Prerequisite: MATH 151; PH 141.
- Forces, static equilibrium, mass center, moments of inertia, kinematics and kinetics of particles and rigid bodies.

**MECH 301 02(1-2-0)**. Engineering Design III. S. Prerequisite: CIVE 360; MECH 202 with a C or better or concurrent registration; MECH 342 with a C or better.
- Computer-aided engineering tools FEA and CFD for analysis and prediction of robustness and performance of mechanical components and assemblies.

**MECH 302 03(3-0-0)**. Engineering Design III. S. Prerequisite: CIVE 360 with a C or better; MECH 202 with a C or better; MECH 324 with a C or better; MECH 337 with a C or better; MECH 342 with a C or better.
- Design fundamentals, including design processes, project planning, creativity, manufacturing, and human factors.

**MECH 303 03(3-0-0)**. Energy Engineering. F. Prerequisite: CBE 310 or ECE 341 or MECH 237 or MECH 339 or PH 361.
- Energy generation (coal, oil, natural gas, solar, wind, geothermal, hydropower, tidal, biofuel, nuclear), conversion, distribution, storage, efficiency.

**MECH 307 04(3-3-0)**. Mechatronics and Measurement Systems. F, S. Prerequisite: CIVE 261 with a C or better; ECE 204 with a C or better; MATH 340 with a C or better; MECH 231 with a C or better.
- Mechatronic and measurement system analysis and design; applied electronics; data acquisition; microcontroller interfacing and programming. ($)

**MECH 324 04(3-2-0)**. Dynamics of Machines. F. Prerequisite: CIVE 261; MATH 340 with a C or better or concurrent registration.
- Analysis and synthesis of moving machinery. ($)

**MECH 325 03(3-0-0)**. Machine Design. S. Prerequisite: CIVE 360 with a C or better.
- Design of mechanical components to avoid failure during operation. Stress analysis, failure theories, and specific mechanical components in design context.

**MECH 331 04(3-2-0)**. Introduction to Engineering Materials. F, S. Prerequisite: CHEM 111 with a C or better; CHEM 112 with a C or better; MECH 231 with a C or better.
- Characteristics of metallic, plastic, and ceramic material; basic principles which relate properties of materials to their atomic and microstructure. ($)

**MECH 337 04(3-0-1)**. Thermodynamics. F. Prerequisite: MATH 261 with a C or better; PH 141 with a C or better.
- First and second laws, property relationships, characteristic functions, thermodynamics solver, various thermodynamics applications.

**MECH 338 01(0-3-0)**. Thermosciences Laboratory. F, S. Prerequisite: MECH 324 with a C or better; MECH 342 with a C or better.
- Experimental methods in heat transfer, fluid flow, and thermodynamics. ($)

**MECH 342 03(3-0-0)**. Mechanics and Thermodynamics of Flow Processes. F. Prerequisite: MATH 340 with a C or better; MECH 337 with a C or better or concurrent registration; PH 141 with a C or better.
- Engineering details of viscous flow with losses, measurements, compressibility, turbomachinery, convective heat transfer.

**MECH 344 03(3-0-0)**. Heat and Mass Transfer. S. Prerequisite: MECH 342 with a C or better.
- Transport and rate processes, conduction, convection, and radiation.

**MECH 402 03(2-2-0)**. Mechanical Engineering Experimental Analysis. F. Prerequisite: MECH 307 with a C or better; MECH 324 with a C or better; MECH 331 with a C or better; MECH 338 with a C or better.
- Analysis of large data sets associated with mechanical engineering experimentation; optimization, variability; design of experiments.

**MECH 407 03(3-0-0)**. Laser Applications in Mechanical Engineering. F. Prerequisite: PH 142.
- Review of electromagnetic waves; applications of lasers and optics in engineering, e.g. position sensing, flowfield measurement, cutting and welding.

**MECH 408 03(2-0-1)**. Applied Engineering Economy. F. Prerequisite: MATH 161. Credit not allowed for both MECH 408 and MECH 410.
- The basic principles and calculations of engineering economy with application to real problems, including energy and the environment.

**MECH 410 01(0-0-1)**. Engineering Economy Principles/Calculations. F, S, SS. Prerequisite: MATH 161. Offered as an online course only.
- Basic principles and calculation of engineering economy. (NT-O)

**MECH 411 03(3-0-0)**. Manufacturing Engineering. S. Prerequisite: CIVE 360; MECH 331.
- Casting, forming, machining, and welding processes used in manufacturing operations. (NT-V)

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Feedback and forward loop control design and simulation; discrete
time and frequency domain methods with implementation
considerations. ($)

MECH 424 03(3-0-0). Advanced Dynamics. S. Prerequisite: MECH 324.
Kinematics and dynamics of rigid bodies. Hamilton’s principle and
Lagrange’s equations for lumped parameter extended bodies and
distributed systems.

MECH 425 04(3-2-0). Mechanical Engineering Vibrations. S.
Prerequisite: MECH 324.
Vibrations applied to rotating machinery and structures. SDOF and
MDOF systems, mode shapes, vibration measurements and control.
Hands-on lab.

MECH 431 03(3-0-0). Metals and Alloys. F. Prerequisite: MECH 331.
Engineering metals and alloys, modification of properties by alloying,
plastic deformation, and heat treatment. Fundamentals of physical
metallurgy. (NT-V)

MECH 432 03(3-0-0). Engineering of Nanomaterials. F.
Prerequisite: MECH 331.
Structure, properties and processing of extremely small (10^-9 m)
synthetic and natural materials.

MECH 437 03(2-0-1). Internal Combustion Engines. F. Prerequisite:
MECH 344.
Application of thermodynamics, heat transfer, and fluid mechanics to
internal combustion engines.

MECH 460 03(3-0-0). Aeronautics. S. Prerequisite: MECH 342.
Thermodynamics and fluid mechanics principles applied to the
mechanics, aerodynamics, performance, stability, and control of
airplanes.

MECH 463 03(3-0-0). Building Energy Systems. S. Prerequisite:
MECH 344.
Comfort, psychrometrics, loads, solar radiation, heating and cooling
system design, transport, solar system design, economics.

MECH 468 03(3-0-0). Space Propulsion and Power Engineering. F.
Prerequisite: ECE 204; MECH 337; MECH 342.
Orbital mechanics and space missions; chemical, nuclear, and electric
rockets; nuclear heat sources; thermoelectric and photovoltaic devices.

MECH 470/BIOM 470 03(3-0-0). Biomedical Engineering. F. Pre-
requisite: MATH 155 or MATH 160; PH 141. Credit not allowed for
both MECH 470 and BIOM 470.
Engineering application in human/animal physiology, diagnosis of
disease, treatment, rehabilitation, human genome manipulation.

MECH 486A-B 04(1-12-0). Engineering Design Practicum.
Capstone engineering design project; transition experience to the
mechanical engineering profession in industry and graduate education.
A) Practicum I. F. Prerequisite: MECH 301 with a C or better; MECH
325 with a C or better; MECH 344 with a C or better; MECH 402 with a
C or better or concurrent registration. (S) B) Practicum II. S.
Prerequisite: CIVE 363 with a C or better; MECH 338 with a C or
better; MECH 486A with a C or better. ($)

MECH 495 Var. Independent Study.

MECH 498A-B 04(1-12-0). Engineering Research Practicum.
Capstone engineering research project; transition experience to
graduate research and education. A) Fall. Prerequisite: MECH 301 with
a C or better; MECH 325 with a C or better; MECH 402 with a C or
better or concurrent registration. (S) B) Spring. Prerequisite: MECH 338
with a C or better; MECH 498A with a C or better.

MECH 501 03(0-0-3). Engineering Project and Program
Management. SS. Prerequisite: Admission to the M.E. program.
Offered only as an online course through Division of Continuing
Education.
Engineering program management fundamentals, program planning
and control strategies, risk assessment, work breakdown structures and
costing options. (NT-O)

MECH 502 03(3-0-0). Advanced/Additive Manufacturing Engineer-
ing. S. Prerequisite: MECH 202; MECH 331.
Materials, controls, and mechanics applied to additive manufacturing;
rapid prototyping; direct digital manufacturing.

MECH 503 03(0-0-3). Engineering Maintenance Process. SS.
Prerequisite: Admission to the M.E. program. Offered only as an online
course through Division of Continuing Education.
Design for engineering maintainability development and management
of effective maintenance programs applicable to typical industrial
environments. (NT-O)

MECH 504 03(0-0-3). Specification and Procurement of Engr
Systems. SS. Prerequisite: Admission to the M.E. program. Offered only
as an online course through Division of Continuing Education.
Specification and procurement of engineering systems, including
contracts, legal, ethics and Statement of Work development. (NT-O)

MECH 520 03(0-0-3). Laser Diagnostics for Thermosciences. S.
Prerequisite: PH 142.
Basics of optics, spectroscopy, and lasers. Physics and applications of
laser diagnostic techniques used in thermosciences. (NT-O)

MECH 525/ *BIOM 525 03(0-0-0). Cell and Tissue Engineering.
S. Prerequisite: Admission to the M.E. program. Offered only as an
online course through Division of Continuing Education.
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MECH 537 03(3-0-0). Principles of Dynamics. S. Prerequisite: MECH
324.
Kinematics and dynamics of rigid body motion; Lagrangian and
Hamiltonian formulations of mechanics; applications to engineering
problems. (NT-V)

MECH 570 03(0-0-0). Laser Diagnostics for Thermosciences. S.
Prerequisite: PH 142.
Basics of optics, spectroscopy, and lasers. Physics and applications of
laser diagnostic techniques used in thermosciences. (NT-O)

MECH 574 03(2-2-0). Manufacturing and Robotic Systems. S.
Prerequisite: MECH 417.
Examination of electromechanical systems of manufacturing
applications and robotics.

MECH 580 03(3-0-0). Finite Element Analysis in Mechanical Engr.
S. Prerequisite: CIVE 360; MATH 340.
Application of FEA as a tool to analyze mechanical engineering
problems.

MECH 583 03(3-0-0). Biomedical Engineering. S. Prerequisite:
MECH 301.
The study of the biological and physiological systems of living
tissues and organ systems that include the cardiovascular system,
respiratory system, endocrine system, gastrointestinal system, and
nervous system.

MECH 584 03(3-0-0). Biomedical Engineering. S. Prerequisite:
MECH 301.
The study of the biological and physiological systems of living
tissues and organ systems that include the cardiovascular system,
respiratory system, endocrine system, gastrointestinal system, and
nervous system.

MECH 585 03(3-0-0). Biomedical Engineering. S. Prerequisite:
MECH 301.
The study of the biological and physiological systems of living
tissues and organ systems that include the cardiovascular system,
respiratory system, endocrine system, gastrointestinal system, and
nervous system.

MECH 586 03(3-0-0). Biomedical Engineering. S. Prerequisite:
MECH 301.
The study of the biological and physiological systems of living
tissues and organ systems that include the cardiovascular system,
respiratory system, endocrine system, gastrointestinal system, and
nervous system.

MECH 587 03(3-0-0). Biomedical Engineering. S. Prerequisite:
MECH 301.
The study of the biological and physiological systems of living
tissues and organ systems that include the cardiovascular system,
respiratory system, endocrine system, gastrointestinal system, and
nervous system.

MECH 588 03(3-0-0). Biomedical Engineering. S. Prerequisite:
MECH 301.
The study of the biological and physiological systems of living
tissues and organ systems that include the cardiovascular system,
respiratory system, endocrine system, gastrointestinal system, and
nervous system.

MECH 589 03(3-0-0). Biomedical Engineering. S. Prerequisite:
MECH 301.
The study of the biological and physiological systems of living
tissues and organ systems that include the cardiovascular system,
respiratory system, endocrine system, gastrointestinal system, and
nervous system.

MECH 590 03(3-0-0). Biomedical Engineering. S. Prerequisite:
MECH 301.
The study of the biological and physiological systems of living
tissues and organ systems that include the cardiovascular system,
respiratory system, endocrine system, gastrointestinal system, and
nervous system.

MECH 591 03(3-0-0). Biomedical Engineering. S. Prerequisite:
MECH 301.
The study of the biological and physiological systems of living
tissues and organ systems that include the cardiovascular system,
respiratory system, endocrine system, gastrointestinal system, and
nervous system.

MECH 592 03(3-0-0). Biomedical Engineering. S. Prerequisite:
MECH 301.
The study of the biological and physiological systems of living
tissues and organ systems that include the cardiovascular system,
respiratory system, endocrine system, gastrointestinal system, and
nervous system.

MECH 593 03(3-0-0). Biomedical Engineering. S. Prerequisite:
MECH 301.
The study of the biological and physiological systems of living
tissues and organ systems that include the cardiovascular system,
respiratory system, endocrine system, gastrointestinal system, and
nervous system.

MECH 594 03(3-0-0). Biomedical Engineering. S. Prerequisite:
MECH 301.
The study of the biological and physiological systems of living
tissues and organ systems that include the cardiovascular system,
respiratory system, endocrine system, gastrointestinal system, and
nervous system.

MECH 595 03(3-0-0). Biomedical Engineering. S. Prerequisite:
MECH 301.
The study of the biological and physiological systems of living
tissues and organ systems that include the cardiovascular system,
respiratory system, endocrine system, gastrointestinal system, and
nervous system.

MECH 596 03(3-0-0). Biomedical Engineering. S. Prerequisite:
MECH 301.
The study of the biological and physiological systems of living
tissues and organ systems that include the cardiovascular system,
respiratory system, endocrine system, gastrointestinal system, and
nervous system.

MECH 597 03(3-0-0). Biomedical Engineering. S. Prerequisite:
MECH 301.
The study of the biological and physiological systems of living
tissues and organ systems that include the cardiovascular system,
respiratory system, endocrine system, gastrointestinal system, and
nervous system.

MECH 598 03(3-0-0). Biomedical Engineering. S. Prerequisite:
MECH 301.
The study of the biological and physiological systems of living
tissues and organ systems that include the cardiovascular system,
respiratory system, endocrine system, gastrointestinal system, and
nervous system.

MECH 599 03(3-0-0). Biomedical Engineering. S. Prerequisite:
MECH 301.
The study of the biological and physiological systems of living

Credit allowed for only one of the following: BIOM 525, CBE 525, and MECH 525.

Cell and tissue engineering concepts and techniques with emphasis on cellular response, cell adhesion kinetics, and tissue engineering design. (S, NT-O)

MECH 526 03(3-0-0). Fundamentals of Vehicle Dynamics. S. Prerequisite: MECH 324.

Kinetics of vehicle suspensions, steady-state and transient stability and control, tires, wheel and suspension geometry and loads, dampers, steering.

MECH 527 03(3-0-0). Hybrid Electric Vehicle Powertrains. F. Prerequisite: MECH 307.

Hybrid powertrains and modeling including vehicle dynamics, internal combustion engine, electric motor, energy storage, and control.

MECH 529 03(3-0-0). Advanced Mechanical Systems. S. Prerequisite: MECH 307.

Modeling, analysis, and synthesis of practical mechanical devices in which dynamic response is dominant consideration.

MECH 530 03(3-0-0). Advanced Composite Materials. F. Prerequisite: CIVE 360; MECH 331.

Materials aspects of advanced composite constituents and how their combination yields synergistic results. (NT-V)

MECH 531/BIOM 531 03(3-0-0). Materials Engineering. S. Prerequisite: MECH 331 or MECH 431. Credit not allowed for both MECH 531 and BIOM 531.

Selection of structural engineering materials by properties, processing, and economics; materials for biomedical and biotechnology applications. (NT-O)

MECH 532/BIOM 532 03(3-0-0). Materials Issues in Mechanical Design. F. Prerequisite: MECH 331. Credit not allowed for both MECH 532 and BIOM 532.

Failure mechanisms from materials viewpoint on use in design. Fracture, creep, fatigue, and corrosion. (NT-V/O)

MECH 536 03(3-0-0). Materials Applications in Renewable Energy. F. Prerequisite: MECH 331. Required field trips.

Materials science applied to renewable energy; transmission and storage; study of solar cells, fuel cells, Li-ion batteries and related technologies.

MECH 538 03(3-0-0). Mechanical Engineering Thermodynamics. F. Prerequisite: MECH 337.

First and second laws of thermodynamics applied to engineering devices and systems. Introduction to availability, energy, and lost work analysis.

MECH 539 03(3-0-0). Advanced Fluid Mechanics. F. Prerequisite: MECH 342 or CIVE 300.

Properties, kinematics; vorticity; exact solutions; instability; boundary layers; turbulence; wakes; compressible flow; supersonic flow; shockwaves.

MECH 544 03(3-0-0). Advanced Heat Transfer. S. Prerequisite: MECH 344.

Fundamentals and engineering applications of heat transfer including conduction, convection, and radiation.

MECH 551 03(3-0-0). Physical Gas Dynamics I. F. Prerequisite: MECH 342.

Characteristics of real gases in reacting and nonequilibrium systems; equilibrium air; statistical mechanics; chemical thermodynamics.

MECH 552 03(3-0-0). Applied Computational Fluid Dynamics. F. Prerequisites: CBE 331 or CIVE 300 or MECH 342.

Introductory theory of CFD, formulation of engineering problems for CFD analyses, mesh generation, solver settings, and postprocessing.

MECH 555 03(3-0-0). Ceramic Materials Engineering. S. Prerequisite: MECH 331.

Ceramic materials engineering and its application to materials technologies.

MECH 557 03(3-0-0). Turbomachinery. S. Prerequisite: MECH 337; MECH 342.

Application of fundamental principles of thermodynamics and fluid mechanics to turbomachinery.

MECH 558 03(3-0-0). Combustion. F. Prerequisite: MECH 342.

Combustion processes: explosions, detonations, flame propagation, ignition, generation of pollutants in moving and stationary energy conversion systems. (NT-O)

MECH 561 04(4-0-0). Space Propulsion and Mission Analysis. S. Prerequisite: MATH 340.

Analysis of space flight missions and propulsion systems.

MECH 564 03(3-0-0). Fundamentals of Robot Mechanics and Controls. S. Prerequisite: MECH 417.

Kinematics of robots, controls for robots.

MECH 567 03(3-0-0). Broad-Beam Ion Sources. S. Prerequisite: MATH 340.

Physical processes in broad-beam electron-bombardment ion sources for space propulsion and ion machining applications.

MECH 569/ECE 569 03(3-0-0). Micro-Electro-Mechanical Devices. S. Prerequisite: ECE 331 with a C- or better or MECH 344.

Credit not allowed for both MECH 569 and ECE 569.

Micro-electro-mechanical processes and applications in sensors, optics, and structures. (NT-O)

MECH 570/BIOM 570 03(3-0-0). Bioengineering. S. Prerequisite: MECH 307; MECH 324. Credit not allowed for both MECH 570 and BIOM 570.

Physiological and medical systems analysis using engineering methods including mechanics, fluid dynamics, control, electronics, and signal processing. (NT-O)

MECH 573/BIOM 573 03(3-0-0). Structure and Function of Biomaterials. S. Prerequisite: MECH 331. Credit not allowed for both MECH 573 and BIOM 573.

Structure-function relationships of natural biomaterials; application to analysis of biomimetic materials and biomaterials used in medical devices. (NT-V/O)

MECH 575 03(3-0-0). Solar and Alternative Energies. F. Prerequisite: MECH 337; MECH 342; MECH 344.

Solar radiation, flat-plate collectors, energy storage, space heating and cooling, power generation, applications, simulation.

MECH 609 03(1-0-2). Experimental Optimization. S, SS. Prerequisite: STAT 315.

Application of design of experiments, response surface and optimization methods to experimental investigations. (NT-O)

MECH 626 03(3-0-0). Race Car Vehicle Dynamics. F. Prerequisites: CIVE 562; MECH 524; MECH 526.

Quasi-static, steady-state and transient analyses of racing suspensions including modal analysis in roll, pitch, heave, yaw and warp.

MECH 628 03(3-0-0). Applied Fracture Mechanics. S. Prerequisite: CIVE 560.

Stress distribution near cracks; energy criteria for fracture; design criteria; fracture toughness testing. (NT-T)

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°MECH 644 03(3-0-0). Conduction Heat Transfer. F. Prerequisite: MECH 344.
Linear and nonlinear, isotropic and nonisotropic conduction; analytical, numerical techniques; inverse methods.

*MECH 645 03(3-0-0). Radiation Heat Transfer. S. Prerequisite: MECH 344.
Radiation fundamentals; properties; spectral, directional variations; transfer between surfaces; participating media; numerical, Monte Carlo methods. (NT-V)

°MECH 646 03(3-0-0). Convection Heat Transfer. S. Prerequisite: MECH 344.
Fundamentals; conservation, constitutive equations; second law; forced, free convection; internal, external flows; laminar, turbulent flows. (NT-V)

MECH 650 03(3-0-0). Computational Materials from First Principles. F. Prerequisite: CHEM 461 or MECH 331; CHEM 474 or MECH 337 or PH 361; MATH 340.
Ab initio calculations for molecules, clusters, solutions and solid state materials. Ab initio and classical molecular dynamics simulations.

MECH 651 03(3-0-0). Computational Gas Dynamics. F., Prerequisite: MATH 530; written consent of instructor.
Numerical methods for inviscid and viscous compressible flow.

Asymptotic structure of flames, limit phenomena and multi-phase combustion.

°MECH 661 03(3-0-0). Theory/Control of Internal Combustion Engines. S. Prerequisite: MECH 437.
Theory and applications of internal combustion engines. Alternative fuels, engine control, and pollution prevention.

°MECH 671/Biom 671 03(3-0-0). Orthopedic Tissue Biomechanics. F. Prerequisite: CIVE 560. Credit not allowed for both MECH 671 and BIOM 671 or for MECH 671/Biom 671 and MECH 571/BIOM 571.
Linear elastic, finite deformation, and viscoelastic theories applied to the mechanical behavior of orthopedic tissues (bone, tendon, cartilage).

MECH 676 03(2-2-0). Building Energy Design. S. Prerequisite: MECH 575. Credit not allowed for both MECH 676 and MECH 463.
Design of space heating and cooling systems. Solar thermal electric power systems, industrial and agricultural process heat.

MECH 684 Var. Supervised College Teaching.

MECH 692 Var. Seminar. F, S.

MECH 695A-M Var. Independent Study.


°MECH 721 Var. Special Topics in Design and Manufacturing. S. Prerequisite: MECH 514 or MECH 620.
Special topics in engineering design and manufacturing.

*MECH 727 03(3-0-0). Continuum Mechanics. S. Prerequisite: CIVE 502.
Mechanics of continuous media; cartesian tensors, vector analysis, kinematics of deformation, balance of momentum, mass and energy, constitutive equations.

MECH 729 03(3-0-0). Special Topics in Mechanics and Materials. S. Prerequisite: MECH 524 or MECH 530.
Advanced topics in discipline of engineering mechanics and materials; associated analysis and manufacturing techniques.

MECH 784 Var. Supervised College Teaching.

MANAGEMENT COURSES
Department of Management
College of Business

MGT 301 03(3-0-0). Supply Chain Management. F, S, SS. Prerequisite: Sophomore standing.
Concept of value-driven supply chains; design and management of effective supply chains; emphasis on current practice and recent trends.

MGT 305 03(3-0-0). Fundamentals of Management. F, S, SS. Prerequisite: None. Credit not allowed for both MGT 305 and MGT 320.
Managerial process of planning, directing, and controlling inputs of an organization. Analysis, decision making, and survey of research literature. (NT-O)

MGT 310 03(3-0-0). Human Resource Management. F, S. Prerequisite: None.
Principles and practices of employee management including hiring, development, compensation, and employee relations.

MGT 320 03(3-0-0). Contemporary Management Principles/Practices. F, S, SS. Prerequisite: BUS 300; AREC 202 or ECON 202; MATH 141 or MATH 155 or MATH 160. Credit not allowed for both MGT 320 and MGT 305.
Principles of management in combination with practices of the new economy to achieve managerial goals. (NT-O)

MGT 325 03(3-0-0). Leadership Communication. F. Prerequisite: BUS 300.
Interpersonal communication for leaders and managers in organizational settings.

MGT 330 03(3-0-0). Corporate Innovation and Entrepreneurship. F, S, SS. Prerequisite: ACT 210, Business Administration, Mechanical Engineering, Agriculture Business, Apparel and Merchandising, Design and Merchandising, Apparel Design and Production, Biomedical Engineering, Computer Science majors; declared LEAP minors; and LEAP graduate students only.
Process of creating new ventures and generating innovations within existing organizations.

MGT 340 03(3-0-0). Entrepreneurship in the Contemporary World. F, S. SS. Prerequisite: None.
Concepts of entrepreneurship and role of entrepreneurs in the economy.

MGT 350 03(3-0-0). Employment Relations: The Legal Environment. F, S. Prerequisite: None.
Legal principle and policy issues arising from the employment relationship.

MGT 360 03(3-0-0). Social and Sustainable Venturing. S. Prerequisite: Junior standing or higher.
Entrepreneurship and economic opportunities in the transition to a socially and ecologically sustainable global economy.

MGT 374 03(3-0-0). Total Rewards and Performance Management. F. Prerequisite: MGT 310.
Principles and best practices for the strategic design and implementation of compensation and performance management systems.

MGT 375 03(3-0-0). Advanced Supply Management. F. Prerequisite: MGT 301.
Advanced design of purchasing and supply management within global supply chains.

MGT 376 03(3-0-0). Advanced Service and Manufacturing Operations. S. Prerequisite: MGT 301.
Advanced concepts for the management of operations in service and manufacturing companies.

MGT 377 03(3-0-0). Advanced Logistics. F, S. Prerequisite: MGT 301; junior standing.
Advanced design and management of logistics and distribution operations within global supply chains.

MGT 410 03(3-0-0). Leadership and Organizational Behavior. F, S. Prerequisite: MGT 305 or MGT 320.
Behavior of people and groups as members of organizations.

MGT 411 03(3-0-0). Leading High Performance Teams. F, S. Prerequisite: MGT 305 or MGT 320.
Design, management, and leadership of teams in organizational settings.

MGT 420 03(3-0-0). New Venture Creation. F. Prerequisite: MGT 340.
Entrepreneurs and the entrepreneurial process. Growth of an independent business.

MGT 425 03(3-0-0). Organizational Communication Strategies. S. Prerequisite: FIN 300 or FIN 305; MGT 305 or MGT 320; MKT 300 or MKT 305.
Strategic communications in organizations; contribution that organizational members make whether acting as individual or group communicators.

MGT 430 03(3-0-0). Leadership and Social Responsibility. S. Prerequisite: None.
Social responsiveness of managers as they face expectations in the firm's internal and external environment.

MGT 440 03(3-0-0). New Venture Management. S. Prerequisite: Written consent of instructor.
Theories and skills necessary for managing startup and existing small firms.

MGT 450 02(2-0-0). Biomedical Entrepreneurship I. S. Prerequisite: BIOM 470/MECH 470 or MGT 340.
Commercialization process for biomedical inventions; market and competitor analysis, regulations, patents; preliminary feasibility study.

*MGT 468 03(3-0-0). Negotiating Globally. S. Prerequisite: MGT 305 or MGT 320 or International Studies majors.
Characteristics and process of negotiation in a global context.

MGT 470 03(3-0-0). Managerial Decisions-Issues and Analysis. F, S. Prerequisite: MGT 301; MGT 305 or MGT 320.
Investigation and application of managerial decision-making processes and methods to solve problems in business functions.

MGT 471 03(3-0-0). Micro Issues in Supply Chain Management. F. Prerequisite: MGT 301.
Managing the supply function (locally or globally) and the productive flow of materials in goods and services-producing supply chains.

MGT 472 03(3-0-0). Macro Issues in Supply Chain Management. S. Prerequisite: MGT 301.
Application of analytical and computer-based tools in the analysis and improvement of supply chains with variable demand and supply.

MGT 473 03(3-0-0). Employment Relations: Labor and Manpower. F, S. Prerequisite: None.
Managerial decision making and action in labor-management relations as affected by labor legislation and administrative practices.

MGT 474 03(3-0-0). Human Resource Planning and Development. S. Prerequisite: MGT 310.
Human resource planning, recruitment, selection, training, and development.

MGT 475 03(3-0-0). International Business Management. S. Prerequisite: FIN 300 or FIN 305; MGT 305 or MGT 320; MKT 300 or MKT 305.

Subcode = State Guarantee Transfer course and AUCC
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Multinational corporations: their scope, activities, managerial problems and decisions.

MGT 476 03(3-0-0). Negotiation and Conflict Management. F, S.
Prerequisite: MGT 305 or MGT 320.
Principles and practice of negotiation and conflict management including bargaining as a social and managerial activity.

MGT 478 03(3-0-0). Global Supply Chain Management. S.
Prerequisite: Select two courses from among MGT 375, MGT 376, MGT 377.
Principles and best practices for the strategic design and implementation of global supply chains.

MGT 486 03(1-4-0). Practicum in Supply Chain Management. S.
Prerequisite: MGT 375; MGT 377; written consent of instructor.
Research and recommend solutions to “real world” supply chain management problems.

MGT 487 Var. Internship.

MGT 495 Var. Independent Study.

MGT 496 Var. Group Study.

MGT 498 Var[1-3]. Research.

MGT 600 03(3-0-0). Manufacturing Process and Systems Design. S.
Prerequisite: BUS 620; BUS 625.
Strategic understanding of alternate manufacturing processes and systems design support needed to manage those processes.

MGT 601/CIS 601 03(3-0-0). Enterprise Computing and Systems Integration. F. Prerequisite: Admission to the M.B.A., M.C.I.S., M.S.B.A., or M.E. program. Credit not allowed for both MGT 601 and CIS 601.
Integrated extended enterprise planning and execution systems concepts including ERP, CRM, SCM, MRPII, business processes, front/back office systems. (NT-O)

MGT 610 03(3-0-0). Strategic Human Resource Management. S.
Prerequisite: Admission to masters program.
Strategic issues associated with recruiting, staffing, evaluating, compensating, and developing employees; leadership issues associated therein.

MGT 611 03(3-0-0). Management of Organization Development. S.
Prerequisite: MGT 305 or MGT 320.
Methods for managing organizational change.

MGT 612 03(3-0-0). Managing in a Global Context. F. Prerequisite: Admission to GSSE program.
Global management and HR development issues/practices. Cross-cultural issues in organization behavior, recruitment, selection, training, compensation.

MGT 620 03(3-0-0). Management. F, S. Prerequisite: None.
Practices, policies, philosophies, and behavior.

MGT 625 03(3-0-0). Managerial Communication Practices. F.
Prerequisite: Admission to a masters program in business.
Internal, external, and managerial communication. Managerial speaking and writing skills enhancement.

MGT 640 02(2-0-0). Supply Chain Management Strategies. F.
Prerequisite: MGT 600.
How to create an effective supply chain management system to establish an efficient network for supplying final consumption.

MGT 665 02(2-0-0). Supply Chain Development and Management. S.
Prerequisite: Written consent of instructor.
This course teaches the development and management of the global supply chain that plans, sources, makes and delivers an organization’s products. (NT-O)

MGT 667 03(3-0-0). Global Social Sustainable Entrepreneurship. F.
S. Prerequisite: Written consent of instructor.
Global challenges-poverty, environmental degradation, public health, agriculture. Role of entrepreneurial management in private and public sector. (NT-O)

MGT 668 03(3-0-0). New Venture Development for Social Enterprise. F.
S. Prerequisite: Written consent of instructor.
Early stages of a new venture, including creation of business plan. Additional study of social entrepreneurship and sustainable business strategies. (NT-O)

MGT 671 03(3-0-0). Labor Management Relations. S. Prerequisite: None.
Collective bargaining process, administration of contract, and impact of public policy on industrial relations.

MGT 675 03(3-0-0). Service Operations/Supply Chain Management. S.
Prerequisite: Admission to a master’s program in business.
Supply chain management (SCM) and operations function. Primary focus on service sector.

MGT 679 03(3-0-0). Principles of Strategic Management. S.
Prerequisite: Admission to a master’s program in business.
Processes through which firms choose and implement strategies. Formulation and implementation of strategic management process in variety of industries.

MGT 695 Var. Independent Study.

MGT 696 Var. Group Study.


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# Microbiology, Immunology, and Pathology Courses

## Department of Microbiology, Immunology, and Pathology

### College of Veterinary Medicine and Biomedical Sciences

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Notes</th>
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<tbody>
<tr>
<td>MIP 101 03(3-0-0)</td>
<td>Introduction to Human Disease.</td>
<td>(GT-SC2, AUCC 3A). S. Prerequisite: None.</td>
<td>Survey of human systems and diseases.</td>
</tr>
<tr>
<td>MIP 149 03(3-0-0)</td>
<td>The Microbial World.</td>
<td>F. Prerequisite: None.</td>
<td>Importance of microbiology in daily life, with emphasis on positive and negative roles of microbes, infectious disease, and current microbiology issues.</td>
</tr>
<tr>
<td>MIP 192 02(0-0-2)</td>
<td>Microbiology First-Year Seminar.</td>
<td>F. Prerequisite: None.</td>
<td>Introduction to microbiology major and faculty; academic and career planning; information sources in biomedical sciences.</td>
</tr>
<tr>
<td>MIP 260 03(3-0-0)</td>
<td>The World of Parasites.</td>
<td>S. Prerequisite: BZ 110 or LIFE 102; CHEM 111.</td>
<td>Introduction to general parasitology; evolution, ecology, epidemiology, physiology, and morphology of representative parasites of every group.</td>
</tr>
<tr>
<td>MIP 275 02(1-0-4)</td>
<td>Microcomputing Applications in Microbiology.</td>
<td>S. Prerequisite: None.</td>
<td>Network software on MS-DOS microcomputers will be used to acquire and analyze data and information that are commonly encountered in microbiology.</td>
</tr>
<tr>
<td>MIP 298 Var[1-3].</td>
<td>Introductory Research.</td>
<td>Prerequisite: Written consent of instructor.</td>
<td>Freshman/sophomore research experience in a working research environment.</td>
</tr>
<tr>
<td>MIP 300 03(3-0-0)</td>
<td>General Microbiology.</td>
<td>F, S, SS. Prerequisite: BZ 110 or BZ 120 or LIFE 102; CHEM 245 or concurrent registration or CHEM 341 or concurrent registration or CHEM 345 or concurrent registration.</td>
<td>Structure, function, development, physiology, and molecular biology of microorganisms emphasizing bacteria. (NT-O)</td>
</tr>
<tr>
<td>MIP 302 02(0-4-0)</td>
<td>General Microbiology Laboratory.</td>
<td>F, S. Prerequisite: MIP 300 or concurrent registration.</td>
<td>Laboratory skills and techniques for isolating, characterizing, and identifying bacteria.</td>
</tr>
<tr>
<td>MIP 303 01(0-0-1)</td>
<td>General Microbiology—Honors Recitation.</td>
<td>F, S. Prerequisite: Concurrent registration in MIP 300—Honors Section; participation in the Honors Program.</td>
<td>Research and present topics related to the material presented in MIP 300.</td>
</tr>
<tr>
<td>MIP 315A-B</td>
<td>Human and Animal Disease.</td>
<td>F, S. Credit not allowed for both MIP 315A and MIP 315B.</td>
<td>Biological systems critical to mammalian physiology and how each is affected by metabolic, genetic, environmental, and infectious agents. A) 03(3-0-0). B) 04(3-0-1). Prerequisite: BMS 300 or BMS 305.</td>
</tr>
<tr>
<td>MIP 334 03(3-0-0)</td>
<td>Food Microbiology.</td>
<td>F. Prerequisite: LIFE 205 or MIP 300.</td>
<td>Microorganisms in production of foods, in preservation and spoilage, and in food-borne diseases. Control of microorganisms in foods.</td>
</tr>
<tr>
<td>MIP 335 02(0-4-0)</td>
<td>Food Microbiology Laboratory.</td>
<td>F. Prerequisite: LIFE 206 or MIP 302; MIP 334 or concurrent registration.</td>
<td>Laboratory skills and techniques related to the presence of microorganisms in food, production, and preservation.</td>
</tr>
<tr>
<td>MIP 342 04(3-0-1)</td>
<td>Immunology.</td>
<td>F. S. Prerequisite: CHEM 245 or concurrent registration or CHEM 341 or concurrent registration or CHEM 345 or concurrent registration; LIFE 201B or LIFE 210 or MIP 300.</td>
<td>Principles of immunology: components of the immune system, interactions of humoral and cellular elements, and clinical applications of basic concepts.</td>
</tr>
<tr>
<td>MIP 343 02(0-4-0)</td>
<td>Immunology Laboratory.</td>
<td>S. Prerequisite: MIP 302; MIP 342 or concurrent registration.</td>
<td>Techniques used in research and clinical immunology, including diagnostic problem solving and data analysis.</td>
</tr>
<tr>
<td>MIP 350 03(3-0-0)</td>
<td>Microbial Diversity.</td>
<td>S. Prerequisite: MIP 300.</td>
<td>Physiological, taxonomic, and phylogenic aspects of microbial diversity. Yeasts and filamentous fungi as microbial entities.</td>
</tr>
<tr>
<td>MIP 351 03(3-0-0)</td>
<td>Medical Bacteriology.</td>
<td>S. Prerequisite: MIP 342.</td>
<td>Bacteria which cause human and veterinary diseases; host-parasite relationships; disease mechanisms, prevention, and therapy.</td>
</tr>
<tr>
<td>MIP 352 03(0-6-0)</td>
<td>Medical Bacteriology Laboratory.</td>
<td>S. Prerequisite: MIP 302; MIP 351 or concurrent registration.</td>
<td>Laboratory skills and techniques necessary for identifying medically important bacteria.</td>
</tr>
<tr>
<td>MIP 384 Var[1-5].</td>
<td>Supervised College Teaching.</td>
<td>Prerequisite: Written consent of department. A maximum of 10 combined credits for all MIP 384 and 484 courses are counted towards graduation requirements.</td>
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<tr>
<td>MIP 400A-G</td>
<td>Capstones in Microbiology.</td>
<td>F, S.</td>
<td>A) Medical microbiology 02(2-0-0). Prerequisite: MIP 342; MIP 351 or concurrent registration or MIP 420 or concurrent registration; written consent of instructor. B) Biotechnology 02(0-0-2). Prerequisite: BC 351 or BC 401; MIP 300. C) Immunology 02(2-0-0). Prerequisite: MIP 342; MIP 351 or concurrent registration or MIP 420 or concurrent registration. D) Microbial diversity, ecology 02(2-0-0). Prerequisite: MIP 342; MIP 351 or concurrent registration or MIP 420 or concurrent registration. E) Microbial genetics 02(2-0-0). Prerequisite: MIP 342; MIP 351 or concurrent registration or MIP 420 or concurrent registration. F) Virology 02(2-0-0). Prerequisite: MIP 342; MIP 351 or concurrent registration or MIP 420 or concurrent registration. G) Service learning. 02(2-0-0). Prerequisite: MIP 342; MIP 351 or concurrent registration or MIP 420 or concurrent registration.</td>
</tr>
<tr>
<td>MIP 420 04(4-0-0)</td>
<td>Medical and Molecular Virology.</td>
<td>F. Prerequisite: BC 351 or concurrent registration or BC 401 or concurrent registration; MIP 342.</td>
<td>Principles of animal virology: structure, classification, assay, diagnosis, control, replication, genetics, host-parasite relationships.</td>
</tr>
<tr>
<td>MIP 425 02(0-4-0)</td>
<td>Virology and Cell Culture Laboratory.</td>
<td>F. Prerequisite: MIP 302; MIP 420 or concurrent registration.</td>
<td>Isolation and characterization of viruses. Viral diagnostic and cell culture techniques.</td>
</tr>
</tbody>
</table>

* MIP 432 03(2-0-1), Microbial Ecology. S. Prerequisite: MIP 300. Principles of microorganism interaction with their living and non-living environments: implication for the environment, plants and animals. |
| MIP 433 01(0-3-0) | Microbial Ecology Laboratory. | S. Prerequisite: MIP 432 or concurrent registration. | Experimental microbial ecology; the design, conduct and interpretation of experiments that illustrate basic principles of microbial ecology. |
| MIP 436 04(2-4-0) | Industrial Microbiology. | F. Prerequisite: LIFE 206 or MIP 302. | Use of microorganisms for producing commercially valuable products. |

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MIP 443 04(3-0-1). Microbial Physiology. S. Prerequisite: BC 351 or BC 401; MIP 300.
Structure, function of bacterial constituents; comparison with other organisms. Bacterial growth, energy production, biosynthesis.

MIP 450 03(3-0-0). Microbial Genetics. F. Prerequisite: BC 351 or concurrent registration or BC 401 or concurrent registration; MIP 300. Principles of genetics at molecular level: mutation, recombination, complementation, suppression, control of gene expression, and recombinant DNA.

MIP 462/BZ 452/BSPM 462 05(3-4-0). Parasitology and Vector Biology. F. Prerequisite: BZ 110 or LIFE 103; BZ 212 or LIFE 206 or MIP 302. Credit allowed for only one of the following: MIP 462, BSPM 462, BZ 462. Protozoa, helminthes, and insects and related arthropods of medical importance; systematics, epidemiology, host damage and control.

MIP 495 Var. Independent Study. Prerequisite: MIP 300; written consent of department.

MIP 496 Var[1-3]. Group Study. F, S. Prerequisite: Written consent of instructor. Faculty-supervised investigation of areas of special interest in microbiology, virology, microbial physiology, or microbial genetics.

MIP 498 Var[1-3]. Research. Prerequisite: MIP 302; written consent of department.

*MIP 530 04(3-0-1). Advanced Molecular Virology. S. Prerequisite: BC 351 or BC 401; BC 463 or MIP 450. Virus-host interactions at the molecular and cellular level.

MIP 533/VS 533 03(2-0-1). Epidemiology of Infectious Diseases/Zoonoses. S. Prerequisite: MIP 300. Credit not allowed for both MIP 533 and VS 533. Epidemiologic features of infectious and parasitic diseases that have a major impact on community medicine.

MIP 540 02(2-0-0). Biosafety in Research Laboratories. F, S. Prerequisite: MIP 300. Practical applications of biosafety principles, including lab practices and regulatory aspects of research involving infectious microorganisms and DNA.

*MIP 543 03(3-0-0). RNA Biology. F. Prerequisite: BC 351 or concurrent enrollment or BC 401 or concurrent enrollment. Gene expression and regulation that occurs at the level of RNA (e.g., splicing, stability, export, translation, RNAi, etc.).

MIP 550 04(2-6-0). Microbial and Molecular Genetics Laboratory. S. Prerequisite: MIP 302; MIP 450; written consent of department. Use of both in vivo genetics and in vitro molecular techniques to study gene structure, function, and regulation in bacteria.

MIP 555 03(3-0-0). Principles and Mechanisms of Disease. F. Prerequisite: BMS 300. Principles of disease processes; emphasis on reactivity of the diseased cell, tissue, organ, or organism.

*MIP 563 03(3-0-0). Biology of Disease Vectors. S. Prerequisite: MIP 462/BSPM 462/BZ 462. Vector physiology and genomics, new strategies in vector control, and vector/host interactions.

MIP 570 03(2-2-0). Functional Genomics. F. Prerequisite: MIP 300; MIP 302; MIP 443; MIP 450. State-of-the-art genomic tools with applications to studies of pathogenesis and pathophysiology of infectious diseases.

MIP 576/BSPM 576 03(3-0-0). Bioinformatics. F, S. Prerequisite: BC 463 or BZ 310 or BZ 350 or CM 501 or CS 155 or ERHS 332 or MIP 275 or MIP 300 or MIP 450 or STAT 307. Credit not allowed for both MIP 576 and BSPM 576.°

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MIP 577/BZ 577 02(0-4-0). Computer Analysis in Population Genetics. F. Prerequisite: MIP 578/BZ 578 or concurrent registration. Credit not allowed for both MIP 577 and BZ 577. Computational and statistical techniques and practical exercises in discrete and quantitative genetics.

MIP 578/BZ 578 04(3-0-1). Genetics of Natural Populations. F. Prerequisite: BZ 350 or LIFE 201A or LIFE 201B or SOCR 330; STAT 201 or STAT 301 or STAT 307. Credit not allowed for both MIP 578 and BZ 578. Theoretical and empirical aspects of the genetics of natural populations; current molecular techniques and statistical analysis.

MIP 611 04(2-0-2). Advanced Microbiological Research Methods. F. Prerequisite: Admission to the M.S. in Microbiology, Immunology, and Pathology, Plan B program.
In-depth presentation of the ever-growing arsenal of techniques needed to be an effective experimental microbiologist/molecular biologist.

MIP 612 03(3-0-0). Applied Immunology. S. Prerequisite: Admission to the M.S. in Microbiology, Immunology, and Pathology, Plan B program.
Application of classic and modern principles in immunology currently being used in the medical, biotechnology and basic research fields.

MIP 613 04(4-0-0). Applied Microbiology and Virology. F. Prerequisite: Admission to the M.S. in Microbiology, Immunology, and Pathology, Plan B program.
Application of bacteria, fungi and viruses in translational research, from drug and vaccine development to the generation of clean energy.

MIP 614 03(3-0-0). Medical Microbiology. S. Prerequisite: Admission to the M.S. in Microbiology, Immunology, and Pathology, Plan B program.
In-depth examination of the pathogenic mechanisms of medically important bacteria, fungi, parasites and viruses.

MIP 615 01(1-0-0). Ophthalmic Pathology. F. Prerequisite: None.
Background in normal ocular histology as well as pathologic changes in the eye, taught through a combination of lectures and class discussions.

MIP 616 04(3-0-1). Modern Molecular Biology for Microbiologists. F. Prerequisite: Admission to the M.S. in Microbiology, Immunology, and Pathology, Plan B program.
Develop a working knowledge in the theory and applications of modern molecular biology to applied and translational research uses in microbiology.

MIP 617 03(3-0-0). Principles of Biodefense/Emerging Pathogens. S. Prerequisite: Admission to the M.S. in Microbiology, Immunology, and Pathology, Plan B program.
In-depth analysis of the physiology, biology and epidemiology of biodefense agents and emerging pathogens.

MIP 618 01(0-0-1). MIP Masters Seminar Series. F, S. Prerequisite: Admission to the M.S. in Microbiology, Immunology, and Pathology, Plan B program. May be taken twice for credit.
Foster the development of MIP master’s students by improving communication skills and discussion of cutting edge research.

MIP 619 02(1-0-1). MIP Masters Topics. F, S. Prerequisite: Admission to the M.S. in Microbiology, Immunology, and Pathology, Plan B program. May be taken twice for credit.
Foster the development of MIP master’s students by improving communication skills and discussion of cutting edge research.

*MIP 624 02(1-0-1). Advanced Topics in Microbial Ecology. F. Prerequisite: MIP 300; MIP 432.
Technical computing across platforms using bioinformatics tools in molecular analyses.
Recent conceptual developments in microbial ecology, emphasizing theoretical aspects of microbial ecology, particularly in an evolutionary context.

**MIP 628 03(3-0-0). Immunity to Infection.** S. Prerequisite: None.
How microorganisms have evolved to counteract the immune system, and how the immune system has evolved to resist microbes.

*MIP 630 03(3-0-0). Advances in Microbial Physiology.** F. Prerequisite: MIP 443.
Contemporary developments in bacterial structure, function, metabolism, and genetics.

°**MIP 636 04(3-0-1). Mechanisms of Viral Infection and Disease.** S. Prerequisite: MIP 420 or MIP 530.
Cytopathic mechanisms, pathogenetic events in viral diseases; host response and antiviral immunity; cancer induction by DNA and RNA viruses.

MIP 643 01(1-0-0). Grant Writing for Microbiology/Pathology. S. Prerequisite: Enrollment in an MIP graduate program.
To effectively communicate ideas, goals and approaches in a scientific grant proposal.

**MIP 651 03(3-0-0). Immunobiology.** F. Prerequisite: MIP 342. Prerequisite: None.
Structure, function, regulation of immunoglobulins and the immune system. Cellular immunity including transplantation and cancer.

MIP 654 01(1-0-0). Research Policies and Regulations. F, S. Prerequisite: None.
Reviews CSU and federal policies, rules, and regulations on integrity, use of humans and animals, authorship, data, genetics, etc., using case studies.

*MIP 666 03(0-0-3). Writing Scientific Manuscripts.** F. Prerequisite: Written consent of instructor.
Writing biological science manuscripts for publication.

°**MIP 670 03(3-0-0). Molecular Immunology and Immunogenetics.** F. Prerequisite: MIP 651.
Molecular basis and genetics of immune response. Biochemistry of immunologically mediated diseases.

*MIP 675 03(3-0-0). Advanced Bioanalytic Pathology.** S. Prerequisite: (VM 724; written consent of instructor) or D.V.M. degree.
Laboratory medicine for post-graduate veterinarians and professional veterinary medical students.

**MIP 698 Var. Research.** Prerequisite: M.S. candidates only.

**MIP 699 Var. Thesis.** Prerequisite: M.S. candidates only.

MIP 700 01(1-0-0). Topics in Microbiology. F, S. Prerequisite: MIP 300.
Current literature in bacteriology, virology, genetics, and immunology.

°**MIP 720 02(1-3-0). Methods in Carbohydrate Analysis.** S. Prerequisite: CHEM 346.
Structural analysis of complex carbohydrates using gas chromatography, mass spectrometry, and nuclear magnetic resonance.

°**MIP 740 03(2-0-1). Microbial and Molecular Genetics.** S. Prerequisite: MIP 450.
Molecular biology and genetics of prokaryotic and eukaryotic cells and their viruses; strategies for genetic manipulation.

°**MIP 760 03(2-0-1). Mechanisms of Bacterial Pathogenesis.** F. Prerequisite: BC 351; MIP 342.
Mechanisms of bacterium-host interaction at molecular and cellular levels in pathogenesis of bacterial disease.

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MARKETING COURSES
Department of Marketing
College of Business

MKT 300 03(3-0-0). Marketing. F, S, SS. Prerequisite: AREC 202 or ECON 202; MATH 141 or MATH 155 or MATH 160. Credit not allowed for both MKT 300 and MKT 305.

Market and buyer analysis, product and service development, pricing, promotion, advertising, selling, and distribution.

MKT 305 03(3-0-0). Fundamentals of Marketing. F, S. Prerequisite: AREC 202 or ECON 101 or ECON 202. Credit not allowed for both MKT 305 and MKT 300.

Overview of marketing activities involved in provision of products and services to consumers, including target markets and managerial aspects. (NT-O)

MKT 320 03(3-0-0). Integrated Marketing Communications. F, S. Prerequisite: MKT 300 or MKT 305.

Principles and practices of managing promotional activities including advertising, sales promotion, and other major media.

MKT 330 03(3-0-0). Business Customer Relationships. F, S. Prerequisite: MKT 300 or MKT 305.

Managing relationships with distribution channel intermediaries and business customers.

MKT 360/DM 360 03(3-0-0). Retailing. F, S, SS. Prerequisite: MKT 300 or MKT 305. Credit not allowed for both MKT 360 and DM 360.

Retail markets, institutions, operations, and problems. (NT-O)

MKT 361 03(3-0-0). Buyer Behavior. F, S. Prerequisite: MKT 300 or MKT 305.

Marketing analysis of buying behavior of individuals, households, businesses, and not-for-profit organizations.

MKT 362 03(3-0-0). Professional Selling. F, S. Prerequisite: MKT 300 or MKT 305.

Persuasive personal communications in selling consumer and industrial products and services.

MKT 363 03(3-0-0). Sales Management. S. Prerequisite: MKT 300 or MKT 305.

Recruiting, selecting, training, compensating, motivating, supervising, and evaluating a sales force.

MKT 364 03(3-0-0). Product Development and Management. F. Prerequisite: MKT 300 or MKT 305.

Consumer and industrial product development and management issues as an integral part of the marketing mix.

MKT 365 03(3-0-0). International Marketing. F, S. Prerequisite: MKT 300 or MKT 305.

Analysis of international markets and development of strategic and tactical options for marketing across national boundaries.

MKT 366 03(3-0-0). Services Marketing. S, SS. Prerequisite: MKT 300 or MKT 305.

Customer service issues and unique challenges involved in marketing and management of services operations.

MKT 367 03(3-0-0). Sports Marketing. F, S. Prerequisite: MKT 300 or MKT 305.

The nature and scope of applying marketing strategy and tactics in the sports marketing environment.

MKT 370 03(3-0-0). Digital Marketing. F, S. Prerequisite: MKT 300 or MKT 305.

Introduction to digital marketing: the landscape and tactics needed to execute marketing strategy in an online, connected world.

MKT 400 03(3-0-0). Consumer Behavior. F. Prerequisite: MKT 300 or MKT 305.

Fundamental concepts and strategies that differentiate the marketing of services from the marketing of tangible goods, including customer satisfaction. (NT-O)

MKT 410 03(3-0-0). Marketing Research. F, S. Prerequisite: MKT 300 or MKT 305; STAT 204 or STAT 301 or STAT 307 or STAT 311 or STAT 315.

Role and methodology of research in business emphasizing selection of study’s direction, collecting data, and choosing techniques for analyzing these data.

MKT 440 03(3-0-0). Pricing and Financial Analysis in Marketing. F, S. Prerequisite: MKT 300 or MKT 305.

Financial analysis involved in addressing marketing problems; advanced study of pricing strategy and tactics.

MKT 479 03(3-0-0). Marketing Strategy and Management. F, S. Prerequisite: MKT 410.

Marketing decisions involving integration of elements of the marketing mix.

MKT 487 03(0-9-0). Internship. Prerequisite: Written consent of instructor. Maximum of 3 credits allowed in course.

MKT 492 03(0-0-3). Seminar. Prerequisite: MKT 300 or MKT 305; written consent of instructor.

MKT 495 Var[1-5]. Independent Study. Prerequisite: 2.750 GPA or better.

MKT 496 Var[1-3]. Group Study.

MKT 498 Var[1-3]. Research.

MKT 600 03(3-0-0). Marketing Management and Strategy. S. Prerequisite: Admission to a master’s program in business.

Processes of customer value creation and value capture; marketing strategy analysis.

MKT 601 03(3-0-0). Marketing for Social Sustainable Enterprises. F. Prerequisite: Admission to GSSE Program.

Customer and stakeholder value creation and capture. Marketing strategy with emphasis on social sustainable organizations.

MKT 621 01(1-0-0). Digital Marketing. F, S. SS. Prerequisite: Admission to a master’s program in business. This is a partial-semester course.

Overview of social media, website management, content marketing, web analytics and search engine optimization. (NT-O)

MKT 661 01(1-0-0). Consumer Behavior. F, S. SS. Prerequisite: Admission to a master’s program in business. This is a partial-semester course.

Marketing analysis of buying behavior of individual consumers. (NT-O)

MKT 662 01(1-0-0). Strategic Selling for Business Customers. F, S, SS. Prerequisite: Admission to a master’s program in business. This is a partial-semester course.

Examination of sales strategies, sales tactics and best practices in professional selling with a primary context in business selling. (NT-O)

MKT 667 01(1-0-0). Services Marketing Management. F, S, SS. Prerequisite: Admission to a master’s program in business. This is a partial-semester course.

Fundamental concepts and strategies that differentiate the marketing of services from the marketing of tangible goods, including customer satisfaction. (NT-O)

MKT 692 03(0-0-3). Seminar.

Critical review and discussion of relevant marketing topics.

MKT 695 Var[1-3]. Independent Study. Prerequisite: 3.250 GPA or better.

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; S Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
MILITARY SCIENCE COURSES
Department of Military Sciences
Office of Provost and Executive Vice President

+MLSC 101 02(2-0-0). Leadership and Personal Development. F. Prerequisite: None. Required field trips. Leadership principles and techniques; first aid; weapons common to U.S. forces; rifle marksmanship; branches of the Army; physical fitness training. ($)

+MLSC 102 02(2-0-0). Introduction to Tactical Leadership. S. Prerequisite: None. Required field trips. Small unit leadership; survival techniques; knots, rappelling; map reading, land navigation; plant/animal identification; physical fitness training. ($)

MLSC 196 01(0-2-0). Military Science Group Study I. F. Prerequisite: concurrent registration in MLSC 101.

MLSC 197 01(0-2-0). Military Science Group Study II. S. Prerequisite: Concurrent registration in MLSC 102.

+MLSC 201 02(2-0-0). Innovative Team Leadership. F. Prerequisite: None. Leadership assessment; principles of war; small unit operations; basic management skills; oral communication; counseling/behavioral evaluation techniques. ($)

+MLSC 202 02(2-0-0). Foundations of Tactical Leadership. S. Prerequisite: None. Required field trips. Operation orders; theories of conflict; small unit operations; troop leading procedures; observing and classifying behavior; physical fitness training. ($)

MLSC 250 Var[2-8]. Basic Camp Leader Internship. SS. Prerequisite: None. Maximum of 8 credits allowed in course. Practical leadership development and management skills in a military operations environment.


MLSC 296 01(0-2-0). Military Science Group Study III. F. Prerequisite: Concurrent registration in MLSC201.

MLSC 297 01(0-2-0). Military Science Group Study IV. S. Prerequisite: Concurrent registration in MLSC 202.

+MLSC 301 03(3-0-0). Adaptive Tactical Leadership. F. Prerequisite: Concurrent registration in MLSC 396. Required field trips. Leadership theory review; leadership assessment program to further develop leadership and management skills; physical fitness training. ($)

+MLSC 302 03(3-0-0). Leadership in Changing Environments. S. Prerequisite: MLSC 301; concurrent registration in MLSC 397. Required field trips. Command and staff functions; operations orders; tactical unit operations; military skills; physical fitness training; field training exercises. ($)

MLSC 357/HIST 357 03(3-0-0). The American Military Experience. F, SS. Prerequisite: HIST 100 or HIST 101 or HIST 115 or HIST 120 or HIST 121 or HIST 150 or HIST 151 or HIST 170 or HIST 171; completion of 45 credits. Credit not allowed for both MLSC 357 and HIST 357. Role of the armed forces in American society; development of military traditions, institutions, and practices.

MLSC 386 08(1-12-1). Advanced Camp Practicum. SS. Prerequisite: MLSC 301. Leadership principles and skills applied to actual field situations.

MLSC 395 Var[1-3]. Independent Study. Leadership theory and skills as applied to the military.

MLSC 396 01(0-2-0). Military Science Group Study V. F. Prerequisite: Concurrent registration in MLSC 301.

MLSC 397 01(0-2-0). Military Science Group Study VI. S. Prerequisite: Concurrent registration in MLSC 302.

+MLSC 401 03(3-0-0). Developing Adaptive Leaders. F. Prerequisite: MLSC 302; MLSC 357/HIST 357; concurrent registration in MLSC 496. Required field trips. Role of the Army officer; ethics, professionalism; military justice; law of land warfare; preparation for active duty; physical fitness training. ($)

+MLSC 402 03(3-0-0). Leadership in a Complex World. S. Prerequisite: MLSC 301; MLSC 302; concurrent registration in MLSC 497. Military staff functions and issues in leadership. ($)

MLSC 495 Var[1-3]. Independent Study.

MLSC 496 01(0-2-0). Military Science Group Study VII. F. Prerequisite: Concurrent registration in MLSC 401.

MLSC 497 01(0-2-0). Military Science Group Study VIII. Prerequisite: Concurrent registration in MLSC 402.

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT Subcode = State Guarantee Transfer course and AUCC Subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
MU 100 03(3-0-0). Music Appreciation. (GT-AH1, AUCC 3B). F, S, SS. Prerequisite: None. Previous musical training not necessary. Survey of music from a wide range of periods and styles. (S, NT-O)

MU 111 03(3-0-0). Music Theory Fundamentals. (GT-AH1, AUCC 3B). F, S, SS. Prerequisite: None. For non-music majors and majors needing basic skills.

- Basic visual and aural fundamentals of music including intervals, scales, key and time signatures, chord construction, basic harmony, melodic writing. (S)

MU 117 04(3-2-0). Music Theory I. F. Prerequisite: Satisfactory completion of placement examination.

- Introduction to diatonic harmony and part-writing; basic sight singing, ear training, and keyboard harmony skills.

MU 118 04(3-2-0). Music Theory II. S. Prerequisite: MU 117.

- Four-part diatonic writing; diatonic modulation; diatonic sight singing, ear training, and keyboard harmony skills.

MU 131 03(3-0-0). Introduction to Music History and Literature. (GT-AH1, AUCC 3B). F, S. Prerequisite: None.

- Landmarks of music history and literature from 1300 to the present.

MU 150 02(2-0-0). Piano Class I. F, S, SS. Prerequisite: None.

- Basic piano technique; keyboard harmony and music rudiments.

MU 151 01(2-0-0). Piano Skills for Music Educators. F, S. Prerequisite: Successful completion of Basic Piano Skills test.

- Intermediate piano technique and appropriate sightreading skills for music educators.

MU 152 01(2-0-0). Piano Skills for Choral Directors. F, S. Prerequisite: MU 151.

- Advanced piano skills necessary for choral directing and accompaniment.

MU 153 01(2-0-0). Piano Skills for Music Therapists. F, S. Prerequisite: Successful completion of Basic Piano Skills test.

- Practical application of functional piano skills for clinical music therapists.

MU 154 01(0-2-0). Jazz Piano Class. S. Prerequisite: Successful completion of Basic Piano Skills test.

- Basic jazz piano skills that serve as the foundation for a jazz pianist or composer.

MU 155 02(2-0-0). Guitar Class I. F, S, SS. Prerequisite: None.

- Fundamental techniques for guitar emphasizing chord study and related literature.

MU 156 02(2-0-0). Guitar Class II. F, S. Prerequisite: MU 155.

- Fundamentals of guitar emphasizing solo literature and accompaniment.

MU 157 02(2-0-0). Voice Class I. F. Prerequisite: None.

- Techniques of singing, emphasizing posture, breathing, tone production and diction, as applied to song literature.

MU 158 02(2-0-0). Voice Class II. F, S. Prerequisite: MU 157.

- Techniques of singing, emphasizing resonance, articulation, projection, and repertoire.

MU 172A 02(1-2-0). Freshman Voice Studio—English/Italian. F. Prerequisite: Concurrent registration in any music ensemble.

- Applied voice study and English/Italian diction in a group setting for freshman voice majors.

MU 172B 02(1-2-0). Freshman Voice Studio—German/French. S. Prerequisite: Concurrent registration in any music ensemble.

- Applied voice study and German/French diction in a group setting for freshman voice majors.

MU 201 01(0-3-0). Men’s Chorus. F, S. Prerequisite: None. Rehearsal and performance of a variety of types and styles of music for men’s voices.

MU 202 01(0-3-0). University Chorus. F, S. Prerequisite: None. Rehearsal and performance of a variety of types and styles of music for mixed voices.

MU 204 01(0-5-0). Marching Band. F. Prerequisite: None. Marching routines utilizing popular and jazz musical idioms with performances at all home football games and other athletic events. ($)

MU 205 01(0-3-0). Concert Band. S. Prerequisite: None. Rehearsal and performance of basic concert literature.

MU 206 01(0-3-0). Colorado State University Concert Orchestra. F, S. Performance opportunity for music majors and non-music majors to perform standard orchestral literature.

MU 217 04(3-2-0). Music Theory III. F. Prerequisite: MU 118.

- Harmonic and formal language of the 17th and 18th centuries; diatonic and chromatic sight singing, ear training, and keyboard harmony skills.

MU 218 04(3-2-0). Music Theory IV. S. Prerequisite: MU 217.

- Late 18th and early 19th century harmonic and formal language; diatonic, chromatic and modal sight singing, ear training, and keyboard harmony skills.

MU 225 02(2-0-0). Jazz Theory. F. Prerequisite: MU 118. Music theory as it pertains to the jazz idiom; the aural language of jazz.

MU 230 03(3-0-0). Music of Black Americans. S. Prerequisite: None. Music indigenous to or composed by Black Americans.

MU 231 03(3-0-0). Women in Music. F. Prerequisite: None. Examination of the role of women in music from historical and societial perspectives.

MU 241 03(3-0-0). Introduction to Music Therapy. F. Prerequisite: None.

- Overview of music therapy, related helping professions, and problems in human functioning; emphasizes basic skills for managing behavior problems.

MU 250 03(2-2-0). Music Therapy Practice. F. Prerequisite: None. Development of fundamental interactive and professional skills used in music therapy practice.

*MU 251 01(0-2-0). Voice Techniques. S. Prerequisite: Instrumental music education majors only.

- Basic voice production, exercises, materials and methods for teaching, including child and adolescent voice concerns.

MU 252A-D Var[1-2]. Instrumental Techniques. F, S. Prerequisite: None.

- Tone production, tuning, fingerings, care, materials, and teaching methods for brass, percussion, string, and woodwind instruments. A) Brass 02(1-2-0). B) Woodwinds 02(1-2-0). C) Strings 01(0-2-0). D) Percussion 01(0-2-0).

MU 254 02(2-0-0). Beginning Conducting. S. Prerequisite: MU 117. Basic conducting patterns and techniques.

*MU 272A-V Var[1-2]. Applied Music Instruction. F, S. Prerequisite: Concurrent registration in any music ensemble. One or two half-hour lessons per week and one hour weekly performance class. May be repeated up to 9 times for credit.

°Alternate year offering (odd); * Alternate year offering (even); † Field trips; S Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
since the 1880s emphasizing its various influences and developments.

MU 332 03(3-0-0). History of Jazz. F, S. Prerequisite: MU 118; MU 131.
One or two half-hour lessons per week.

MU 274A-G Var[1-2]. Applied Jazz Instruction. F, S. Prerequisite: Written consent of instructor. May be repeated up to 9 times for credit.

MU 275 Var[1-2]. Composition Instruction. F, S. Prerequisite: MU 118; MU 131.
One or two half-hour lessons per week.

MU 286 01(0-2-0). Practicum-Music Education.
MU 300 01(0-3-0). Women’s Chorus. F, S. Prerequisite: None.
Rehearsal and performance of a variety of types and styles of music for women’s voices.

MU 302 01(0-5-0). University Orchestra. F, S. Prerequisite: Audition required for this ensemble.
Rehearsal and performance of standard orchestral literature.

MU 304 01(0-3-0). Symphonic Band. F, S, SS. Prerequisite: Audition required for this ensemble.
Preparation for public performance of full symphonic instrumentation of concert band literature.

MU 305 01(0-5-0). Colorado State University Concert Choir. F, S. Prerequisite: Audition required for this ensemble.
Rehearsal and performance of choral literature emphasizing extended works with orchestral accompaniment.

MU 309 01(0-3-0). Jazz Ensemble. F, S. Prerequisite: Audition required for this ensemble.
Rehearsal and performance of jazz ensemble literature of standard and experimental types.

MU 310 01(0-2-0). Jazz Combo. F, S. Prerequisite: Audition required for this ensemble.
Small group jazz performance practice and standard jazz repertoire.

MU 317 02(1-2-0). Music Theory V. F. Prerequisite: MU 218.
Late 19th and 20th century systems of composition and analysis; including articulation and phrasing. A) Piano, B) String bass, C) Trombone, D) Trumpet, E) Percussion, F) Saxophone, G) Guitar.

MU 318 02(2-0-0). Arranging and Orchestration. S. Prerequisite: MU 218.
Techniques for writing music for the standard orchestral and band instruments; basic arranging skills for various instrumental and choral ensembles.

MU 320 01(0-2-0). Jazz Improvisation. F, S. Prerequisite: MU 225.
Jazz improvisation skills through training in jazz theory, ear training, and improvisatory concepts.

MU 325 02(2-0-0). Jazz Composition/Arranging. S. Prerequisite: MU 225.
Arranging jazz music for a variety of ensembles; composition of music in the jazz idiom.

MU 332 03(3-0-0). History of Jazz. S, SS. Prerequisite: None. Jazz since the 1880s emphasizing its various influences and developments.
(NT-O)

MU 333 03(3-0-0). History of Rock and Roll. SS. Prerequisite: None.
Historical overview of rock and roll with emphasis on listening skills, musical analysis, the artists, and the industry. (NT-O)

MU 334 03(3-0-0). Music History I. F, S. Prerequisite: MU 100 or MU 131; MU 118.
Music of the medieval, Renaissance, and baroque periods.

MU 335 03(3-0-0). Music History II. S. Prerequisite: MU 100 or MU 131; MU 118.
Music of the classical, Romantic, and contemporary periods.

MU 338 02(2-0-0). Opera History and Literature. S. Prerequisite: MU 131.
Historical and musical development of opera from its roots through the 20th century.

MU 342 03(3-0-0). Psychology of Music. F. Prerequisite: PSY 100.
Psychological aspects of music: perception, psychoacoustics, aesthetics, musical function, communication, measurement, and affective responses.

MU 343 03(3-0-0). Research Methods in Music Therapy. S. Prerequisite: STAT 201.
Techniques of observing, measuring, and recording behavior. Basic experimental methods and procedures used in music therapy research.

MU 351A-C 02(2-4-0). String Pedagogy I. F, S. Prerequisite: None.

MU 352A-C 02(1-2-0). String Pedagogy II. F, S. Prerequisite: MU 351.

MU 355 02(1-2-0). Choral Conducting and Literature. F. Prerequisite: MU 254.
Basic techniques of choral conducting and analysis of selected works as an aid to interpretation.

MU 356 02(1-2-0). Instrumental Conducting and Literature. S. Prerequisite: MU 254.
Essentials of instrumental conducting and analysis of selected works.

MU 365A-B 01(0-2-0). Advanced Diction. Prerequisite: MU 172A; MU 172B.
Practical application of lyric diction through performance of art song andarias. A) Italian and English. F. B) French and German. S.

MU 400 01(0-5-0). Colorado State University Chamber Choir. F, S. Prerequisite: Audition required for this ensemble.
Performance of chamber choral literature from all musical periods ranging from madrigals to music in a contemporary idiom.

MU 401 Var[1-2]. Opera Theater. F, S, SS. Prerequisite: Audition required for this ensemble.
Performance of opera and/or operatic scenes emphasizing operatic singing and acting techniques.

MU 402 01(0-5-0). Theater/Chamber Orchestra. F, S, SS. Prerequisite: Audition required for this ensemble.
Performance of selected operas, musicals, oratorio, orchestral accompaniments, and chamber music.

MU 404 01(0-5-0). Symphonic Wind Ensemble. F, S. Prerequisite: Audition required for this ensemble.
Performance of wind ensemble and band literature emphasizing most challenging of repertoire, using a select ensemble of performers.

MU 407 01(0-3-0). Accompanying. F, S. Prerequisite: Written consent of instructor.
Performance literature for small instrumental ensembles: duets, trios, quartets, and quintets.

MU 408 01(0-3-0). Chamber Music. F, S. Prerequisite: Written consent of instructor.
Performance literature for small instrumental ensembles: duets, trios, quartets, and quintets.

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MU 415 02(1-2-0). Advanced Jazz Techniques. S. Prerequisite: MU 320. Prerequisite: None.
  Advanced jazz theory and rhythmic concepts, free improvisation and other modern performance techniques.

MU 417 03(3-0-0). Counterpoint. F. Prerequisite: MU 218. 
Contrapuntal techniques from the Middle Ages through the 20th century; development of compositional skills in counterpoint.

MU 418 02(2-0-0). Advanced Orchestration. S. Prerequisite: MU 318. 
Advanced writing for modern orchestra and related ensembles; advanced study of traditional and contemporary writing for the individual instruments.

MU 419 02(2-0-0). Electronic Music Composition. S. Prerequisite: 
Fundamentals of electronic music composition, including hardware, software, digital audio, MIDI, and computer music.

MU 420 02(2-0-0). Marching Band Techniques. S. Prerequisite: MU 204. 
Marching band conducting, design, and performance techniques.

MU 421 02(1-3-0). Orchestral Techniques. S. Prerequisite: MU 252C. 
Orchestral conducting and rehearsal techniques.

MU 425 02(2-0-0). Jazz Pedagogy. F. S. Prerequisite: None. Jazz ensemble, instrumentation, literature, performance practice and rehearsal techniques.

MU 430 03(3-0-0). 20th Century Music. S. Prerequisite: None.
Musical styles from 1900 to present; major 20th-century movements which reflect a changing society.

MU 431 03(3-0-0). American Music. S. Prerequisite: None. 
Sacred, patriotic, popular, and cultivated musical developments from the Pilgrims to 1900 including music on the Western frontier.

*MU 432 02(2-0-0). Hymnology. F. Prerequisite: MU 100 or MU 131. 
Hymns and congregational singing in the Christian tradition.

*MU 433 02(2-0-0). Music and Rites of Christian Liturgy. S. Prerequisite: MU 100 or MU 131. 
History of the music and rites of Christian liturgy from its beginnings to the present.

*MU 434 02(2-0-0). Psalms in Music and Liturgy. F. Prerequisite: MU 100 or MU 131. 
Musical traditions of the poetry and psalms of the Hebrew Bible, primarily from the perspective of Jewish and Christian liturgy.

*MU 435 02(2-0-0). Contemporary Liturgical Music in America. S. Prerequisite: MU 100 or MU 131. 
History and practice of contemporary liturgical music in America.

MU 437 02(1-2-0). History and Structure of the Organ. F. Prerequisite: MU 472H. 
Physical structure, tonal disposition, acoustical surroundings, and historical development.

MU 440 03(3-0-0). Music Therapy Methods I. S. Prerequisite: MU 241; admission to professional curriculum. 
Basic characteristics of handicapped children encountered in the music classroom; methods and materials for educating them in music.

MU 443 03(3-0-0). Music Therapy Methods II. S. Prerequisite: BMS 300; MU 241. 
Relation of music to health; current and future music therapy scenes; and emphasis on cognitive, affective, and psychomotor approaches to therapy.

MU 444 03(3-0-0). Music Therapy Methods III. S. Prerequisite: 
Music therapy techniques: assessment, formulating objectives, designing and implementing programs, evaluation, problem solving, and creativity.

MU 445 02(2-0-0). Improvisation Techniques in Music Therapy. S. Prerequisite: Admission to professional curriculum.
Music/movement improvisation techniques with clinical populations.

MU 451A-C 02(1-2-0). String Pedagogy III. F. S. Prerequisite: MU 352. 

MU 464A-C 02(2-0-0). String Literature. F. S. 
A) Violin/viola. Prerequisite: MU 272N or MU 272Q. B) Violoncello. Prerequisite: MU 272P. C) String bass. Prerequisite: MU 272M.

MU 465 02(1-2-0). Keyboard Literature. F. Prerequisite: None. 
Survey of early keyboard literature from pre-piano to early Romantic period; problems in present-day performance.

*MU 466 02(1-2-0). Song Literature. S. Prerequisite: None. Development of song as an art form from monody to German Lieder, French school, and contemporary songs of England and America.

*MU 467 02(2-0-0). Vocal Pedagogy. S. Prerequisite: MU 265A; MU 265B; concurrent registration in MU 472Q. Pedagogical foundations, techniques, resources, methods, and terminology for teaching singing.

MU 468 02(1-2-0). Organ Literature. S. Prerequisite: MU 437. 
Survey of literature from earliest known works to present; stylistic content and interpretation.

MU 469 02(1-2-0). Instrumental Literature. S. Prerequisite: None. 
Survey of literature for string, woodwind, and brass ensembles.

MU 471 01(0-0-1). Recital. F, S, SS. Prerequisite: Written consent of instructor. 
Demonstration of individual musical proficiency through public performance.

MU 472A-V Var[1-2]. Applied Music Instruction. F, S. Prerequisite: MU 272A-V; concurrent registration in any music ensemble; successful completion of upper-division qualifying exam. One or two half-hour lessons per week and one hour weekly performance class, emphasizing pedagogical methods. May be repeated up to 9 times for credit.


MU 473 Var[1-2]. Composition Instruction. F. S. Prerequisite: MU 273; successful completion of upper-division qualifying exam. One or two half-hour lessons per week; emphasizing pedagogical methods.

MU 474 Var[1-2]. Applied Jazz Instruction. F, S. Prerequisite: MU 274A-G (any one subtopic); concurrent registration in any jazz ensemble; successful completion of upper division qualifying exam. Private jazz instruction covering advanced aspects of jazz improvisation and performance.

MU 486A-B Var[1-3]. Practicum. 
A) Music therapy. Prerequisite: Piano proficiency. B) Music education. Prerequisite: Admission to teacher licensure.

MU 487 Var. Internship. Prerequisite: Completion of all course work in the music therapy curriculum. Six-month field experience that students must complete to become eligible for registration and board certification.

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MU 495A-H Var[1-3]. Independent Study.  

MU 496A-I Var[1-3]. Group Study.  

MU 498 Var[1-3]. Research in Music Therapy. Prerequisite: MU 241; MU 286.  
Participation of undergraduate music therapy majors in departmental research projects.

MU 499 Var. Thesis. Prerequisite: Music majors only.

MU 510 03(3-0-0). Foundations of Music Education. F, SS. Prerequisite: MU 526A.  
Cultural, philosophical, psychological, and historical applications of music education. (NT-O)

MU 517 02(2-0-0). Analytic Techniques I. F. Prerequisite: Satisfactory completion of placement examination.  
Appropriate analytic techniques for Middle Ages, Renaissance, and baroque music.

MU 518 03(3-0-0). Analytic Techniques II. S. Prerequisite: Satisfactory completion of placement examination.  
Appropriate analytic techniques for classical, Romantic, and 20th-century music. (NT-O)

MU 519 03(3-0-0). History of Music Theory. S. Prerequisite: MU 317.  
Important authors, treatises, and texts dealing with acoustics, composition, counterpoint, harmony, notation, orchestration, thoroughbass, and tuning.

MU 520 03(3-0-0). Elementary School Music. F. Prerequisite: EDUC 450.  
Musical concepts and teaching strategies for grades K-6; contemporary influences on music education.

MU 521 03(3-0-0). Junior and Senior High School Music. S. Prerequisite: EDUC 450.  
Music for grades 7-12. General music classes, choral and instrumental organizations, common problems, practices, and new concepts.

MU 525A-C 03(1-0-2). Orff-Schulwerk Training Program. SS. Prerequisite: MU 590L.  
A) Orff-Schulwerk Training I. B) Orff-Schulwerk Training II. C) Orff-Schulwerk Training III.

MU 526A-C 05(2-2-2). Kodaly Training Program. F, SS.  
A) Level I. B) Level II. C) Level III.

+MU 527A 04(0-0-4). Conducting Seminar—Level 1. SS. Prerequisite: Audition and acceptance into the graduate school. Required field trips.  
Music score analysis, preparation and conducting problems; various conducting projects to sharpen skills and increase gestures. ($)

+MU 527B 04(0-0-4). Conducting Seminar—Level 2. SS. Prerequisite: MU 527A. Required field trips.  
Further techniques learned in MU 527A; focuses on rehearsal techniques, performance practice, and asymmetrical meters. ($)

MU 527C 04(0-0-4). Conducting Seminar—Level 3. SS. Prerequisite: MU 527B.  
Further study from MU 527A-B; recitative technique through both operatic and choral examples; final project is a group conducted Broadway musical. ($)

*MU 530 03(3-0-0). Music Through the Middle Ages. F. Prerequisite: MU 334.  
Music in Western civilization from its beginnings through Middle Ages.

*MU 531 03(3-0-0). Music of the Renaissance. F. Prerequisite: MU 334.  
Music of 15th and 16th centuries.

MU 532 03(3-0-0). Music of the Baroque. SS. Prerequisite: MU 334.  
Style and musical language of baroque from Gabrielli through Johann Sebastian Bach.

*MU 533 03(3-0-0). Music of the Classical Era. S. Prerequisite: MU 335.  
Vocal and instrumental music of middle and late 18th century.

MU 534 03(3-0-0). Music of the Romantic Era. F, S, SS. Prerequisite: MU 335.  
Musical works, philosophies, and related arts of 19th century. (NT-O)

*MU 535 03(3-0-0). Contemporary Music. S. Prerequisite: MU 430.  
20th-century music emphasizing stylistic and theoretical concepts.

MU 543 03(3-0-0). Advanced Research Methods in Music Therapy. S. Prerequisites: MU 241; MU 250.  
Research techniques used in measuring and recording behavior. Advanced methods used in music therapy research. (NT-O)

MU 544 03(3-0-0). Advanced Techniques-Neurologic Music Therapy. S. Prerequisites: BMS 300; MU 241; MU 250.  
Advanced neurologic music therapy techniques used with various clinical populations.

MU 545 03(2-2-0). Composition for Music Therapy Practitioners. S, SS. Prerequisite: None.  
Music composition techniques for the music therapy clinician. (NT-O)

MU 555 03(3-0-0). Choral Techniques, Style, and Interpretation. F. Prerequisite: MU 355.  
Techniques for achieving expressive conducting, problems of tone and diction, musical style and interpretation, and rehearsal techniques.

MU 556 03(3-0-0). Advanced Instrumental Conducting and Techniques. S. Prerequisite: MU 356.  
Score reading and analysis, preparation of instrumental scores for performance; expressive baton techniques, rehearsal methods and procedures.

*MU 564 03(3-0-0). Collaborative Piano Literature. F. Prerequisite: None.  
Literature and historical performance practices of collaborative piano music.

MU 565 02(2-0-0). Piano Literature-1800 to Present. S. Prerequisite: MU 465.  
Keyboard music representing Romantic and Impressionistic periods, nationalism, twelve-tone, and recent developments including aleatory elements.

MU 566 02(2-0-0). Choral Literature-Renaissance and Baroque. F, SS. Prerequisite: MU 355.  
Analytical and comparative survey of choral literature from Renaissance to 1750.

MU 567 02(2-0-0). Choral Literature-1750 to Present. S, SS. Prerequisite: MU 356.  
Analytical and comparative survey of choral literature from 1750 to present.

MU 569 02(1-2-0). Symphonic Literature. F. Prerequisite: MU 469.  
Symphonic development from early classicism through Impressionism; emphasis on formal structure, thematic sources, and social and historical influence.

Alternate year offering (odd); * Alternate year offering (even); + Field trips; S Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCsubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
MU 590A-N Var[1-3]. Workshop. SS.

MU 608 01(0-3-0). Graduate Chamber Music. F, S. Prerequisite: Graduate standing; audition required.
Graduate-level performance literature for small instrumental ensembles: duets, trios, quartets, and quintets.

MU 630 03(3-0-0). Methods of Music Research. F. Prerequisite: MU 317.
Research, documentation, and bibliography for music history, literature, performance, theory, acoustics, music education, and quantitative testing. (NT-O)

MU 647 03(3-0-0). Historical Foundations of Music Therapy. S. Prerequisite: None.
Historical foundations of music therapy in the United States from 1750 to the present. (NT-O)

MU 648 03(3-0-0). Neuroscience/Music Foundations in Therapy. S. Prerequisite: MU 544.
Historical and scientific foundations of neurologic music therapy. (NT-O)

MU 649 03(0-0-3). Advanced Practice in Music Therapy. SS. Prerequisite: Admission to the Graduate School.
Group study of advanced music therapy techniques. (NT-B)

MU 669 02(2-0-0). Instrumental Literature. S. Prerequisite: MU 469.
Solo and small ensemble literature for string, woodwind, and brass instruments.

MU 671 01(0-0-1). Graduate Recital. F, S. Prerequisite: Written consent of instructor.
Demonstration of graduate-level applied musical proficiency through public performance.

MU 672A-V Var[2-3]. Applied Music Instruction. F, S. Prerequisite: MU 472A-V. One or two half-hour lessons per week and one hour weekly performance class.

MU 673 Var[2-3]. Composition Instruction. Prerequisite: MU 473.
One or two half-hour lesson per week.

MU 674 Var[1-3]. Supervised College Teaching.
Supervised assistance in instruction.

MU 686 03(0-6-0). Music Therapy Practicum. F, S. Prerequisite: Six credits of MU 486A.
Clinical practicum for graduate music therapy students. (NT-C)

MU 692 Var[1-3]. Seminar.

MU 695A-H Var[1-3]. Independent Study.

MU 696A-I Var[1-3]. Group Study.

MU 698 Var[1-3]. Research.
°Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
NEUROBIOLOGY COURSES
Nondepartmental, Interdisciplinary
Office of Provost and Executive Vice President

NB 192 01(0-0-1). Introductory Neuroscience Seminar. F, S.
Prerequisite: Written consent of instructor.
Introduction to neuroscience; discussion of concentrations, career
paths and research opportunities. Group activities and strategies for
success.

NB 500 01(0-0-1). Readings in Cellular Neurobiology. F.
Prerequisite: One college-level course in each: biology, biochemistry,
physics, calculus; concurrent registration in NB 501 or BMS 500.
Membrane properties of nerve and muscle; molecular mechanisms of
synaptic function; neuromuscular units.

NB 501 02(2-0-0). Cellular and Molecular Neurophysiology. F.
Prerequisite: One college-level course with laboratory in each:
biology, biochemistry, physics; written consent of instructor.
Credit not allowed for both NB 501 and BMS 500.
Membrane properties of nerve and muscle; molecular mechanisms of
synaptic function; neuromuscular units.

NB 502/CMM 502 02(1-3-0). Techniques in Molecular & Cellular
Biology. F. Prerequisite: One college-level course with laboratory in
each: biology, biochemistry, physics; written consent of instructor.
Credit not allowed for both CM 502 and NB 502.
Current methods in molecular and cellular neurobiology.

NB 503/BMS 503 03(3-0-0). Developmental Neurobiology. S.
Prerequisite: One college-level course in each: biology, biochemistry,
physics, calculus. Credit not allowed for both NB 503 and BMS 503.
Molecular mechanisms involved in development of nervous system
including differentiation, growth, pathfinding, and synaptogenesis.

NB 505/BMS 505 03(3-0-0). Neuronal Circuits, Systems and
Behavior. S. Prerequisite: BMS 325 or BMS 500 or NB 501. Credit not
allowed for both NB 505 and BMS 505.
Anatomical and physiological organization of the nervous system.

NB 586 01(0-2-0). Practicum-Techniques in Neuroscience II. S.
Prerequisite: NB 501; NB 502/CMM 502.
Current research projects in the laboratories of neuroscience faculty.

NB 600/PSY 600D 03(3-0-0). Advanced Psychology-Sensation and
Perception. S. Prerequisite: PSY 456; fifteen credits in psychology.
Credit not allowed for both NB 600 and PSY 600D.
Neural mechanisms of human perception; color and depth perception,
pitch, loudness, and the effects of aging.

NB 650 01(1-0-0). Computer Analysis of Neuronal Proteins. S.
Prerequisite: None.
Theory and practice of using computers to study proteins.

NB 750 02(2-0-0). Physiology of Ion Channels. S. Prerequisite: BMS
500; written consent of instructor.
Physiological and structural analysis of membrane ion channels.

NB 771 01(1-0-0). Writing, Submitting and Reviewing Grants. F.
Prerequisite: None.
Preparation of NRSA fellowship proposals; proposal review; possible
submission to NIH for funding.

NB 793 01(0-0-1). Neuroscience Seminar.

NB 795 Var. Independent Study.

NB 796A-E Var. Group Study.
A) Ion channels. B) Neuronal growth and regeneration. C) Topics in
neurosciences. D) Seizures and epilepsy. E) Neuroendocrine
mechanisms.

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blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and
AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
NATURAL RESOURCES COURSES
Nondepartmental
Warner College of Natural Resources

NR 120A 03(3-0-0). Environmental Conservation. F, S. (GT-SC2, AUCC 3A). Prerequisite: None. Credit not allowed for both NR 120A and NR 120B.
Overview of natural resources environmental concerns including population, pesticides, energy, and pollution. (NT-O)

NR 120B 04(3-3-0). Environmental Conservation. F, S. Prerequisite: Participation in University Honors Program. Credit not allowed for both NR 120B and NR 120B.
Overview of natural resources environmental concerns including population, pesticides, energy, and pollution.

+NR 130 03(3-0-0). Global Environmental Systems. (GT-SC2, AUCC 3A). F, S, SS. Prerequisite: None. Required field trips.
Studies of the earth’s lithosphere, hydrosphere, atmosphere, and biosphere systems, and their interrelations with human dimensions.

NR 150 03(3-0-0). Oceanography. (GT-SC2, AUCC 3A). F, S, SS. Prerequisite: None.
Introduction to the geology, physics, chemistry, and biology of the world ocean; oceanic relationships with various human dimensions.

NR 192 02(0-0-2). First Year Seminar in Environmental Studies. F. Prerequisite: None.
Introduction to the disciplines involved in natural resources through exposure to current issues.

+NR 193 01(0-0-1). FRS First Year Seminar. F, S. Prerequisite: Must be enrolled in one of the following majors: Forestry, Natural Resources Management, or Rangeland Ecology. This is a partial semester course. Required field trips.
A first year seminar for all new Forest and Rangeland Stewardship students, both transfer and freshmen.

+NR 220 05(2-6-0). Natural Resources Ecology and Measurements. SS. Prerequisite: (BZ 110 and BZ 111) or BZ 120 or LIFE 103; MATH 118 or one course from MATH 141 to 161, or one course from MATH 229 or higher.
Ecology of Rocky Mountain ecosystems. Basic measurements and integrated management of natural resources. Pingree Park Campus. (S)

NR 300 03(2-0-1). Biological Diversity. S. Prerequisite: NR 120A or NR 120B or one course in biology.
Biological diversity examined in context of species; extinction. Principles, techniques of conservation biology utilized to understand and resolve issues.

NR 310 03(3-0-0). Ecosystem Services and Human Well-Being. S. Prerequisite: AREC 202 or ECON 202 or ESS 211 or LAND 220/LIFE 220.
Life supporting and life-fulfilling benefits that nature provides to humans; theory, case studies, and policy.

+NR 319 04(2-4-0). Geospatial Applications in Natural Resources. F, S. Prerequisite: Junior standing. Required field trips.
Introduction to global positioning systems (GPS), geographic information systems (GIS) and remote sensing (RS) with natural resource applications.

NR 320 03(3-0-0). Natural Resources History and Policy. (AUCC 3D). F, S. Prerequisite: None.
History, values and institutions, and policy process guiding natural resources management and conservation.

NR 322 04(2-4-0). Introduction to Geographic Information Systems. F. S. Prerequisite: None.
Fundamental concepts of spatial data handling and computer-assisted map analysis.

NR 323/GR 323 03(2-2-0). Remote Sensing and Image Interpretation. F. Prerequisite: None. Credit allowed for only one of the following: NR323, GR 323, NR 503, GR 503.
Remote sensing systems and applications; characteristics of photographic, scanner and radar images; imagery interpretation.

NR 326 03(3-0-0). Forest Vegetation Management. F. Prerequisite: NR 220. Credit not allowed for both NR 326 and F 325.
Ecologically-based management to restore and manage forests.

NR 330 03(3-0-0). Human Dimensions in Natural Resources. F. Prerequisite: NR 120A or NR 120B.
Social, political, cultural, and economic considerations in natural resource management.

NR 353/BZ 353 03(3-0-0). Global Change Ecology, Impacts and Mitigation. S. Prerequisite: LAND 220/LIFE 220 or LIFE 320. Credit not allowed for both BZ 353 and NR 353.
Ecological impacts of human-induced global change, and the strategies that can/are being used to adapt to and mitigate these impacts.

NR 355 03. Contemporary Environmental Issues. F, S, SS. Prerequisite: One course in biology. Offered as telecourse only.
Fundamental concepts of energy, population, and ecology applied to range of contemporary environmental issues. (NT-T)

NR 365 03(3-0-0). Environmental Education. F. Prerequisite: None.
Principles of interpretation related to natural resource management and public informal education.

NR 367 03(3-0-0). Concepts in Vertebrate Nutrition. S. Prerequisite: CHEM 245.
Concepts in suborganismal and organismal vertebrate nutrition; introduction to nutritional ecology.

NR 370 03(3-0-0). Coastal Environmental Ecology. F, S. Prerequisite: CHEM 107 or CHEM 113.
Sensitive and complex coastal area environments and the effects of accelerated change on and offshore caused by human activities.

NR 375 01(1-0-0). Environment and Natural Resources Leadership. S. Prerequisite: None.
Environmental and natural resources leadership history, skills, and styles. Creation of leadership path and organization prescriptions.

NR 382A-B 05(5-0-0). Social-Ecological Field Methods. SS. Prerequisite: None.

+NR 383/AGRI 383 02(0-2-1). U.S. Travel-Integrated Resource Management. S. Prerequisite: None. Credit not allowed for both NR 383 and AGRI 383. Required field trips.
Evaluation of integrated ranch management decision alternatives in conjunction with professional resource managers.

NR 387 01(1-0-0). Internship I.
Preparation for field experience in natural resources management.

NR 400 03(2-0-1). Public Relations in Natural Resources. F, S, SS. Prerequisite: NR 320.
Effective public relations and public information programs applicable to natural resource professions.

NR 401 02(0-4-0). Techniques in Public Relations. F, S. Prerequisite: SPCM 200.
Effective communications methods related to natural resource professions; preparation of graphics, organization of programs using slide show format.

* Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
+NR 420 04(3-0-0). Integrated Ecosystem Management. F. S. Prerequisite: LAND 220/LIFE 220 or LIFE 320; NR 220; NR 319; NR 320; senior standing. Required field trips.

Natural resource management exercises; quantitative integration techniques, group dynamics. (S)

NR 421 03(3-0-0). Natural Resources Sampling. S. Prerequisite: NR 220; STAT 201 or STAT 301.

Designs, techniques, problems in sampling natural resource populations; analysis, interpretation of data.

NR 422 04(2-4-0). GIS Applications in Natural Resource Management. S. Prerequisite: NR 319 or NR 322.

Development and implementation of GIS projects and problems in spatial data analysis.

NR 423 01(5-1-0). Applications of Global Positioning Systems. F, S. Prerequisite: NR 322 or NR 505

Introduction to concepts and use of global positioning systems with applications to natural resources.

NR 425 03(3-0-0). Natural Resource Policy and Sustainability. S. Prerequisite: F 325; NR 320.

Principles, concepts, and operating examples of sustainable resource management with a concentration on forest policies and practices.

NR 432 01. Foundations of National Forest Lands Program. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course.

History of U.S. public land law and evolution of National Forests. Nature, policy, trend, and needs of lands program; its integration into management. (NT-C)

NR 433 04. Special Uses Management. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course only.

Authorities, application, and administration; agriculture, aviation, community, public information, industrial, water, treasure trove, and cultural uses. (NT-C)

NR 434 03. Linear Uses and FERC Licenses. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course only.

Rights-of-way authorities and management; road and trail grants and easements; communication uses; Federal Energy Regulatory Commission licenses. (NT-C)

NR 435 05. Valuation and Landownership Adjustment. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course only.

Authorities, coordination, valuation, title; land purchase, donation, exchange, interchange, transfers, sales, condemnation, and negotiation. (NT-C)

NR 436 03. Right-of-Way Acquisition. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course only.

Need, authority, policy, planning, acquiring, negotiating, and managing rights-of-way; cost-share agreements. (NT-C)

NR 437 03. Boundaries, Status, Claims, and Withdrawals. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course only.

Administration of landownership status, title encumbrances, withdrawals, title claims, Native American rights and claims, property boundary management. (NT-C)

+NR 440 03(2-0-1). Applications in Conservation Planning. F. Prerequisite: NRRT 340. Required field trips.

Conservation planning method applications that integrate natural resources by conservation organizations and government agencies. (NT-O)

NR 444 03(3-0-0). Fire Economics and Policy. S. Prerequisite: AREC 202 or ECON 202.

Development of wildlife and fuel management economics integrated with critical federal policies.

+NR 460 03(3-0-0). Wilderness Management. S. Prerequisite: LAND 220/LIFE 220; NRRT 231. Required field trips.

Management of wilderness in the U.S. National Wilderness Preservation System and equivalent international wildlands.

+NR 479 02(0-2-1), Restoration Case Studies. F. Prerequisite: LAND 220/LIFE 220 or LIFE 320; NR326 or F 311 or RS 300; written consent of instructor. Required field trips one week prior to first day of semester.

Analysis of ecological restoration projects. (S)

NR 484 Var[1-5]. Supervised College Teaching. Prerequisite: Written consent of instructor. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.


NR 493 01(0-0-1). Seminar on GIS and Remote Sensing Applications. S. Prerequisite: NR 322 or NR 323/GR 323.

Techniques, use of remote sensing, GIS technologies for forest, range, wildlife, water, geology, recreation, and other resource management applications.

NR 495 Var. Independent Study.

NR 501 03(0-0-3). Leadership and Public Communications. F, S, SS. Prerequisite: Introductory course to natural resource management fields, communication course (speech, writing, journalism). Offered as correspondence course only.

Two-way communication skills used to involve publics, write for various media, and understand role of leadership within natural resources profession. (NT-C/O)

NR 503/GR 503 04(3-3-0). Remote Sensing and Image Analysis. F. Prerequisite: None. Credit allowed for only one of the following: NR503, GR 503, NR 323, GR 323.

Interpretation and analysis of photographic, multispectral scanner, and radar data; sensor systems; applications to resource management.

NR 504 04(2-6-0). Computer Analysis of Remote Sensing Data. S. Prerequisite: GR 323/NR 323 or GR 503/NR 503.

Computer-aided analysis techniques for extracting resource information from aerial and satellite remote sensing data.

NR 505 04(2-4-0). Concepts in GIS. F. Prerequisite: STAT 301 or STAT 511.

Concepts of geographic information systems and spatial data analysis.

NR 506 04(2-4-0). GIS Methods for Resource Management. S. Prerequisite: NR 505.

Current methods in applied geographic information systems and spatial data analysis.

NR 510 03(3-0-0). Ecosystem Services: Theory and Practice. S. Prerequisite: AREC 540/ECON 540 or AREC 541/ECON 541 or ECOL 505 or FW 555.

Theory and application of ecosystem services drawing upon ecological, economic, and institutional analysis.

NR 512 03(3-0-0). Spatial Statistical Modeling—Natural Resources. F. Prerequisite: NR 322; NR 323/GR 323; STAT 301.

Statistical techniques used to model natural and environmental resources; GIS, remote sensing and spatial statistics.

° Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCsubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
NR 515 03(0-0-3). Natural Resources Policy and Biodiversity. F, S. SS. Prerequisite: Political science, introductory course to natural resources management fields. Offered as correspondence course only. Review evolution of natural resource policy, administration, and law emphasizing interdisciplinary concept of managing for biodiversity. (NT-C/O)

NR 520 03(3-0-0). Applied Optimization in Resource Management. S. Prerequisite: One course in each of the following subjects: calculus and economics.

Design optimization models to integrate economics, ecology, ecology and social concerns in natural resource management.

°NR 521 02(2-0-0). Natural Resource Administration. F. Prerequisite: NR 320.

Administration of forest and natural resource projects in developed and developing countries.

NR 522 03(0-6-0). Wilderness Ecosystem Planning. S. Prerequisite: Written consent of instructor.

Expertise developed in preparing effective implementation plans for park and wilderness ecosystems.

NR 523/STAT 523 03(3-0-0). Quantitative Spatial Analysis. S. Prerequisite: STAT 301 or STAT 307. Credit not allowed for both NR 523 and STAT 523.

Techniques in spatial analysis: point pattern analysis, spatial autocorrelation, trend surface and spectral analysis.

NR 525 03(3-0-0). World Natural Resources. S. Prerequisite: Written consent of instructor.

Interdisciplinary approach to overview global problems and solutions in natural resources.

NR 526 04(4-0-0). Techniques for Ecosystem Management. S. Prerequisite: Enrollment in Continuing Education in Ecosystem Management (CEEM) program. Offered only through the Division of Continuing Education.

Assessing the biophysical and sociopolitical environment and decision-making techniques used in ecosystem management. (NT)

NR 527 03(2-0-1). Methods-Human Dimensions of Natural Resources. SS. Prerequisite: B.S. degree; participant in Advancing Human Dimensions Expertise Among Fish and Wildlife Agencies training program.

Human dimensions research in areas of problem identification, research process, survey methods, sampling, validity and reliability.

NR 528 03(2-2-0). Analysis: Human Dimensions–Natural Resources. SS. Prerequisite: B.S. degree; participant in Advancing Human Dimensions Expertise Among Fish and Wildlife Agencies training program; STAT 301 or STAT 307/ERHS 307 or STAT 311 or STAT 315.

Human dimensions analysis techniques: codebook development and data entry, univariate statistics, and bivariate/multivariate statistics.

NR 529 02(2-0-0). Concepts: Human Dimensions-Natural Resources. SS. Prerequisite: B.S. degree; participant in Advancing Human Dimensions Expertise Among Fish and Wildlife Agencies training program.

Concepts guiding human dimensions research: motivations/satisfactions, attitudes, values, attitude/behavior change and norms.

NR 530 01(1-0-0). Human Dimensions-Application. SS. Prerequisite: B.S. degree; participant in Advancing Human Dimensions Expertise Among Fish and Wildlife Agencies training program.

Application of human dimensions information; incorporate information into decision-making process.

° Alternate year offering (odd); † Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCsubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)

NR 531 01(1-0-0). Public Participation. SS. Prerequisite: B.S. degree; participant in Advancing Human Dimensions Expertise Among Fish and Wildlife Agencies training program.

Diagnostic tools for public involvement; appropriate methods for specific situations, issues, and stakeholders.

NR 535 03(0-0-3). Action for Sustainable Behavior. F, S, SS. Prerequisite: Graduate student or senior standing; one course in human dimensions; one course in science. Offered as a correspondence course only.

Review sustainability issues and develop solutions considering environments; economics; psychology; sociology; law and politics; and administration. (NT-C/O)


A) Water Resources 02(1-2-0). B) Biological Diversity 02(1-2-0).

C) Ecologic Reconciliation 02(1-2-0). D) Ecosystem Services 02(2-0-0).

NR 541 02(2-0-0). Conservation Policy, Finance, and Governance. F. Prerequisite: Admission to the Conservation Leadership program.

Overview of conservation policy, finance, and governance issues at the local, national, and international levels.

NR 542 02(2-0-0). Global Change and Conservation. F. Prerequisite: Admission to the Conservation Leadership program.

Potential ecological, societal, and economic impacts of global change across scales in the context of conservation.

NR 543A 02(2-0-0). Catalyzing Change: Conflict and Conservation. F. Prerequisite: Admission to the Conservation Leadership program.

Collaborative communication theories, methods, and tools to effectively create change in the field of conservation.


Collaborative communication theories, methods, and tools to effectively create change in the field of conservation.

NR 544A-E. Conservation Methods. S. Prerequisite: Admission to the Conservation Leadership program.

A) Watershed sciences 01(1-0-0). B) Ecological sciences 01(1-0-0).

C) Social sciences 01(1-0-0). D) Spatial information 01(1-0-0).

E) Integrative field work Var[2-4].

NR 545A-B 02(2-0-0). Multilevel Views: Society/Conservation. S. Prerequisite: Admission to the Conservation Leadership program.

Myriad and often opposing views of societal and environmental problems across cultures and across scales. A) Mexico 02(2-0-0). B) Global 03(3-0-0).

NR 546A-B. Socioecological Context. F, SS. Prerequisite: Admission to the Conservation Leadership program.

Background for field site-specific conservation: ecosystems, peoples, politics, and development. (NT-O)

A) Mexico 02(2-0-0). B) Global 03(3-0-0).

NR 547 02(2-0-0). Poverty and Sustainable Development. SS. Prerequisite: Admission to the Conservation Leadership program.

Theoretical and methodological tools to analyze the interactions between poverty and sustainable development in the field site country.

NR 548A-B. Conservation Planning Management. F, SS. Prerequisite: Admission to the Conservation Leadership program.

Fundamental theories and management practices of protected areas in a global context.

A) Mexico 02(2-0-0). B) Global 03(3-0-0). Subtopic B only: (NT-O).
NR 549A Var[1-3]. Conservation/Systems Leadership. S, SS. Prerequisite: Admission to the Conservation Leadership program. Conservation leadership development by exposure to leadership models, theories, case studies, assessments and trainings.

NR 549B Var[1-3]. Conservation/Systems Leadership: Field. SS. Prerequisite: Admission to the Conservation Leadership program. Effective environmental leadership across cultures through exposure to leadership models, theories, case studies, assessments and trainings.

NR 550 03(3-0-0). Sustainable Military Lands Management. F, S, SS. Prerequisite: Completed undergraduate degree. Overview of military lands in the U.S.—historical, geographical, environmental—and evolution of military lands as part of the federal lands system. (NT-O)

NR 551 03(3-0-0). Cultural Resource Mgmt on Military Lands. F, S, SS. Prerequisite: Completed undergraduate degree; NR 550. Intro to cultural resource laws and policies for broad range of heritage resources, prehistoric and historic, with emphasis on tools and techniques. (NT-O)

NR 552 03(3-0-0). Ecology of Military Lands. F, S, SS. Prerequisite: Completed undergraduate degree; NR 550. Landscape ecology of military lands with emphasis on ecological processes and principles as related to militarily-induced disturbances. (NT-O)

NR 554/ANTH 554 03(2-2-0). Ecological and Social Agent-based Modeling. S. Prerequisite: Junior or senior standing. For upper level undergraduates. Credit not allowed for both NR 554 and ANTH 554.

NR 555 02(2-0-0). Preparation of Grant Proposals. S. Prerequisite: STAT 301; one course in ecology. Idea development, preparation, writing, and presentation of research proposals in natural resources.

NR 561 02(2-2-0). Habitat Evaluation Procedures. F, S, SS. Prerequisite: General biological, natural resources, or planning course work. Rationale, philosophy, and use of habitat as a mechanism for conducting environmental impact assessments.

NR 562 03(3-0-0). Ecosystem Services in a Changing World. F. Prerequisite: Admission to the Conservation Leadership program. Understanding of ecosystem services and global change.

NR 563 04(4-0-0). Research Methods in Conservation—Global. F. Prerequisite: Enrollment in the Conservation Leadership program. Reviews the contribution of fieldwork/research in addressing conservation issues, social and ecological data collection, and analysis methods. (NT-O)

NR 565 03(3-0-0). Principles of Natural Resources Ecology. F, S. Prerequisite: Admission to the Masters of Natural Resources Stewardship degree program or written consent of instructor. Offered only online. Overview of ecological fundamentals examined from the perspective of forest, rangeland, wildlife and fisheries science and management. (NT-O)

NR 566 03(3-0-0). Natural Resource Inventory and Data Analysis. S. Prerequisite: Admission to the Master of Natural Resources Stewardship degree program or written consent of instructor. Offered only online. Sampling designs, implementation and analysis for inventory and monitoring of forests, rangelands, wetlands and streams. (NT-O)

NR 567 03(3-0-0). Analysis of Environmental Impact. F. Prerequisite: Admission to the Master of Natural Resources Stewardship degree program or written consent of instructor. Credit not allowed for both NR 567 and NR 622. Preparation and evaluation of environmental impact statements under NEPA. (NT-O)

NR 568 03(3-0-0). Economics of Forests, Restoration and Fire. S. Prerequisite: Admission to the Masters of Natural Resources Stewardship degree program or written consent of instructor. Offered only online. Overview of basic microeconomics principles as applied to forestry, restoration, and wildland fire management. (NT-O)

NR 578 03(3-0-0). Ecology of Disturbed Lands. S. Prerequisite: LAND 220/LIFE 220; SOCR 240. Credit not allowed for both RS 578 and NR 578. Analysis of basic and applied ecological principles involved in the restoration of drastically disturbed lands.

NR 592 Var. Seminar in Natural Resources.

NR 600 02(1-0-1). Advanced Public Relations in Natural Resources. S. Prerequisite: NR 400. Public relations aspects of current natural resource management programs; case history approach.

NR 621 03(1-4-0). Design of Geographic Information Systems. F. Prerequisite: CS 110; LAND 520 or NR 322.

NR 625 03(0-0-3). Community-Based Natural Resource Management. S. Prerequisite: One upper division course in natural resource ecology, management, or social science. History, theory, practice, and evaluation of community-based natural resource management.

NR 676 04(3-2-0). Ecological Models. S. Prerequisite: NR 575. Model development for ecosystems, subsystems, deterministic, stochastic models; validation, sensitivity analysis.

NR 678 04(3-0-1). Advanced Ecological Restoration. S. Prerequisite: BZ 450 or F 311 or LAND 220/LIFE 220; SOCR 240. Credit not allowed for both RS 478 and NR 678. Analysis of environmental factors influencing restoration of disturbed lands and practices for successful restoration of disturbed ecosystems.

NR 684 Var[1-5]. Supervised College Teaching. Prerequisite: Written consent of instructor.

NR 687 Var[1-8]. Natural Resources Internship. Prerequisite: Written consent of instructor. Field experience and exercises in international natural resources management.

NR 693 Var[1-2]. Natural Resources Stewardship Seminar. F. Prerequisite: Admission to the Master of Natural Resources Stewardship degree program or written consent of instructor. Invited speakers will present different perspectives on natural resources. (NT-O)

NR 793 01(0-0-1). Seminar on Remote Sensing and GIS. Prerequisite: NR 322 or NR 323/GR 323 or NR 503/GR 503 or NR 505. Techniques, use of remote sensing, GIS technologies for forest, range, wildlife, water, geology, recreation, and other resource management applications.

° Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCSubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
NRRT 100 03(3-0-0). Foundations of Recreation and Tourism. F. Prerequisite: None.
Current concepts, terminology, suppliers, and the social, economic, and personal benefits from recreation, leisure, and tourism.

NRRT 231 03(3-0-0). Principles-Parks/Protected Area Management. F. Prerequisite: None.
Tools and strategies used by managers in parks and protected areas.

NRRT 262 03(3-0-0). Principals of Environmental Communications. S. Prerequisite: None.
Principals of environmental communication, education, and interpretation for managing natural and cultural resources.

NRRT 270 03(3-0-0). Principles of Natural Resource Tourism. F, SS. Prerequisite: None.
Tourism and private commercial outdoor recreation industry in America. (NT-O)

NRRT 301 03(3-0-0). Conservation Leadership. F. Prerequisite: NRRT 262; NRRT 231.
Approaches to conservation leadership.

NRRT 320 03(3-0-0). International Issues-Recreation and Tourism. F, S. Prerequisite: None.
History, development, and preservation of international parks, preserves, tourist and historical sites. (NT-O)

NRRT 321 03(1-3-1). Travel Abroad-Marine Ecotourism-Bahamas. SS. Prerequisite: Minimum GPA of 2.500; ability to swim; passport; three credit natural science course.
Environmental and socio-cultural aspects of marine ecotourism in the Bahamas.

NRRT 330 03(3-0-0). Social Aspects of Natural Resource Management. F, S. Prerequisite: None.
Conceptual frameworks of human dimension research and its application to resource management decisions.

NRRT 331 03(2-3-0). Management of Parks and Protected Areas. S. Prerequisite: NRRT 231; NRRT 330.
Comprehensive assessment of problems confronted by park professionals and the techniques and tools applied to their solution. ($) +NRRT 340 03(3-0-0). Principles in Conservation Planning and Mgmt. F. Prerequisite: NRRT 231. Required field trips.
Social, economic, legal, and ecological concepts that shape planning and management frameworks within conservation.

NRRT 350 03(2-2-0). Wilderness Leadership. F. Prerequisite: None.
Practical and philosophical aspects of wilderness usage including safety, group dynamics, and backcountry skills. ($) +NRRT 351 03(2-2-0). Wilderness Instructors. S. Prerequisite: None.
Preparation to safely lead and instruct groups in outdoor wilderness programs; further refine skills including judgment and leadership. ($) +NRRT 360 03(3-0-0). Group Decision Making. F. Prerequisite: NRRT 262.
Theoretical, critical, and practical approaches to group decision making, collaboration, and teamwork related to natural resource management.

NRRT 361 03(3-0-0). Natural Resources and the Media. S. Prerequisite: NRRT 262.
Representations of the environment in the media and strategies for effective media relations about natural resource issues.

NRRT 362 03(3-0-0). Environmental Conflict Management. F. Prerequisite: NRRT 262.
Theoretical, critical, and practical approaches to negotiation, mediation, and conflict management strategies related to natural resources.

NRRT 363 03(2-2-0). Outdoor Recreation Programming. F, S. Prerequisite: NRRT 231 or NRRT 270.
Develop administrative and program planning skills for private, public, and nonprofit recreation/tourism organizations.

NRRT 370 03(3-0-0). Managing Tourism in the E-Commerce Era. F, S. Prerequisite: NRRT 270.
E-commerce foundations, business models, and practices in the recreation and travel industry.

NRRT 371 03(2-1-0). Techniques in Interpretation. F. Prerequisite: NRRT 262.
Intermediate techniques in interpretation including exhibit design and construction, personal program development and visitor studies.

NRRT 372 03(3-0-0). Tourism Promotion. F. S. Prerequisite: NRRT 270.
Planning development and implementation of marketing programs specifically applied to the recreation, travel, and tourism industries.

NRRT 375 03(2-2-0). Budgeting and Revenue Resources. F. Prerequisite: NRRT 231 or NRRT 270.
Budget development, presentation, types, techniques; computer-aided budgeting using spread sheets; revenue generating sources.

NRRT 376 03(2-2-0). Human Dimensions Research and Analysis. F. S. Prerequisite: STAT 201.
Application of human dimensions (recreation) research and analysis techniques to natural resource issues.

NRRT 384 Var. Supervised College Teaching. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

NRRT 400 03(3-0-0). Environmental Governance. F. Prerequisite: NRRT 231.
Theory and practice of prevalent environmental governance approaches in diverse social and environmental contexts. +NRRT 401 03(3-0-0). Collaborative Conservation. F Prerequisite: NRRT 231 or NRRT 262. Required field trips.
Guiding principles and practices for effectively engaging stakeholders in conservation issues and management. ($) +NRRT 431 03(3-0-0). Protected Areas, Working Lands, Livelihoods. S. Prerequisite: LAND 220/LIFE 220; NRRT 231. Required field trips.
Management practices of protected areas and working lands that work at the interface of ecological, human, and economic dimensions. ($) +NRRT 432 01. Foundations of Forest Recreation. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course only. History, philosophy, role, and sources of information of the Forest Service and National Forest System. (NT-C)

NRRT 433 04. Meeting Needs of Recreation Users. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course only. Visitor behavior, communications and conflicts, working with volunteers, programs, partnerships, quality service, and role of interpretive services. (NT-C)

° Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
NRRT 434 03. Recreation Special Uses and Appeals. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course only.

Special use benefits, authorities, planning, terms and conditions, administration and kinds, appeal review, discretionary review and decisions. (NT-C)

NRRT 435 03. Trails, Facility Design, Operation, Maintenance. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course only.

Trail planning, development, maintenance; recreation site planning, design operation, maintenance; visitor and resource protection. (NT-C)

NRRT 436 02. Recreation, Visual, Cultural Resource Management. F, S. SS. Prerequisite: Written consent of instructor. Offered as correspondence course only.

Economic analysis, recreation opportunity spectrum, visual and cultural resource management. (NT-C)

NRRT 437 02. Off-Road Vehicle, River, and Winter Recreation. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course only.

History, authorities, planning, management, and coordination of off-road, river, and winter recreation. (NT-C)

NRRT 438 02. Management of Wilderness. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course only.

Forest Service role, management principles, legislative differences, components, public education, visitor management, and wilderness management skills. (NT-C)

NRRT 439 03(3-0-0). Open Space and Natural Area Management. S. Prerequisite: NR 440 or NRRT 331.

Acquisition of, planning for, and management of local government and private open space and natural areas.

NRRT 440 03(3-0-0). Applications in Environmental Communication. S. Prerequisite: NRRT 262.

Application of tools and techniques for communicating to audiences about issues related to conservation, environment and sustainability.

NRRT 441 03(2-2-0). Spatial Analysis of Protected Areas. S. Prerequisite: NRRT 231.

Spatial analytical techniques used in planning and managing protected areas, including locating, managing, and assessing parks.

NRRT 442 03(3-0-0). Tourism Planning. F, S. Prerequisite: NRRT 270.

Planning for regional tourism resources and programs.

NRRT 450 03. Wilderness Philosophy and Ethic Development. F, S, SS. Offered as correspondence course only.

History, philosophical origin, ethics, and international context of wilderness; history of conservation movement. (NT-C)

NRRT 451 03. National Wilderness Preservation System. F, S, SS. Prerequisite: NRRT 450. Offered as correspondence course only.

Early history and key components of the Wilderness Act, wilderness legislation since 1964, and related natural systems. (NT-C)

NRRT 452 04. Management of the Wilderness Resource. F, S, SS. Prerequisite: NRRT 451. Offered as correspondence course only.

Ecosystem characteristics, basic principles of wilderness management, and management of specific resources and nonconforming uses. (NT-C)

NRRT 453 03. Management of Recreation Resources. F, S, SS. Prerequisite: NRRT 451. Offered as correspondence course only.

Managing for quality visitor experiences and for minimal recreation impacts; techniques for wilderness education/information. (NT-C)

NRRT 454 03. Wilderness Management Planning. F, S, SS. Prerequisite: NRRT 451. Offered as correspondence course only.

Agency differences in planning, basic planning concepts, and the Limits of Acceptable Change. (NT-C)

NRRT 455 03. Wilderness Management Skills and Projections. F, S, SS. Prerequisite: NRRT 451. Offered as correspondence course only.

Using primitive means to achieve management objectives, no-trace camping methods and volunteers, and expectations for the future. (NT-C)

NRRT 457 03. Off-Highway Vehicle Recreation in America. F, S, SS. Offered as correspondence course only.

Overviews the supply and demand of off-highway vehicle recreation. (NT-C)

NRRT 458 03. Planning for Off-Highway Vehicle Recreation. F, S, SS. Prerequisite: NRRT 457. Offered as correspondence course only.

Developing working knowledge of the planning tools, techniques, and challenges with off-highway vehicle recreation. (NT-C)

NRRT 459 03. Managing Off-Highway Vehicle Recreation. F, S, SS. Prerequisite: NRRT 457. Offered as correspondence course only.

Developing working knowledge of the management tools, techniques, and challenges with off-highway vehicle recreation. (NT-C)

NRRT 460/RRM 460 03(3-0-0). Event and Conference Planning. S. Prerequisite: NRRT 270 or RRM 101. Credit not allowed for both NRRT 460 and RRM 460.

Foundation in planning, organizing, and producing special events and conferences. Functions and strategies necessary for effective event management.

NRRT 462 03(3-0-0). Environmental Communication—Natural Resources. S. Prerequisite: NRRT 262.

Exploration and application of theories, concepts, and techniques for successful environmental communication in natural resources.

NRRT 463 03(3-0-0). Non-Profit Administration in Conservation. S. Prerequisite: NRRT 231; NRRT 262.

Role of NGOs in protected-area management and conservation education; models for development, including grant writing, in conservation.

NRRT 470 03(3-0-0). Tourism Impacts. F, S. Prerequisite: NRRT 270.

Social, cultural, physical, and economic impacts of tourism; techniques for assessing impacts.

NRRT 471 03(3-0-0). Starting and Managing Tourism Enterprise. F, S. Prerequisite: NRRT 231 or NRRT 262 or NRRT 270.

Aspects of starting and managing a tourism enterprise.

NRRT 473 03(3-0-0). Ski Area Management. F, S. Prerequisite: NRRT 270; senior standing.

Ski area management; history and trends, ski area operations, human resource management, environmental issues, liability, resort planning and design. ($)

NRRT 483 Var. Off-Campus Study.

NRRT 487 Var. Internship.

NRRT 495A-C Var. Independent Study.


NRRT 496 Var. Group Study.

NRRT 499 Var. Senior Thesis.

Independent research project culminating in thesis presented to faculty mentor.

NRRT 504 02(2-0-0). Water-Based Recreation. S. Prerequisite: Written consent of instructor.

Identify issues and management strategies for recreation utilization of water resources.

° Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
NRRT 508 03(3-0-0). Current Issues in Environmental Education. F, S, SS. Prerequisite: One upper-division course in natural resources, biological sciences, or ecology.

Impact of current events, legislation, demographic changes, and other events on informal environmental education. (NT-C)

NRRT 509 03(3-0-0). Science Education in Informal Settings. S. SS. Prerequisite: Upper division course in natural resources or related field.

NOTE: This course does not count towards State teacher licensure. (NT-C)

NRRT 512 03(3-0-0). Ecotourism. S. Prerequisite: NRRT 470.

Concept of ecotourism, impacts associated with ecotourism, and role of education/interpretation in mitigating these impacts. (NT-C)

NRRT 565 03(3-0-0). Research-Human Dimensions Natural Resources. F. Prerequisite: None.

Theory, research, literature review, hypothesis development, scientific writing, proposal development. (NT-O)

NRRT 600 02(0-0-2). Tourism Industry Concepts and Practices. F. Prerequisite: Graduate standing. Offered only as an online course. This is a partial semester course.

Primary conceptual issues of contemporary tourism important to comprehend the practice of tourism. (NT-O)

NRRT 601 02(0-0-2). Tourism Quantitative Analysis I. S. Prerequisite: STAT 312; graduate student standing. Offered only as an online course. This is a partial semester course.

Statistical techniques used by researchers to inform and support tourism decision-making. (NT-O)

NRRT 602 02(0-0-2). Tourism Quantitative Analysis II. S. Prerequisite: Graduate student standing. Offered only as an online course. This is a partial semester course.

Explores the domestic and international sources of data and their applications for decision-making in tourism. (NT-O)

NRRT 605 03(3-0-0). Human Dimensions of Natural Resources Theory. S. Prerequisite: None.

Application of theories and conceptual approaches from social sciences to study of recreation behavior and natural resource issues. (NT-O)

NRRT 610 02(0-0-2). Natural Resource Management and Tourism. F. Prerequisite: Graduate student standing. Offered only as an online course. This is a partial semester course.

Connection between the management of tourism resources and the changing conditions of the natural world. (NT-O)

NRRT 615 02(0-0-2). Sustainable Tourism Development Foundations. F. Prerequisite: Graduate student standing. Offered only as an online course. This is a partial semester course.

Theory, practice, history, terminology and issues surrounding sustainable tourism development. (NT-O)

NRRT 625 02(0-0-2). Communication/Conflict Management in Tourism. S. Prerequisite: Graduate student standing. Offered only as an online course. This is a partial semester course.

Negotiation tools for effective organizational communication/conflict management in tourism. (NT-O)

NRRT 655 02(0-0-2). Tourism Marketing Concepts and Applications. F. Prerequisite: Graduate student standing. Offered only as an online course. This is a partial semester course.

Marketing processes as they apply to travel and tourism. (NT-O)

NRRT 662 02(0-0-2). Global Tourism Policy. S. Prerequisite: Graduate student standing. Offered only as an online course. This is a partial semester course.

Major global policies, trends, and challenges facing the travel and tourism industry. (NT-O)

NRRT 665 03(2-2-0). Survey Research and Analysis. S. Prerequisite: NRRT 565; STAT 301.

Survey research, design, and analysis in human dimensions of natural resources. (NT-O)

NRRT 666 03(3-0-0). Qualitative Research in NRRT. Prerequisite: NRRT 565.

Qualitative approaches to tourism research and techniques from a range of disciplinary backgrounds; methodological aspects. (NT-O)

NRRT 671 02(0-0-2). Strategic Management for Travel and Tourism. S. Prerequisite: Graduate standing. Offered only as an online course. This is a partial semester course.

Factors, tools, and techniques for strategic management of a travel and tourism business or organization. (NT-O)

NRRT 679A-B 01(0-0-1). Current Topics in Nature-Based Tourism. F, S. Prerequisite: Graduate standing. Students will enroll in this course during both the Fall and Spring semesters.

Current topics in nature-based travel and tourism. A) Fall. B) Spring.

NRRT 695A-D Var. Independent Study.


NRRT 698 Var. Research.


NRRT 765 03(2-2-0). Applied Multivariate Analysis. F. Prerequisite: NRRT 665.

Application and interpretation of multivariate statistics to human dimensions in natural resources, recreation, and tourism. (NT-O)

NRRT 784 Var. Supervised College Teaching.

NRRT 798 Var. Research.

NATURAL SCIENCES COURSES
Nondepartmental
College of Natural Sciences

NSCI 192 02(0-0-2). Introductory Seminar. F. Prerequisite: None.
Introduction to the culture and values of science and the College of Natural Sciences.

NSCI 295 Var[1-3]. Independent Study-Natural Sciences. Prerequisite: Written consent of Natural Sciences Dean’s Office.

NSCI 296 Var[1-3]. Group Study-Natural Sciences. Prerequisite: Written consent of Natural Sciences Dean’s Office.

NSCI 298 Var[1-3]. Undergraduate Research-Natural Sciences. Prerequisite: Written consent of Natural Sciences Dean’s Office.

NSCI 384 Var[1-3]. Supervised College Teaching. F, S. Prerequisite: Written consent of instructor. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.
Supervised experience in computer lab.

NSCI 487 Var[1-3]. Internship-Natural Sciences. Prerequisite: Written consent of Natural Sciences Dean’s Office.

NSCI 495 Var[1-3]. Independent Study-Natural Sciences. Prerequisite: Written consent of Natural Sciences Dean’s Office.

NSCI 496 Var[1-3]. Group Study-Natural Sciences. Prerequisite: Written consent of Natural Sciences Dean’s Office.

NSCI 498 Var[1-3]. Undergraduate Research-Natural Sciences. Prerequisite: Written consent of Natural Sciences Dean’s Office.

NSCI 579/VS 579 03(3-0-0). Animal Behavior in Captive Populations. F, S. Prerequisite: Enrollment in the M.P.N.S., Zoo, Aquarium and Shelter Management specialization, or BZ 300. Credit not allowed for both NSCI 579 and VS 579.
How animals learn, perceive their world, and behave, and how all of these intersect to alter behavior in captive settings.

NSCI 590A-G. Workshop in Instruction.
A) Science instruction in rural Colorado. Var[1-3]. Concurrent registration not allowed in NSCI 590A-B and EDUC 591B.
B) Mathematics instruction in rural Colorado. Var[1-3]. Concurrent registration not allowed in NSCI 590A-B and EDUC 591B.
C) Small-scale science-teachers as researchers. 04(2-4-0).
D) Colorado science teacher enhancement project. 07(7-0-0).
E) Summer mathematics. 03(3-0-0).
G) Small-scale chemistry. 02(1-2-0).

NSCI 596 Var[1-3]. Small-Scale Science Group Study.

NSCI 601/PHIL 601 01(0-0-1). Master of Profess. Natural Sciences Ethics. F. Prerequisite: Enrollment in the Master of Professional Natural Sciences program. Credit not allowed for both NSCI 601 and PHIL 601.
This is a partial-semester course.
Ethical issues involving the care and treatment of animals in captive environments. Lectures, case studies, discussions, and student presentations.

NSCI 610 03(2-2-0). Team Research in Quantitative Ecology. S. Prerequisite: Written consent of instructor.
Interdisciplinary team-based research aimed at studying real life models in quantitative ecology using mathematical and statistical tools.

NSCI 619 03(1-3-1). Physics for Science Educators. F, S, SS. Prerequisite: Admission into the MNS program.
Materials and energy transduction for grade 6-12 science teachers, with emphasis on optics, acoustics, and electromagnetism. (NT-O)

NSCI 620 03(1-3-1). Chemistry for Science Educators. F, S, SS. Prerequisite: Admission into the MNS program.
Theoretical and experimental chemistry for grade 6-12 science teachers, with emphasis on water chemistry. (NT-O)

NSCI 630 03(1-3-1). Spectroscopy for Science Educators. F, S, SS. Prerequisite: Admission into the MNS program.
Theory and applications of spectroscopy for grade 6-12 science teachers. (NT-O)

NSCI 640 03(1-3-1). Energetics for Science Educators. F, S, SS. Prerequisite: Admission into the MNS program.
Production and use of energy for grade 6-12 science teachers, with emphasis on chemical and biological systems. (NT-O)

NSCI 650 03(1-3-1). Pollution and Environmental Biology for Educators. F, S. Prerequisite: Admission to the MNS program. (NT-O)

NSCI 660 03(0-0-3). Evolutionary Biology for Educators. F, S, SS. Prerequisite: Admission to Master of Natural Sciences Education (M.N.S.E.) degree program.
Evolutionary theory, with an emphasis on innovative methods for teaching evolutionary biology in grades 6-12. (NT-O)

NSCI 687A-B. MPNS Internship. F, S, SS

NSCI 693 01(0-0-1). Seminar—MPNS. F, S, SS. Prerequisite: Enrollment in the MPNS program.
Students will present and discuss current research relevant to their specializations and present results of their internships and group projects.

NSCI 695 03(0-0-3). Independent Study for the MNSE, SS. Prerequisite: NSCI 698 and written consent of instructor.
Independent study based on review of the primary scientific literature in biology, chemistry, or physics.

NSCI 696 Var[1-6]. Group Study. F, S, SS. Prerequisite: Bachelor’s degree.

NSCI 698 06(0-0-6). Research Experience in Natural Sciences. SS. Prerequisite: Nine credits MNSE program coursework.
Research experience in biology, chemistry, or physics.

° Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCsubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
OT 110 03(3-0-0). Introduction to Occupational Therapy. F, S, SS.
Prerequisite: None. Roles and activities in occupational therapy. (NT-O)

OT 215 01(0-0-1). Medical Terminology. F, S. Prerequisite: None.
Definition and use of medical terms. (NT-O)

OT 355 02(1-0-1). Handicapped Individual in Society. F, S. Prerequisite:
PSY 100 or SOC 100. Description and exploration of handicapping conditions; review
of support systems including legal and financial implications.

OT 450 03(0-1-2). Biomechanics of Human Occupation. S, SS.
Prerequisite: Minimum of 4 credits of either combined anatomy and
physiology or human anatomy at the 200-level or higher; concurrent
registration allowed. Exploration of performance of the activities of daily living in context
as impacted by function/dysfunction of the human musculoskeletal
system. (NT-B)

OT 590 Var[1-9]. Workshop.

OT 597 Var. Group Study.

OT 601 03(1-0-2). Occupation and Rehabilitation Science I. F.
Prerequisite: Admission to master’s degree program in occupational
therapy. Multidisciplinary perspectives on human performance and participation
in everyday occupations.

OT 610 03(0-2-2). Professional Decision Making. F. Prerequisite:
Admission to master’s degree program in occupational therapy.
Exploration of the thought processes occupational therapists use when
determining how best to address clients’ needs. (S)

OT 611 03(0-0-3). Reflective and Evidence-Based Practice. F.
Prerequisite: OT 678 or sufficient exposure in fieldwork to contribute to and
complete course requirements. Development of reflective and evidence-based practice skills through
integrating and synthesizing fieldwork experiences in OT practice.

OT 620 03(3-0-0). Research to Practice I. F. Prerequisite: Admission
to master’s degree program in occupational therapy. Critically evaluate qualitative and quantitative research processes per-
taining to individuals.

OT 621 03(1-2-1). Occupational Performance: Infancy-Childhood. F.
Prerequisite: OT 678. Optimizing occupational performance and participation for infants
and children within a contextual framework. ($)

OT 630 03(0-0-3). Occupational Performance: Adult to Old Age I. S.
Prerequisite: OT 610; OT 620. Concurrent registration in OT 636, OT 660, OT 665, and OT 686C.
Optimizing occupational performance for adults and older adults with attention to roles, satisfaction, competence and activities.

OT 631 03(0-0-3). Program Assessment and Development. F.
Prerequisite: OT 678. Assessment of program strengths and needs, followed by development of proposals to support occupational performance and participation.

OT 636 02(0-4-0). Occupational Performance: Adult/Old Age I Lab. S. Prerequisite: Concurrent registration in OT 630; OT 660; OT 665; OT 686C. Optimizing occupational performance for adults and older adults with attention to roles, satisfaction, competence, and activities.

OT 640 03(3-0-0). Research to Practice II. S. Prerequisite: OT 620.
Critically evaluate qualitative and quantitative research processes pertaining to groups and systems.

OT 641 03(1-0-2). Occupation and Rehabilitation Science II. S.
Prerequisite: OT 601; OT 621; OT 631. Explore historical evolution of topics and the link to future implications for and growth of occupation and rehabilitation science.

OT 656 03(2-0-1). Topics on Brain Plasticity and Performance. S.
Prerequisite: Occupational Therapy graduate student or written consent of instructor.
Multidisciplinary viewpoints on brain plasticity and its relationship to performance across the lifespan.

OT 660 03(0-0-3). Occupational Performance: Adult to Old Age II. S.
Prerequisite: OT 610; OT 620; Concurrent registration in OT 630, OT 636, OT 665, and OT 686C.
Foundations of occupational performance for adults and older adults with attention to abilities, skills and developed capacities. ($)

OT 661 03(1-2-1). Occupational Performance: Adolescent-Young Adult. S. Prerequisite: OT 621. Corequisite: OT 686D must be taken concurrently.
Optimizing occupational performance and participation for youth and young adults within a contextual framework.

OT 665 02(0-4-0). Adult to Old Age II Lab. S. Concurrent registration
in OT 660. Optimizing occupational performance for adults and older adults with attention to abilities, skills and developed capacities.

OT 666 03(0-0-3). Optimizing Occupation through Technology. S.
Prerequisite: Admission to Occupational Therapy M.O.T., M.S., or Ph.D. program. Use of technology-based resources and/or strategies (current and emerging) to meet client needs in their everyday occupations and contexts.

OT 676 03(3-0-0). Pathokinésiological Conditions and Assessment. S.
Prerequisite: OT 450. Various musculoskeletal imbalances and injuries that present as
difficulties in function and participation in everyday activity.

OT 684 Var. Supervised College Teaching. F, S.

OT 686A-E, Fieldwork I. Prerequisite: Evidence of professional liability insurance.
Level I fieldwork in various settings.
A) OT Process Var[1-4]. F, S, SS. Prerequisite: Admission to OT master’s degree program. ($) B) Seminar 03(0-2-2). F, S. Prerequisite: Successful completion of all first year courses. ($) C) Adult to Old Age Var[1-4]. S, SS. Prerequisite: OT 666A; OT 610. Corequisite: OT 630 and OT 660 must be taken concurrently. ($) D) Infancy to Young Adult Var[1-4]. F, S. Prerequisite: Evidence of professional liability insurance. OT 687; (OT 621 or concurrent registration) or (OT 661 or concurrent registration). ($) E) Special Interest Var[1-4]. F, S, SS. Prerequisite: OT 666A. ($)

OT 687A-T Var[1-12]. Fieldwork II A. F, S, SS. Prerequisite: Evidence of professional liability insurance; successful completion of first year of OT master’s courses and approval of department head.
Level II fieldwork in various settings.
OT 688A-T Var[1-12]. Fieldwork IIIB. F, S, SS. Prerequisite: Evidence of professional liability insurance; successful completion of all coursework and approval of department head or degree in Occupational Therapy.


OT 690 Var[1-9]. Workshop.

OT 692 Var. Seminar.

OT 694 Var. Independent Study.

OT 696 Var. Group Study.

OT 698 Var. Research.


OT 701 03(0-0-3). Occupation and Rehabilitation Science III. F. Prerequisite: OT 640 or 3 credits quantitative and 3 credits qualitative research; OT 641.

Investigation of the intersection of occupational science and rehabilitation science research situated in various paradigms.

°OT 710 03(0-0-3). Teaching Occupation and Rehab Science. S. Prerequisite: Written consent of instructor.

Design and implementation of teaching and learning philosophies and approaches in occupation and rehabilitation science contexts.

OT 784 Var[1-4]. Supervised College Teaching. F, S, SS. Prerequisite: Admission into a PhD program.

OT 786 Var[1-9]. Practicum. F, S, SS. Prerequisite: Concurrent enrollment in OT 620 or 3 credits of qualitative research.

OT 792 Var[1-3]. Seminar. F, S, SS. Prerequisite: Admission into a PhD program.

OT 794 Var[1-6]. Independent Study. F, S, SS. Prerequisite: Admission into a PhD program.

OT 796 Var[1-6]. Group Study. F, S, SS. Prerequisite: Admission into a PhD program.

OT 799 Var[1-15]. Dissertation. F, S, SS. Prerequisite: None.

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PUBLIC HEALTH COURSES
Graduate Degree Program in Public Health
Special Academic Unit

PBHL 516 02(2-0-0). Public Health Foundations. F. Prerequisite: Graduate standing; Colorado School of Public Health student. Credit not allowed for both PBHL 516 and PSY 516A-C. Introduction to public health history, concepts, principles, and current trends.

PBHL 686 02(0-0-2). Public Health Practicum. F, S, SS. Prerequisite: Admission to Master of Public Health Program.

PBHL 692 Var[1-6]. Public Health Seminar. F, S, SS. Prerequisite: Graduate standing. May be taken for credit up to 3 times; maximum of 9 credits allowed in course.

PBHL 695 Var[1-6]. Public Health Independent Study. F, S, SS. Prerequisite: Graduate standing; Colorado School of Public Health student. May be taken for credit up to 3 times; maximum of 9 credits allowed.


* Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
PERFORMING ARTS COURSES
Department of Music, Theatre, and Dance
College of Liberal Arts

PF 110 03(2-0-1). Performing Arts Around the World. F. Prerequisite: None.
Music, theatre, and dance traditions via exploration of a broad range of representative cultures.

PF 250 02(1-3-0). Performing in Musical Theatre. S. Prerequisites:
MU 272Q; TH 151 or D 120A or D 120B or D 120C.
Skills and techniques used in music, theatre, and dance. Brief history and technical production overview of musical theatre.

° Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
PHYSICS COURSES
Department of Physics
College of Natural Sciences

PH 110 03(3-0-0). Descriptive Physics. (GT-SC2, AUCC 3A). F, S, SS. Prerequisite: None. Credit not allowed for both PH 110 and PH 121. Conceptual aspects of physics applied to phenomena in everyday life and to problems in other fields of science.

PH 111 01(0-2-0). Descriptive Physics Laboratory. (GT-SC1, AUCC 3A). F, S, SS. Prerequisite: PH 110 or concurrent registration. Experiments dealing with basic physics concepts including explorations of everyday phenomena.

PH 121 05(3-2-1). General Physics I. (GT-SC1, AUCC 3A). F, S, SS. Prerequisite: MATH 125 or concurrent registration; MATH 126 or concurrent registration. Credit not allowed for both PH 121 and PH 110; or for both PH 121 and PH 141.

PH 122 05(3-2-1). General Physics II. (GT-SC1, AUCC 3A). F, S, SS. Prerequisite: PH 121. Credit not allowed for both PH 122 and PH 142.

PH 141 05(3-2-1). Physics for Scientists and Engineers I. (GT-SC1, AUCC 3A). F, S, SS. Prerequisite: (MATH 126 or concurrent registration; MATH 155 or concurrent registration) or MATH 160 or concurrent registration. Credit not allowed for both PH 141 and PH 121.

PH 142 05(3-2-1). Physics for Scientists and Engineers II. (GT-SC1, AUCC 3A). F, S, SS. Prerequisite: MATH 161 or concurrent registration or MATH 255 or concurrent registration; PH 141. Credit not allowed for both PH 142 and PH 122.

PH 160 03. Basic Physics and Physical Worldview. F, S, SS. Prerequisite: High school algebra or MATH 118; MATH 126. Offered as telecourse only. Physics, cultural and historical background of physical thought, humans’ relationship to physical world. (NT-T)

PH 192 02(0-0-2). The Flying Circus of Physics. F. Prerequisite: None. Richness and variety of physical phenomena; physical world view including appreciation for the academic community.

PH 245 03(2-3-0). Introduction to Electronics. F. Prerequisite: MATH 161; PH 142. AC circuits, physical bases and applications of electronic devices.

PH 293 01(1-0-0). Selected Topics in Physics. F, S, SS. Prerequisite: PH 142.

PH 298 Var[1-6]. Introductory Research. Prerequisite: Written consent of instructor.

PH 314 04(4-0-0). Introduction to Modern Physics. S. Prerequisite: MATH 261 or concurrent registration; PH 142. Relativity; quantum mechanics; atomic structure; applications to solid-state, nuclear, and elementary particle physics.

PH 315 02(0-4-0). Modern Physics Laboratory. S. Prerequisite: PH 314 or concurrent registration. Experiments in modern physics.

PH 341 04(4-0-0). Mechanics. F. Prerequisite: MATH 340 or MATH 345; PH 141. Particle dynamics, translation and rotation of rigid bodies, moving coordinate systems, Lagrangian mechanics, matrix and tensor methods.

PH 351 04(4-0-0). Electricity and Magnetism. S. Prerequisite: MATH 340 or MATH 345; PH 142. Electrostatics, magnetostatics, currents, time-dependent electric and magnetic fields, radiation.

PH 353 04(3-3-0). Optics and Waves. F. Prerequisite: MATH 261; PH 142. Geometrical optics; wave optics; interference, diffraction, and polarization; quantum optics.

PH 361 03(3-0-0). Physical Thermodynamics. S. Prerequisite: MATH 261; PH 142. Laws of thermodynamics; thermodynamic potentials; applications such as fluids, phase transitions, electrical and magnetic systems, binary mixtures.

PH 384 Var[1-5]. Supervised College Teaching. Prerequisite: PH 121 or PH 141; written consent of department head. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements. Participation as a physics tutor.

PH 425 02(0-4-0). Advanced Physics Laboratory. S. Prerequisite: PH 315; PH 451. Advanced experiments in electricity and magnetism, statistical physics and quantum mechanics.

PH 451 03(3-0-0). Introductory Quantum Mechanics I. F. Prerequisite: MATH 340 or MATH 345; PH 314. Schroedinger’s theory of wave mechanics, potential wells, harmonic oscillators, wave packets, operators, angular momentum.

PH 452 03(3-0-0). Introductory Quantum Mechanics II. S. Prerequisite: PH 451. Approximation techniques, perturbation theory, identical particles and spin, structure and spectra of atoms and molecules, hydrogen atom.

PH 462 03(3-0-0). Statistical Physics. F. Prerequisite: MATH 340; PH 314; PH 361. Maxwell-Boltzmann, Fermi-Dirac, and Bose-Einstein distribution functions; kinetic theory; applications to solids, metals, semiconductors, and gases.

PH 492 01(0-0-1). Seminar. S. Prerequisite: Written consent of instructor. Preparation and presentation of seminars on selected modern topics.

PH 495 Var[1-6]. Independent Study. Prerequisite: Written consent of instructor.

PH 498 Var[1-6]. Research. Prerequisite: Written consent of instructor.

PH 521 03(3-0-0). Introduction to Lasers. S. Prerequisite: CHEM 476 or PH 451; MATH 340; PH 353. Stimulated emission; laser resonators; theory of laser oscillation; specific laser systems; applications.

PH 522 01(0-2-0). Introductory Laser Laboratory. S. Prerequisite: PH 521 or concurrent registration. Experiments providing hands-on experiences with lasers.

PH 531 03(3-0-0). Introductory Solid State Physics. S. Prerequisite: PH 361; PH 451. Crystal structures and bonding, electronic levels and vibrations, dielectric, optical and magnetic properties, quasiparticles, superconductivity.

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PH 541 03(3-0-0). Classical Physics. S. Prerequisite: PH 341; PH 351.
Linear and orbital motions, rotation, moment-of-inertia matrix, electrostatics, images, magnetostatics, induction, Maxwell’s equations.

PH 551 03(3-0-0). Modern Physics. F. Prerequisite: PH 452; PH 462 or concurrent registration.
Wave functions, energy levels, harmonic oscillator, transmission and reflection, perturbation theory, thermodynamic potentials, partition function.

PH 561 03(3-0-0). Elementary Particle Physics. S. Prerequisite: PH 451.
Particle interactions and detection techniques. Quark model, scattering models and standard model of electroweak interactions, physics of colliders.

PH 571 03(3-0-0). Mathematical Methods for Physics I. F. Prerequisite: MATH 340.
Vector analysis, eigenvalues and eigenvectors, infinite series, method of Frobenius, complex variables, contour integration.

PH 572 03(3-0-0). Mathematical Methods for Physics II. S. Prerequisite: PH 571.

PH 621 03(3-0-0). Classical Mechanics. F. Prerequisite: PH 341; PH 571 or concurrent registration.
Central forces, scattering, noninertial reference frames, Coriolis force, Lagrange’s and Hamilton’s equations, small oscillations, continuum mechanics.

PH 631 03(3-0-0). Solid State Physics. S. Prerequisite: PH 531.
Electronic band structure and conduction phenomena; cohesive energy; lattice dynamics and thermal properties; metals; insulators; semiconductors.

PH 641 03(3-0-0). Electromagnetism I. F. Prerequisite: PH 351; PH 572.
Electrostatics in a vacuum and a medium, general solution of Laplace’s equation, Green’s functions, magnetostatics in a vacuum and a medium.

PH 642 03(3-0-0). Electromagnetism II. S. Prerequisite: PH 641.
Maxwell’s equations, electromagnetic waves, radiation by accelerated charges, special relativity, Lagrangian formulation of electromagnetism.

PH 651 03(3-0-0). Quantum Mechanics I . F. Prerequisite: PH 452; PH 571 or concurrent registration.
WKB theory, Heisenberg picture, 3D wells, hydrogen atom, time-independent perturbation theory, angular momentum and spin, Clebsch-Gordan coefficients.

PH 652 03(3-0-0). Quantum Mechanics II. S. Prerequisite: PH 651.
Wigner-Eckhart theorem, symmetries, density matrix, identical particles, interaction picture, time-dependent perturbation theory, scattering.

PH 671 03(3-0-0). Statistical Mechanics II. F. Prerequisite: PH 452; PH 462; PH 571 or concurrent registration.
Canonical and grand-canonical ensembles; Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics; density operator; Bose-Einstein condensation.

PH 672/ECE 672 03(3-0-0). Principles of Semiconductors. S. Prerequisite: ECE 471B or PH 531. Credit not allowed for both PH 672 and ECE 672.
Electronic properties of semiconductors: band structure, statistics, transport properties, photoelectronic properties, potential barriers, interfaces.

PH 692 01(0-0-1). Seminar.
PHILOSOPHY COURSES
Department of Philosophy
College of Liberal Arts

PHIL 100 03(3-0-0). Appreciation of Philosophy. (GT-AH3, AUCC 3B) F, S, SS. Prerequisite: None.
Basic issues in philosophy including theories of knowledge, metaphysics, ethics, and aesthetics.

PHIL 103 03(3-0-0). Moral and Social Problems. (GT-AH3, AUCC 3B) F, S, SS. Prerequisite: None.
Contemporary ethical issues in the United States, such as abortion, euthanasia, and genetic engineering. (NT-O)

PHIL 104/ANEQ 104 03(3-0-0). Values, Culture, and Food Animal Agriculture. S. Prerequisite: Non-Animal Science majors with a freshman or sophomore standing. Credit not allowed for both PHIL 104 and ANEQ 104.
Evolution of the social values and cultural understandings shaping modern animal agriculture; current problems in animal agriculture.

PHIL 106 03(3-0-0). Wisdom of the East-Oriental Philosophy. F, S. Prerequisite: None.
Major philosophical issues and world views of the Orient.

PHIL 110 03(3-0-0). Logic and Critical Thinking. (GT-AH3, AUCC 3B) F, S, SS. Prerequisite: None.
Identify, analyze, and evaluate real arguments in everyday life, politics, the sciences, and the professions. (NT-O)

PHIL 112 03(3-0-0). Reasoning and Problem Solving. F. Prerequisite: None.
Creative and critical techniques in problem solving and decision making.

PHIL 120 03(3-0-0). History and Philosophy of Scientific Thought. (GT-AH3, AUCC 3B) F, S, SS. Prerequisite: None.
Historical development of western, scientific world view from ancient times to the 20th century.

PHIL 130 02(2-0-0). Bioethics and Society. S. Prerequisite: None.
Major issues in bioethics.

PHIL 170 03(3-0-0). World Philosophies. (GT-AH3, AUCC 3E) F, S. Prerequisite: None.
Philosophies of North America, Mesoamerica, West Africa, South Asia, and East Asia.

PHIL 171 03(3-0-0). Religions of the West. F, S. Prerequisite: None.
Major religions of the Near East and West emphasizing their classical development; Judaism, Zoroastrianism, Christianity, Islam.

PHIL 172 03(3-0-0). Religions of the East. F, S. Prerequisite: None.
Major religions of India and the Far East emphasizing their classical development; Hinduism, Buddhism, Confucianism, Taoism.

PHIL 173 03(3-0-0). Philosophy of Traditional Judaism. F. Prerequisite: None.
Concepts and essentials of Jewish philosophy and Judaism, including overview of Jewish lifecycle, history, law, literature, ethics, and mysticism.

PHIL 205 03(3-0-0). Introduction to Ethics. F, S. Prerequisite: Sophomore standing or higher.
Problems and theories concerning values and standards, right action, and the good life.

PHIL 206 03(3-0-0). Knowledge and Existence-An Introduction. F, S. Prerequisite: Sophomore standing or higher.
Problems and theories concerning knowledge, being, nature of the world.

PHIL 210 03(3-0-0). Introduction to Formal Logic. F, S. Prerequisite: Sophomore standing or higher.
Elementary principles, techniques in propositional and predicate logic.

PHIL 240 03(3-0-0). Philosophies of Peace and Nonviolence. F. Prerequisite: None.
Classic and contemporary religious and philosophical work on peace and nonviolence.

PHIL 270 03(3-0-0). Issues in the Study of Religion. F, S. Prerequisite: Sophomore standing or higher.
Contemporary religion, its nature, types, forms of expression.

PHIL 295 Var[1-3]. Independent Study.

PHIL 297 Var[1-3]. Group Study.

PHIL 300 03(3-0-0). Ancient Greek Philosophy. F, S, SS. Prerequisite: PHIL 205 or PHIL 206 or PHIL 210.
Philosophy of ancient Greece emphasizing Plato and Aristotle.

PHIL 301 03(3-0-0). 17th and 18th Century European Philosophy. S. Prerequisite: PHIL 206 or PHIL 210 or PHIL 300.
Philosophy from the scientific revolution through Kant.

PHIL 302 03(3-0-0). 19th-Century Philosophy. F. Prerequisite: PHIL 301.
Major figures, movements, concepts in Europe and America from about 1800 to early 20th century.

PHIL 305A-G 03(3-0-0). Philosophical Issues in the Professions. May be repeated for credit with consent of department head.

PHIL 310 03(3-0-0). Writing and Reasoning. F, S, SS. Prerequisite: CO 150; PHIL 110 or PHIL 210.
Logic-based, analytic and critical writing and reading of complex argument and explanation types.

PHIL 312 03(3-0-0). Philosophy of Law. F. Prerequisite: Sophomore standing.
Philosophical concepts, theories, and problems concerning the law.

PHIL 315 03(3-0-0). Philosophy of Language. S. Prerequisite: PHIL 205 or PHIL 206 or PHIL 210 or any upper-division course in philosophy.
Basic concepts and principles in the theory of language.

PHIL 318 03(3-0-0). Aesthetics-Visual Arts. F, S. Prerequisite: None.

PHIL 320 03(3-0-0). Ethics of Sustainability. F, S. Prerequisite: None.
Required field trips.
Ethical and conceptual issues surrounding creation of sustainable societies and lifestyles.

PHIL 325 03(3-0-0). Philosophy of Natural Science. F. Prerequisite: PHIL 210; one course in natural sciences. May be repeated for credit with consent of department head.
Structure of theories; basic concepts and assumptions; methods of explanation and confirmation; emphasis varies between physical and life sciences.

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PHIL 327 03(3-0-0). Philosophy of Behavioral Sciences. S. Prerequisite: PHIL 120 or PHIL 205 or PHIL 206 or PHIL 210 or any upper-division course in philosophy. May be repeated for credit with consent of department head.

Structure of theories; basic concepts; explanation and confirmation; reductionism and values; emphasis varies between psychology and social sciences.

PHIL 330/AGRI 330 03(3-0-0). Agricultural and Food System Ethics. S. Prerequisite: CO 150. Credit not allowed for both PHIL 330 and AGRI 330.

Basic concepts in ethics and their application to agriculture and the food system.

PHIL 335 03(3-0-0). Islam: Cosmology and Practice. F. Prerequisite: None. Cosmological, spiritual, ritual, and practical aspects of Islam.

PHIL 345 03(3-0-0). Environmental Ethics. F. S. Prerequisite: Sophomore standing or higher. Scientific, philosophical, and religious concepts of nature as they bear on human conduct; an ecological perspective.

PHIL 348 03(3-0-0). Philosophy of Literature and the Arts. S. Prerequisite: None. Aesthetic and philosophical issues in literature and the arts.

PHIL 349 03(3-0-0). Philosophies of East Asia. S. Prerequisite: Sophomore standing or higher. Philosophical traditions of East Asia, including Confucianism, Daoism, and Zen Buddhism.

PHIL 350 03(3-0-0). Social and Political Philosophy. F. S. Prerequisite: PHIL 205 or PHIL 206 or any upper-division course in philosophy. Moral relationships between persons and institutions.


PHIL 353 03(3-0-0). Feminist Philosophies. S. Prerequisite: Sophomore standing or higher. Conceptual, moral, and social analysis of women’s issues from a variety of philosophical feminist perspectives.

PHIL 355 03(3-0-0). Philosophy of Religion. F. Prerequisite: PHIL 106 or PHIL 171 or PHIL 172 or PHIL 270. Philosophical analysis of nature of religion and structure of meaning in religious discourse.

PHIL 359 03(3-0-0). Philosophy of Human Nature. F. Prerequisite: PHIL 105 or PHIL 205 or PHIL 206 or any upper-division course in philosophy. Philosophical study of theories of human nature.

PHIL 360 03(3-0-0). Topics in Asian Philosophy. S. Prerequisite: Sophomore standing or higher. Examination of major philosophical topics from ethics, sociopolitical philosophy, metaphysics, aesthetics.

PHIL 366 03(3-0-0). Philosophy of Aging. S. Prerequisite: None. Philosophical problems related to experience of growing old.

PHIL 370 03(3-0-0). Contemporary Western Religious Thought. F. Prerequisite: PHIL 106 or PHIL 171 or PHIL 172 or PHIL 270. Contemporary interpretations of significant Western religious traditions.

PHIL 371 03(3-0-0). Contemporary Eastern Religious Thought. S. Prerequisite: None. Transformation of Indian and Chinese religious thought in the modern period.

PHIL 372 03(3-0-0). Meaning and Truth in Religion. F. Prerequisite: PHIL 106 or PHIL 171 or PHIL 172 or PHIL 270. Nature, variety, functions, interpretation, evaluation of religious language.

PHIL 375 03(3-0-0). Science and Religion. S. Prerequisite: PHIL 106 or PHIL 171 or PHIL 172 or PHIL 270. Encounter of religious belief with Western science, influences on each other, present relations.

PHIL 379 03(3-0-0). Mysticism East and West. F. Prerequisite: PHIL 106 or PHIL 171 or PHIL 172 or PHIL 270. Varieties of mystical experience in selected Eastern and Western representatives.

PHIL 384 Var[1-5]. Supervised College Teaching. F. S. Prerequisite: None. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

Teaching basic philosophy courses.

PHIL 407 03(3-0-0). Phenomenology and Existentialism. F. Prerequisite: PHIL 205 or PHIL 206 or PHIL 300 or PHIL 301. Methods, epistemology, metaphysics, axiology, ethics of 20th-century phenomenologists and existentialists.

PHIL 409 03(3-0-0). 20th-Century Philosophy. S. Prerequisite: PHIL 301. Major figures, trends, and concepts in 20th-century philosophy.

PHIL 410 03(3-0-0). Formal Logic. F. S. Prerequisite: PHIL 210 or CS 270. Quantification theory; axiomatic systems; rigorous axiomatization of some logical or mathematical theory.

PHIL 415 03(3-0-0). Logic and Scientific Method. F. S. Prerequisite: None. Approaches to analysis, assessment of scientific inference, problems of induction; applications to natural, behavioral, social sciences.

PHIL 425 03(3-0-0). Epistemology. S. Prerequisite: PHIL 210 or PHIL 300 or PHIL 301. Concepts, problems, and theories of knowledge.

PHIL 435 03(3-0-0). Metaphysics. F. Prerequisite: PHIL 210 or PHIL 300 or PHIL 301. Philosophical problems concerning nature, structure, and basic constituents of reality.

PHIL 438 03(3-0-0). Philosophy of Mind. S. Prerequisite: PHIL 300 or PHIL 301 or PHIL 302 or PHIL 315 or PHIL 325 or PHIL 327 or PHIL 359. Nature and status of mind, mental states, mental activity; the mind-body problem, mind and human sciences, mind and self, nature of human action.

PHIL 447 03(3-0-0). Ethical Theory. F. Prerequisite: PHIL 205 or PHIL 300 or PHIL 301. Fundamental problems and options in ethical theory.

PHIL 455 03(3-0-0). Islamic Philosophy. S. Prerequisite: PHIL 206; PHIL 210. Development of philosophical thought in early, middle, and late Muslim civilization.

PHIL 460 03(3-0-0). Seminar in Great Philosophers. F. Prerequisite: PHIL 300 or PHIL 301 or PHIL 302. Maximum of 9 credits allowed in course. Works of one major figure in the history of philosophy.

PHIL 461 03(3-0-0). Seminar in Philosophical Issues and Problems. S. Prerequisite: PHIL 300 or PHIL 301 or PHIL 302. Thorough examination of a major philosophical problem or issue.

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PHIL 462 03(0-0-3). Capstone Seminar. F, S. Prerequisite: Senior standing; any two of the following courses: PHIL 300, PHIL 301, PHIL 302, PHIL 409.
In-depth, integrative study of major topics, texts, and problems in both philosophy and religion.

PHIL 463 03(0-0-3). Seminar in Religious Studies. F, S, SS.

PHIL 479 03(3-0-0). Topics in Comparative Religions. F. Prerequisite: PHIL 171 or PHIL 172 or PHIL 270; 300-level religious studies course.
Comparative study of topics in world religions and philosophy or religion.

PHIL 495 Var[1-9]. Independent Study.

PHIL 497 Var[1-9]. Group Study.

PHIL 499 03(0-0-3). Thesis. Prerequisite: Written consent of department head.

PHIL 500 03(0-0-3). Seminar in Major Philosophical Texts. F. Prerequisite: Admitted graduate student.
Intensive study of one or two major works in the history of philosophy.

PHIL 501 03(0-0-3). Seminar: Topics in History of Philosophy. S. Prerequisite: None.
Selected figures and periods from the history of western philosophy, from ancient to modern. Topics change from semester to semester.

PHIL 525 03(0-0-3). Seminar in Epistemology. F. Prerequisite: PHIL 425.
Analysis of contemporary theories of knowledge.

PHIL 527 03(0-0-3). Seminar in Philosophy of Science. S. Prerequisite: PHIL 325 or PHIL 327 or PHIL 415.
Systematic survey of major 20th-century philosophies of science.

*PHIL 535 03(0-0-3). Seminar in Metaphysics. S. Prerequisite: PHIL 500.
Contemporary topics philosophical metaphysics.

*PHIL 545 03(3-0-0). Concept of Natural Value. S. Prerequisite: PHIL 345.
Philosophical analysis of nature as a value carrier. Types of value associated with nature, their interrelations.

PHIL 547 03(0-0-3). Seminar in Meta-Ethics. S. Prerequisite: PHIL 447.
Systematic and historical overview of contemporary theories of meta-ethics.

PHIL 550/IE 550 03(3-0-0). Ethics and International Development. F. Prerequisite: Written consent of instructor. Credit not allowed for both PHIL 550 and IE 550.
Ethical reflection applied to development goals, strategies of Third World countries; relations between developed and developing countries.

*PHIL 555 03(0-0-3). Seminar in Philosophical Models of Nature. F. Prerequisite: Written consent of instructor.
Comparative inquiry into the “nature” of nature as viewed by philosophers of the past and present.

*PHIL 564 03(0-0-3). Seminar in Animal Rights. S. Prerequisite: Written consent of instructor.
Contemporary issues concerning nature and moral status of nonhuman animals.

*PHIL 565 03(0-0-3). Seminar in Environmental Philosophy. F. Prerequisite: Written consent of instructor.
Aesthetic appreciation of nature, duties concerning fauna, flora, endangered species, ecosystems.

*PHIL 566 03(0-0-3). Seminar in Applied Philosophy. S. Prerequisite: Written consent of instructor.
Application of philosophical ideas and methods to analyze practical problems such as distributive justice, abortion, human rights conflicts.

PHIL 570 03(0-0-3). Seminar in Contemporary Philosophical Theory. S. Prerequisite: PHIL 500.
Major concepts and problems in current philosophical theory.

PHIL 593 03(0-0-3). Seminar.

PHIL 601/NSCI 601 01(0-0-1). Master of Profess. Natural Sciences Ethics. F. Prerequisite: Enrollment in the Master of Professional Natural Sciences program. Credit not allowed for both PHIL 601 and NSCI 601. This is a partial-semester course.
Ethical issues involving the care and treatment of animals in captive environments. Lectures, case studies, discussions, and student presentations.

PHIL 662 03(0-0-3). Seminar.

*PHIL 666/CM 666 03(3-0-0). Science and Ethics. S. Credit not allowed for both PHIL 666 and CM 666.
Ethical issues of research on humans and animals; biosafety; fraud and deception in science; genetic engineering.

PHIL 684 Var[1-5]. Supervised College Teaching. F, S.

PHIL 695 Var[1-9]. Independent Study.

PHIL 697 Var[1-9]. Group Study.

PHIL 698 Var[1-6]. Research. F, S, SS.


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<th>PREREQUISITES</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLS 103 03(3-0-0)</td>
<td>State and Local Government and Politics.</td>
<td>(GT-SS1, AUCC 3C), F, S, SS</td>
<td>Prerequisite: None. Principles, organization, and operation of American state and local government. (NT-O)</td>
</tr>
<tr>
<td>POLS 131 03(3-0-0)</td>
<td>Current World Problems.</td>
<td>(GT-SS1, AUCC 3E), F, S</td>
<td>Prerequisite: None. Background and nature of international political events.</td>
</tr>
<tr>
<td>POLS 232 03(3-0-0)</td>
<td>International Relations.</td>
<td>(GT-SS1, AUCC 3E), F, S</td>
<td>Prerequisite: None. Basic concepts and approaches in international relations.</td>
</tr>
<tr>
<td>POLS 241 03(3-0-0)</td>
<td>Comparative Government and Politics.</td>
<td>(GT-SS1, AUCC 3E). S</td>
<td>Prerequisite: None. Major foreign political systems stressing cross-national comparison of political forces, parties, ideologies, and institutions. (NT-O)</td>
</tr>
<tr>
<td>POLS 302 03(3-0-0)</td>
<td>U.S. Political Parties and Elections.</td>
<td>F. Prerequisite: POLS 101.</td>
<td>Foundational, institutional, and behavioral features of American political parties and elections. (NT-O)</td>
</tr>
<tr>
<td>POLS 303 03(3-0-0)</td>
<td>Politics of Organized Interests.</td>
<td>F. Prerequisite: POLS 101.</td>
<td>Role of interests in varied forms: social movements, institutions, associations, and membership groups in American politics.</td>
</tr>
<tr>
<td>POLS 304 03(3-0-0)</td>
<td>Legislative Politics.</td>
<td>F, S. Prerequisite: POLS 101.</td>
<td>Structure, organization, behavior, processes, and policy implications of U.S. legislatures.</td>
</tr>
<tr>
<td>POLS 305 03(3-0-0)</td>
<td>Judicial Politics.</td>
<td>F. Prerequisite: POLS 101.</td>
<td>Allocation of powers among judicial structures in American federal system.</td>
</tr>
<tr>
<td>POLS 306 03(3-0-0)</td>
<td>Executive Politics.</td>
<td>F. Prerequisite: POLS 101.</td>
<td>Structure, organization, behavior, processes, and policy implications of U.S. executive leadership.</td>
</tr>
<tr>
<td>POLS 309 03(3-0-0)</td>
<td>Urban Politics.</td>
<td>F, S. Prerequisite: POLS 101 or POLS 103.</td>
<td>Governmental structures and political processes in urban government.</td>
</tr>
<tr>
<td>POLS 320 03(3-0-0)</td>
<td>Empirical Political Analysis.</td>
<td>F, S. Prerequisite: None.</td>
<td>Methods of empirical political inquiry.</td>
</tr>
<tr>
<td>POLS 321 01(0-2-0).</td>
<td>Empirical Political Analysis Laboratory.</td>
<td>F, S. Prerequisite: Concurrent registration in POLS 320.</td>
<td>Laboratory applications of empirical research methods.</td>
</tr>
<tr>
<td>POLS 331 03(3-0-0)</td>
<td>Politics and Society Along Mexican Border.</td>
<td>F, S. Prerequisite: None.</td>
<td>Analysis of U.S.-Mexican relations and domestic politics as these affect regional characteristics and development of U.S.-Mexican border region.</td>
</tr>
<tr>
<td>POLS 332/ECON 332 03(3-0-0).</td>
<td>International Political Economy.</td>
<td>F, S. Prerequisite: AREC 202 or ECON 202; POLS 232. Credit not allowed for both POLS 332 and ECON 332.</td>
<td>Theories on relations between international politics and economics. Policy implications of different theories and case studies.</td>
</tr>
<tr>
<td>POLS 341 03(3-0-0)</td>
<td>Western European Government and Politics.</td>
<td>F. Prerequisite: POLS 241.</td>
<td>Politics in Western European countries such as Britain, France, and Germany, and countries influenced by European traditions.</td>
</tr>
<tr>
<td>POLS 345 03(3-0-0)</td>
<td>Russian, Central, and East European Politics.</td>
<td>S. Prerequisite: POLS 241.</td>
<td>Political structures and processes in Russia, Central and East Europe, and selected post-Communist countries.</td>
</tr>
<tr>
<td>POLS 351 03(3-0-0)</td>
<td>Public Administration.</td>
<td>F, S, SS. Prerequisite: POLS 101.</td>
<td>Government organization and management; decision processes; political and intergovernmental relations in administration.</td>
</tr>
<tr>
<td>POLS 361 03(3-0-0)</td>
<td>U.S. Environmental Politics and Policy.</td>
<td>F, S, SS. Prerequisite: POLS 101.</td>
<td>Public and contemporary issues relating to U.S. environmental policy. (NT-O)</td>
</tr>
<tr>
<td>POLS 362 03(3-0-0)</td>
<td>Global Environmental Politics.</td>
<td>F, S, SS. Prerequisite: POLS 232 or POLS 241.</td>
<td>Cross-national and international contexts of environmental politics and policy.</td>
</tr>
<tr>
<td>POLS 364 03(3-0-0)</td>
<td>U.S. Energy Policy Analysis.</td>
<td>F, S, SS. Prerequisite: POLS 101.</td>
<td>Analysis of U.S. space politics, space law, and space policy making. (NT-O)</td>
</tr>
<tr>
<td>POLS 371 03(3-0-0)</td>
<td>U.S. Space Policy.</td>
<td>F. Prerequisite: None.</td>
<td>Discussion and analysis of energy use and its impact on the economy and environment with an emphasis on future policy. (NT-O)</td>
</tr>
<tr>
<td>POLS 405 03(3-0-0)</td>
<td>Race and Ethnicity in U.S. Politics.</td>
<td>S. Prerequisite: POLS 101.</td>
<td>Relationships among American racial/ethnic groups, political attitudes, behavior; race and ethnicity roles in elections; implications for public policy.</td>
</tr>
<tr>
<td>POLS 409 03(3-0-0)</td>
<td>Urban and Regional Politics.</td>
<td>F, S. Prerequisite: POLS 101 or POLS 103.</td>
<td>Governance processes and public policies in metropolitan regions.</td>
</tr>
<tr>
<td>POLS 410 03(3-0-0)</td>
<td>American Constitutional Law.</td>
<td>F. Prerequisite: POLS 101.</td>
<td>Allocation of powers among structures in American federal system.</td>
</tr>
<tr>
<td>POLS 413 03(3-0-0).</td>
<td>U.S. Civil Rights and Liberties S, SS. Prerequisite: POLS 101.</td>
<td>U.S. Constitutional provisions and cases pertaining to the rights and liberties of individuals.</td>
<td></td>
</tr>
<tr>
<td>POLS 420 03(3-0-0).</td>
<td>History of Political Thought.</td>
<td>F, S. Prerequisite: None.</td>
<td>Issues and texts related to tradition of political thought from the ancient through the modern period. (NT-O)</td>
</tr>
<tr>
<td>POLS 421 03(3-0-0).</td>
<td>Contemporary Political Theories.</td>
<td>F. Prerequisite: None.</td>
<td>Major political theories and ideologies of contemporary times.</td>
</tr>
<tr>
<td>POLS 422 03(3-0-0).</td>
<td>Democratic Theory.</td>
<td>F, S, SS. Prerequisite: POLS 101; completion of AUCC category 2.</td>
<td>Competing approaches to the theory and practice of democracy, both locally and globally.</td>
</tr>
</tbody>
</table>
POLS 423 03(3-0-0). American Political Theories. S. Prerequisite: POLS 101.

Major American theories and ideologies: their development and present uses.

POLS 431 03(3-0-0). International Law. F, S. Prerequisite: POLS 232.

Rules and obligations for conduct of relations among states and other international entities.

POLS 433 03(3-0-0). International Organization. F, S. Prerequisite: POLS 232.

History, development, structure, process, and activity of selected public international organizations.

POLS 435 03(3-0-0). United States Foreign Policy. F, S, SS. Prerequisite: POLS 232.

Institutions, responsibilities, processes, and issues in formulation and execution of U.S. foreign policy.

POLS 436 03(3-0-0). Comparative Foreign Policy. S. Prerequisite: POLS 232; POLS 241.

Effect of varying international and domestic contexts on foreign policy choices and outcomes across different countries, cultures, issues, and time.

POLS 437 03(3-0-0). International Security. F, S. Prerequisite: None.

Examines the conditions that make for war and peace in international relations. (NT-O)

POLS 442 03(3-0-0). Environmental Politics in Developing World. F, S, SS. Prerequisite: POLS 241.

Examines environmental politics in developing countries and evaluates climate change, natural resource governance and environmental justice.

POLS 443 03(3-0-0). Comparative Social Movements. F, S. Prerequisite: POLS 241.

Reviews major works dealing with conceptual and theoretical foundations of social movements and examines a number of cases across regions.

POLS 444 03(3-0-0). Comparative African Politics. S, SS. Prerequisite: POLS 241.

African political systems focusing on precolonial, colonial influences; rise of nationalism; approaches to new political order; influences of development.

POLS 445 03(3-0-0). Comparative Asian Politics. F, SS. Prerequisite: POLS 241.

East and South Asian political systems emphasizing issues of development, political culture, and institutional change.

POLS 446 03(3-0-0). Politics of South America. F, S. Prerequisite: POLS 241.

South American political actors and institutions with emphasis on themes of development, democracy, revolution, and international affairs.

POLS 447 03(3-0-0). Politics in Mexico, Central America, Caribbean. F, S. Prerequisite: POLS 241.

Mexican politics with comparison to one or more Central American and Caribbean countries.

POLS 448 03(3-0-0). Comparative Racial/Ethnic Politics. F, S. Prerequisite: POLS 241.

Comparative examination of politics of race and ethnicity and role it plays in formation of nation-states.

POLS 449 03(3-0-0). Middle East Politics. F, S. Prerequisite: POLS 241.

Political issues of the Middle East, including the Palestinian-Israeli conflict, Islamism, and democratization.

POLS 451 03(3-0-0). Public Policy Design and Governance. S. Prerequisite: POLS 101 or POLS 103; junior standing.

Examination of governance institutions outside the scope of traditional bureaucratic organizations and accountability.

POLS 459 03(3-0-0). Program Evaluation for Public Administrators. F, S, SS. Prerequisite: POLS 101; junior or senior standing.

An overview of research methods and statistical methods for public administrators. (NT-O)

POLS 460 03(3-0-0). Public Policy Process. F, S. Prerequisite: POLS 101; junior standing.

Explanations of U.S. policy formation, implementation, and impact. (NT-O)

POLS 463 03(3-0-0). Urban Policy and Management. F, S, SS. Prerequisite: POLS 101 or POLS 103; completion of AUCC category 2.

Policy choices and management issues associated with urban government.

POLS 462 03(3-0-0). Globalization, Sustainability, and Justice. F, S, SS. Prerequisite: POLS 232 or POLS 241.

Public and private policies to promote sustainability and social justice in a globalizing world.

POLS 465 03(3-0-0). Public Policy Analysis. F, S, SS. Prerequisite: POLS 101; completion of AUCC category 2; junior standing.

Methods and tools used in the practice of policy analysis and evaluation of current public policy; emphasis on applied analysis. (NT-O)

POLS 486A-B. Practicum.

+A) Legislative politics 06(0-8-2). (S) B) Government Var[1-6].

POLS 492 03(0-0-3). Capstone Seminar. Prerequisite: Upper-division course in at least four subfields of political science.

POLS 495 Var. Independent Study.

POLS 500 03(3-0-0). Governmental Politics in the U.S. F, S. Prerequisite: Three upper-division credits in American politics with a B or better.

Selected primary source materials on performance of government officials and institutions at federal, state, and local levels.

POLS 501 03(3-0-0). Citizen Politics in the U.S. F, S. Prerequisite: Three upper-division credits in American politics with a B or better.

Selected primary source materials on behavior of individuals and groups in American politics.

POLS 509 03(3-0-0). Gender and the Law. F, S. Prerequisite: POLS 410 or POLS 413.

Relationship between gender and the law and the changing nature of that relationship over time.

POLS 520 03(3-0-0). Theories of Political Action. F, S. Prerequisite: POLS 420 or POLS 421.

Intensive review of primary material on Western political thought.

POLS 530 03(3-0-0). International Relations. F, S. Prerequisite: Nine credits in international relations or related studies.

Theory and methodology utilized in different approaches to international relations.

POLS 531 03(3-0-0). Policy Making, Diplomacy, and World Politics. F, S. Prerequisite: Three upper-division credits in international relations with a B or better.

Theories of policy making and bargaining in international politics as applied to different countries, organizations, and historical periods.

POLS 532 03(3-0-0). Governance of the World Political Economy. F, S. Prerequisite: 9 upper division credits in international relations with a B or better.

Theoretical and practical debates on the organization and governance of the world political economy.
POLS 540 03(3-0-0). Comparative Politics. F, S. Prerequisite: Three upper-division credits in comparative politics with a B or better.

Theories, methods, and approaches to study of comparative politics.

POLS 541 03(3-0-0). Political Economy of Change and Development. F, S. Prerequisite: Three upper-division credits in comparative politics with a B or better.

Responses of the state and its institutions to political, economic, and social change.

POLS 542 03(3-0-0). Democracy and Democratization. F, S. Prerequisite: None.

Theoretical foundations of democracy and democratization across world regions.

POLS 544/ETST 544 03(3-0-0). National Identities and Nation Building. F. Prerequisite: None. Credit not allowed for both POLS 544 and ETST 544.

How statist conceptions of race and ethnicity have been mobilized in nation-building projects.

POLS 550 03(3-0-0). Advanced Public Administration. F, S. Prerequisite: POLS 351; written consent of instructor.

Overview of study of public administration; recent developments in theory and practice.

POLS 552A-C 03(3-0-0). Topics in Public Administration. F, S. Prerequisite: POLS 351; GPA of 3.000 or better.


POLS 620 03(3-0-0). Approaches to the Study of Politics. F. Prerequisite: Fifteen credits in political science.

POLS 621 03(3-0-0). Qualitative Methods in Political Science. S. Prerequisite: POLS 620 or concurrent registration or SOC 311. Credit not allowed for both POLS 621 and SOC 610.

Research design, data gathering and organization, ethical issues, and computer applications in qualitative political research.

POLS 624 03(3-0-0). Scope and Methods of Political Science. F, S. Prerequisite: 15 credits of upper division (300-level and above) coursework in Political Science.

Graduate survey of the scope of the Political Science discipline and the range of research designs and methods in the discipline.

POLS 625 03(3-0-0). Quantitative Methods of Political Research. S. Prerequisite: POLS 320.

Quantitative approaches and methods for study of political life.

POLS 626 01(0-2-0). Political Research Laboratory. S. Prerequisite: POLS 321; concurrent registration in POLS 625.

POLS 652 03(0-0-3). Public Organization Theory. F. Prerequisite: POLS 351.

Theories of behavior of individuals and organizations in government bureaucracies.

POLS 660 03(3-0-0). Theories of the Policy Process. F, S. Prerequisite: POLS 351 or POLS 460.

Recent developments in policy analysis.

POLS 665 03(0-0-3). Public Policy Analysis. S. Prerequisite: POLS 625.

The practice of policy analysis and the tools used to conduct an analysis including: forecasting CBA, CEA, and policy design.

POLS 670 03(3-0-0). Politics of Environment and Sustainability. F. Prerequisite: Written consent of instructor.

Domestic, international, and comparative dimensions of environment and natural resource politics and policy.

POLS 684 Var[1-3]. Supervised College Teaching. Prerequisite: One year of graduate work.

POLS 692 03(0-0-3). Seminar in Environmental Policy.

Topics in domestic and/or global environmental policy.

POLS 695 Var. Independent Study.


POLS 709 03(3-0-0). Environmental Politics in the U.S. F, S. Prerequisite: POLS 500 or POLS 501; POLS 670.

Selected primary materials on governmental performance, groups, and mass public in American environmental politics.

POLS 729 03(3-0-0). Political Theory and the Environment. F, S. Prerequisite: POLS 520; POLS 670.

Political thought applied to questions of the environment.

POLS 739 03(3-0-0). International Environmental Politics. F, S. Prerequisite: POLS 530; POLS 670.

Theories and methodologies used in analyzing international environmental politics and policy.

POLS 749 03(3-0-0). Comparative Environmental Politics. F, S. Prerequisite: POLS 540 or POLS 541; POLS 670.

Application of comparative political theory to analysis of environmental politics.

POLS 759 03(3-0-0). Environmental Policy and Administration. F, S. Prerequisite: POLS 670.

Effects of regulation, intergovernmental relations, and resource availability on federal environmental programs in U.S.

POLS 795 Var. Independent Study.


Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
PSYCHOLOGY COURSES
Department of Psychology
College of Natural Sciences

PSY 100 03(3-0-0). General Psychology. (GT-SS3, AUCC 3C). F, S, SS. Prerequisite: None.
Principles of psychology emphasizing empirical approaches; theories and research on learning, individual differences, perception, social behavior. (NT-O/T)

PSY 121 01(1-0-0). Health and the Mind. F, S. Prerequisite: None.
Maintenance of positive mental health.

PSY 175/HDFS 175 03. Developmental Psychology Across the Life Span. F, S, SS. Prerequisite: None. Credit not allowed for both PSY 175 and HDFS 175. Offered as telecourse only.
Theory and research on physical, cognitive, and psychosocial human development across the life span. (NT-T)

PSY 192 01(0-0-1). Psychology First-Year Seminar. F, S. Prerequisite: None.
Special topics in psychology.

PSY 210 03(3-0-0). Psychology of the Individual in Context. F, S, SS. Prerequisite: PSY 100.
Psychological explanations of cultural, social, and individual differences in behavior. (NT-O)

PSY 228 03(3-0-0). Psychology of Human Sexuality. F, S, SS. Prerequisite: None.
Physiology, psychology of human sexuality; cross cultural issues, development, social perspectives, values, sexual dysfunction. (NT-C/O)

PSY 250 04(4-0-0). Research Methods in Psychology. F, S, SS. Prerequisite: PSY 100.
Design, analysis, and reporting of psychological research. (NT-O)

PSY 252 03(3-0-0). Mind, Brain, and Behavior. F, S. SS. Prerequisite: PSY 100.
Psychological, physiological, and evolutionary explanations of perception, cognition, and behavior. (NT-O)

PSY 260 03(3-0-0). Child Psychology. F, S, SS. Prerequisite: PSY 100.
Description and explanation of development of human behavior emphasizing theory and research concerned with infant and child.

PSY 292 A-D. Seminar. F, S, SS. Prerequisite: None.
A) Industrial/Organizational 01(0-0-1). B) Mind, Brain & Behavior 01 (0-0-1). C) Controversial Issues in Psychology 01(0-0-1).
D) Special Topics in Psychology Var[1-3].

*PSY 295 Var[1-3]. Independent Study. Maximum of 12 credits allowed for psychology majors toward graduation for any combination of PSY 295, PSY 296, PSY 384, PSY 486, PSY 488, PSY 495, PSY 496, PSY 498, PSY 499; enrollment limited to one per student per semester.
Individual investigation of a special topic in psychology under direction of faculty.

*PSY 296 Var[1-3]. Group Study. Maximum of 12 credits allowed for psychology majors toward graduation for any combination of PSY 295,

*Maximum of 12 credits allowed for psychology majors toward graduation for any combination of PSY 295, PSY 296, PSY 384, PSY 486, PSY 488, PSY 495, PSY 496, PSY 498, PSY 499; enrollment limited to one per student per semester.

PSY 296, PSY 384, PSY 486, PSY 488, PSY 495, PSY 496, PSY 498, PSY 499; enrollment limited to one per student per semester.
Collective investigation of a special topic in psychology under direction of faculty.

PSY 305 03(3-0-0). Psychology of Religion. F, S, SS. Prerequisite: PSY 100.
Survey of research on religion from a psychological perspective. (NT-O)

PSY 310 03(3-0-0). Basic Counseling Skills. S. Prerequisite PSY 100.
Psychologically-based interpersonal communication skills; rapport thinking, gathering information and bringing about change in others.

PSY 311A-B 02(0-4-0). Basic Counseling Skills Laboratory. Prerequisite: PSY 100; PSY 310 or concurrent registration. Credit not allowed for both PSY 311A and PSY 311B.
A) CACI. Application of psychologically-based interpersonal skills in drug addiction treatment, for students seeking CACI certification.
B) Non-CACI. Application of psychologically-based interpersonal communication skills.

PSY 315 03(3-0-0). Social Psychology. F, S, SS. Prerequisite: PSY 100.
Social psychological theory and research findings emphasizing research methodology; applications to contemporary social problems. (NT-O)

PSY 316 03(3-0-0). Environmental Psychology. F, S, SS. Prerequisite: PSY 100.
Social psychological theory and research on effects of behavior on the environment; environmental influences on behavior. (NT-C)

PSY 317 02(0-4-0). Social Psychology Laboratory. F, S, SS. Prerequisite: PSY 250; PSY 315 or concurrent registration.
Review of research techniques in social psychology. Computer simulations with applications to contemporary social problems. (NT-O)

PSY 320 03(3-0-0). Abnormal Psychology. F, S, SS. Prerequisite: PSY 100.
Definition and description of behavior pathology; theory and research on factors in etiology and treatment of behavior disorders. (NT-T)

PSY 325 03(3-0-0). Psychology of Personality. F, S, SS. Prerequisite: PSY 100.
Theory and research related to personality as a psychological concept; analytic, phenomenological, and behavioristic views. (NT-O)

PSY 327 03(2-0-1). Psychology of Women. F, S, SS. Prerequisite: PSY 100.
Contemporary theory and research focusing on emotional, cognitive, bio-social, and interpersonal contributions to female identity and sex role.

*PSY 330 03(3-0-0). Clinical and Counseling Psychology. S. Prerequisite: PSY 100.
Specialty areas, conceptualization of clients, assessment, intervention techniques for behavior change, research methods, ethical issues.

PSY 335 03(3-0-0). Forensic Psychology. F, S, SS. Prerequisite: PSY 100; junior or senior standing.
The psychology of crime and criminal behavior, including theory on deviance, the criminal mind, and the root causes of violence in society.

PSY 340 03(3-0-0). Organizational Psychology. F. Prerequisite: PSY 250; concurrent registration in PSY 341; STAT 301 or STAT 311.
Theories and research on interpersonal relations, work group processes, decision making, power, and change strategies within organizations. (NT-O)

Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
PSY 341 01(0-2-0). Organizational Psychology Laboratory. F. Prerequisite: Concurrent registration in PSY 340.
Application of organizational psychology through simulations and field involvements. (NT-O)

PSY 350 03(3-0-0). Applied Research Methods in Psychology I. F. Prerequisite: PSY 250; STAT 311; enrollment in University Honors Program.
Application of research methods concepts to design and conduct experiments.

PSY 352 03(3-0-0). Learning and Memory. F, S, SS. Prerequisite: PSY 252.
Research, theory, and applications regarding conditioning, learning, and retention in animals and humans.

PSY 354 03(3-0-0). Human-Computer Interaction. F, S. Prerequisite: PSY 100.
Theoretical and applied areas of psychology and computer science in the area of human-computer interaction.

PSY 360 03(3-0-0). Psychology of Drug Addiction Treatment. S, SS. Prerequisite: PSY 100; PSY 320.
Psychological theory and method for treating substance use addictions. (NT-O)

PSY 362 03(3-0-0). Professional Issues in Addiction Treatment. F, SS. Prerequisite: PSY 360 or concurrent registration.
Diversity, ethno-cultural, and ethical issues in drug addiction treatment.

PSY 364 03(0-0-3). Infectious Diseases and Substance Use. F, S, SS. Prerequisite: PSY 100.
Infectious disease transmission/progression related to substance use, risk assessment and treatment of substance users in alcohol and drug treatment. (NT-O)

PSY 370 03(3-0-0). Psychological Measurement and Testing. F, S, SS. Prerequisite: PSY 100; concurrent registration in PSY 371; STAT 301 or STAT 311.
Measurement theory including scale properties, reliability, and validity; construction and evaluation of psychological tests. (NT-O)

PSY 371 01(0-2-0). Psychological Measurement and Testing Laboratory. F, S. Prerequisite: Concurrent registration in PSY 370.
Exercises and problems in test administration, norming, reliability, validity, and scale construction. (NT-O)

1PSY 384 Var[1-3]. Supervised College Teaching. Prerequisite: PSY 100; written consent of department head. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements. Maximum of 12 credits allowed for psychology majors toward graduation for any combination of PSY 295, PSY 296, PSY 384, PSY 486, PSY 488, PSY 495, PSY 496, PSY 498; enrollment limited to one per student per semester.
Supervised teaching, training, and discussion leadership in undergraduate courses.

2PSY 392 02(0-0-2). Honors Seminar: Current Topics in Psychology. F. Prerequisite: PSY 100; PSY 250; enrollment in University Honors Program.
Research areas in psychology; reading and discussing current journal articles.

PSY 401 03(3-0-0). History and Systems of Psychology. F, S. Prerequisite: PSY 250; junior or senior standing.
Philosophical and scientific underpinnings of psychology; major historical developments in psychology; schools of psychological thought. (NT-O)

PSY 410 03(3-0-0). Psychobiology of Addictions. F. Prerequisite: PSY 250, PSY 252.
Biological basis of the psychology of addictions.

PSY 437 03(3-0-0). Psychology of Gender. F. Prerequisite: PSY 210.
Psychology of gender in cultural context.

PSY 440 03(3-0-0). Industrial Psychology. F, S, SS. Prerequisite: PSY 250; concurrent registration in PSY 441; STAT 301 or STAT 311.
Problems and procedures in selection and classification of personnel; work motivation; job satisfaction; leadership. (NT-O)

PSY 441 01(0-2-0). Industrial Psychology Laboratory. F. Prerequisite: Concurrent registration in PSY 440.
Laboratory and field experiences in job analysis, selection strategies, performance appraisal, and criterion development.

PSY 450 04(3-2-0). Applied Research Methods in Psychology II. S. Prerequisite: PSY 350; enrollment in University Honors Program.
Interpretation and reporting of psychological research findings.

PSY 452 03(3-0-0). Cognitive Psychology. F, S, SS. Prerequisite: PSY 252.
Human thinking processes as related to perception, attention, memory, knowledge representation, reasoning, decision making, and problem solving. (NT-C/O)

PSY 453 02(0-4-0). Cognitive Psychology Laboratory. F, S, SS. Prerequisite: PSY 250; PSY 452 or concurrent registration.
Exercises in laboratory research in perceptual processes, attention, memory, language, problem solving, and decision making. (NT-O)

PSY 454 03(3-0-0). Biological Psychology. F, S, SS. Prerequisite: PSY 252.
Research and theory on the biological basis of behavior.

PSY 455 02(0-4-0). Biological Psychology Laboratory. F, S, SS. Prerequisite: PSY 250; PSY 454 or concurrent registration.
Laboratory exercises in biological psychology.

PSY 456 03(3-0-0). Sensation and Perception. F, S, SS. Prerequisite: PSY 250, PSY 456 or concurrent registration.
Review of research on physiological substrates of sensation; methods of scaling sensory experience; role of perception in behavioral adaptation.

PSY 457 02(0-4-0). Sensation and Perception Laboratory. F, S, SS. Prerequisite: PSY 250; PSY 456 or concurrent registration.
Review of research on physiological substrates of sensation; methods of scaling sensory experience; role of perception in behavioral adaptation.

PSY 458 03(3-0-0). Cognitive Neuroscience. F, S, SS. Prerequisite: PSY 252.
Review of the human brain and its mediation of cognitive processes.

PSY 459 02(0-4-0). Cognitive Neuroscience Laboratory. F, S, SS. Prerequisite: PSY 250; PSY 458 or concurrent registration.
Laboratory exercises in cognitive neuroscience.

PSY 460 03(3-0-0). Child Exceptionality and Psychopathology. F, S, SS. Prerequisite: PSY 100.
Definition and description of child exceptionality and psychopathology; theory and research in etiology, educational implications, and treatment. (NT-O)

PSY 465 03(3-0-0). Adolescent Psychology. F, S. Prerequisite: PSY 100.
Contemporary theory and research on adolescence including physiological and psychological changes, social influences.

Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
1PSY 484 Var[1-3]. Supervised College Teaching. F, S, SS. Prerequisite: PSY 100; written consent of department chair. A maximum of 10 combined credits for all 384 and 484 are counted towards graduation requirements. Maximum of 12 credits allowed for psychology majors toward graduation for any combination of PSY 295, PSY 296, PSY 384, PSY 484, PSY 486, PSY 495, PSY 496, PSY 498, PSY 499.

Advanced supervised teaching, training and discussion leadership in undergraduate courses.

1PSY 486 Var[1-3]. Practicum. Maximum of 12 credits allowed for psychology majors toward graduation for any combination of PSY 295, PSY 296, PSY 384, PSY 486, PSY 488, PSY 495, PSY 496, PSY 498, PSY 499; enrollment limited to one per student per semester.

Supervised work experience in approved psychological setting with periodic consultation of faculty.

1PSY 488 Var[1-3]. Field Placement. Maximum of 12 credits allowed for psychology majors toward graduation for any combination of PSY 295, PSY 296, PSY 384, PSY 486, PSY 488, PSY 495, PSY 496, PSY 498, PSY 499; enrollment limited to one per student per semester.

Supervised affiliation with and/or service work in approved psychological setting. ($)

PSY 492A-F Var[1-3]. Seminar. F, S, SS. Prerequisite: None.
C) Counseling/Clinical Psychology. D) Industrial/Organizational Psychology.
E) Perceptual and Brain Sciences. F) Special Topics in Psychology.

1PSY 495A-F Var[1-3]. Independent Study. F, S, SS. Maximum of 12 credits allowed for psychology majors toward graduation for any combination of PSY 295, PSY 296, PSY 384, PSY 486, PSY 488, PSY 495, PSY 496, PSY 498, PSY 499; enrollment limited to one per student per semester.

Individual investigation of a special topic in psychology under direction of faculty.
C) Counseling/Clinical Psychology. D) Industrial/Organizational Psychology.
E) Perceptual and Brain Sciences. F) Special Topics in Psychology.

1PSY 496A-F Var[1-3]. Group Study. F, S, SS. Maximum of 12 credits allowed for psychology majors toward graduation for any combination of PSY 295, PSY 296, PSY 384, PSY 486, PSY 488, PSY 495, PSY 496, PSY 498, PSY 499; enrollment limited to one per student per semester.

Collective investigation of a special topic in psychology under direction of faculty.
C) Counseling/Clinical Psychology. D) Industrial/Organizational Psychology.
E) Perceptual and Brain Sciences. F) Special Topics in Psychology.

1PSY 498A-F Var[1-3]. Research. F, S, SS. Maximum of 12 credits allowed for psychology majors toward graduation for any combination of PSY 295, PSY 296, PSY 384, PSY 486, PSY 488, PSY 495, PSY 496, PSY 498, PSY 499; enrollment limited to one per student per semester.

Independent research project culminating in formal research paper.
C) Counseling/Clinical Psychology. D) Industrial/Organizational Psychology.
E) Perceptual and Brain Sciences. F) Special Topics in Psychology.

1PSY 499A-F Var[1-6]. Thesis. F, S, SS. Maximum of 12 credits allowed for psychology majors toward graduation for any combination of PSY 295, PSY 296, PSY 384, PSY 486, PSY 488, PSY 495, PSY 496, PSY 498, PSY 499; enrollment limited to one per student per semester.

Independent research project culminating in a thesis presented to a faculty committee.
C) Counseling/Clinical Psychology. D) Industrial/Organizational Psychology.
E) Perceptual and Brain Sciences. F) Special Topics in Psychology.

1PSY 515 03(0-0-3). Women’s Health. F. Prerequisite: None.
Current issues in women’s health.

1PSY 517*/IE 517 03(0-0-3). Perspectives in Global Health. S. Prerequisite: None. Credit not allowed for both PSY 517 and IE 517.

Science, skills, and beliefs directed at the maintenance and improvement of health for all people.

PSY 595A-F Var[1-3]. Independent Study. F, S, SS.
Individual investigation of a special topic in psychology under direction of faculty.
C) Counseling/Clinical Psychology. D) Industrial/Organizational Psychology.
E) Perceptual and Brain Sciences. F) Special Topics in Psychology.

PSY 596A-F Var[1-3]. Group Study. F, S, SS.
Collective investigation of a special topic in psychology under direction of faculty.
C) Counseling/Clinical Psychology. D) Industrial/Organizational Psychology.
E) Perceptual and Brain Sciences. F) Special Topics in Psychology.

PSY 600A-M 03(3-0-0). Advanced Psychology. F, S.
A) History. B) Physiological. C) Neuropsychology. D) /NB 600) Sensation and perception. Prerequisite: PSY 456; fifteen credits in psychology. Credit not allowed for both PSY 600D and NB 600.

1PSY 601 01(0-2-0). Measurement Laboratory. S. Prerequisite: PSY 600K or concurrent registration.
Laboratory experience using measurement concepts and procedures.

PSY 605 03(0-0-3). Applied Measurement Theory. S. Prerequisite: Admission to the Plan C graduate program in Applied Industrial/Organizational Psychology. Credit not allowed for both PSY 605 and PSY 600K. PSY 605 offered only through Division of Continuing Education. (NT-O)

PSY 610 03(3-0-0). Counseling and Clinical Pre-practicum I. F. Prerequisite: Written consent of instructor.
Basic assessment and intervention skills; accurate observation, conceptualization, and response.

PSY 611 03(3-0-0). Counseling and Clinical Pre-practicum II. S. Prerequisite: PSY 610.
Counseling and clinical techniques; assessment and intervention strategies; special applications.

PSY 643 03(3-0-0). Industrial/Organizational Psychology I. F. Prerequisite: None.
Integration of multiple perspectives for examining work organizations, roles, and relationships, and organizational entry and socialization.

PSY 644 03(3-0-0). Industrial/Organizational Psychology II. S. Prerequisite: None.
Multiple perspectives for examining individual and organizational development, orientation to organizations, and science and practice in industrial/organizational psychology.

* Alternate year offering (odd); * Alternate year offering (even); * Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
PSY 645 02(2-0-0), Industrial/Organizational Psychology at Work I. F. Prerequisite: None.
Integrating theory, research, and practice in industrial/organizational settings. Assessment and development of applications of psychology in organizations.

PSY 646 02(2-0-0), Industrial/Organizational Psychology at Work II. S. Prerequisite: None.
Development and application of scientific, ethical, and professional standards and competencies in applying psychology in industrial/organizational settings.

PSY 647 03(0-0-3). Applied Industrial Psychology. F. Prerequisite: Must be admitted to the Master of Applied/Industrial Organizational Psychology program.
Applications of theory and methods for recruitment, selection, training, and performance management within organizations. (NT-O)

PSY 648 03(0-0-3). Applied Organizational Psychology. S. Prerequisite: Must be admitted to the Master of Applied/Industrial Organizational Psychology program. (NT-O)

PSY 652 04(3-2-0). Methods of Research in Psychology I. F. Prerequisite: One 300- or 400-level STAT course
Psychological research emphasizing hypothesis testing and simple research designs, introducing general linear model approach.

PSY 653 04(3-2-0). Methods of Research in Psychology II. S. Prerequisite: PSY 652.
Advanced research designs emphasizing general linear model approach.

PSY 655A-B 03(3-0-0). Research Issues and Models in Psychology. S.
Generation and development of research ideas, evaluating approaches, interpreting and reporting findings. A) Applied. B) Experimental.

PSY 660 03(0-0-3), Applied Cross-Cultural I/O Psychology. S. Prerequisite: Must be admitted to the Master of Applied/Industrial Organizational Psychology program; PSY 647 or PSY 648.
Cultural differences in the application of individual and organizational interventions to improve human and organizational effectiveness. (NT-O)

PSY 661 03(0-0-3). Applied Organizational Development. SS. Prerequisite: Must be admitted to the Master of Applied/Industrial Organizational Psychology program; PSY 648.
Techniques and interventions for developing, improving and effecting change in organizations through diagnosis, planned change, and survey feedback.

PSY 662 04(0-0-4). Applied Psychological Research Methods I. F. Prerequisite: Must be admitted to the Master of Applied/Industrial Organizational Psychology program; any upper-division statistics course. Credit not allowed for both PSY 662 and PSY 652.
Psychological research emphasizing hypothesis testing and simple research designs, the general linear model approach with emphasis on application. (NT-O)

PSY 663 04(0-0-4). Applied Psychological Research Methods II. S. Prerequisite: Must be admitted to the Master of Applied/Industrial Organizational Psychology program; PSY 662. Credit not allowed for both PSY 663 and PSY 653.
Advanced research designs emphasizing general linear model approach with emphasis on application. (NT-O)

PSY 665 03(0-0-3). Applied Psychological Research Design. SS. Prerequisite: Must be admitted to the Master of Applied/Industrial Organizational Psychology program; any graduate applied statistics course. Credit not allowed for both PSY 655C and PSY 665.
Review of scientific method, generation of hypotheses, and design of laboratory and field research studies. (NT-O)

PSY 666 03(0-0-3). Succession Planning/Leadership Development. SS. Prerequisite: Must be admitted to the Master of Applied/Industrial Organizational Psychology program; PSY 648.
Examines modern theories of leadership, strategies for succession planning; training, coaching, mentoring, professional development for leadership. (NT-O)

PSY 667 03(0-0-3). Competency Modeling and Criterion Development. F. Prerequisite: Must be admitted to the Master of Applied/Industrial Organizational Psychology program; PSY 647.
Conducting job analyses and competency modeling within organizations, application of the results of those processes to criterion development. (NT-O)

PSY 668 03(0-0-3). Workforce Training and Development. S. Prerequisite: Must be admitted to the Master of Applied/Industrial Organizational Psychology program; PSY 647.
An overview of adult learning theory, emphasizing the role of I/O psychology in identifying, designing, transferring, and evaluating training. (NT-O)

PSY 670 03(3-0-0). Psychological Measurement-Personality. F. Prerequisite: None.
Construction, administration, interpretation of objective measures of personality including aptitudes, abilities, interests.

PSY 672 03(3-0-0). Psychological Assessment. S. Prerequisite: PSY 610; PSY 670.
Use of test data to determine cognitive functioning and predict behavior; supervised test administration and interpretation.

PSY 675 03(3-0-0). Ethics and Professional Psychology Practice. F. Prerequisite: PSY 611.
Ethical practice of psychology, duty-to-warn statutes, Colorado law, problematic ethical situations.

PSY 684 Var[1-3]. Supervised College Teaching.
Supervised teaching, training, and discussion leadership in under-graduate courses.


PSY 692A-F Var. Seminar. F. S. SS.


PSY 720 03(3-0-0). Psychopathology. F. Prerequisite: Psychology graduate students only.
Adult and child behavior pathology; theory, research, and methods related to etiology, defining characteristics, and maintaining causes.

PSY 722 03(3-0-0). Empirically Validated Therapies. S. Prerequisite: PSY 720.
Outline of major empirically validated approaches to assessment and treatment including cognitive-behavioral therapies, interpersonal therapy.

Alternate year offering (odd); * Alternate year offering (even); # Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
PSY 727 03(3-0-0). Theories of Vocational Development. S. SS.
Prerequisite: Psychology graduate students only.
Nature and current status of vocational development theory with implications for career counseling.

PSY 729 03(3-0-0). Counseling and Psychotherapy II. S. Prerequisite: PSY 722.
Theory and practice of group psychotherapy and counseling.

*PSY 754 03(3-0-0). Multivariate Analysis in Behavioral Sciences. S.
Prerequisite: PSY 653.
Multivariate analysis, including factor and component analysis, applied to psychological research.

PSY 775 03(3-0-0). Diversity Issues in Counseling. F. Prerequisite: PSY 611.
Diversity issues in clients and counselors such as gender, race, age, sexual orientation, education, religion, disability, socioeconomic status.

PSY 784 Var. Supervised College Teaching. F. S.
Philosophy, approaches, and techniques of college-level instruction; supervised teaching with consultation of faculty.

PSY 786A-J Var. Advanced Practicum. Prerequisite: Appropriate subtopic of PSY 686A-G.
A) Counseling and diagnosis II. B) Industrial-organizational II.
C) School II. D) Clinical. E) Supervision. F) Applied social II.

PSY 787 Var. Internship.
Supervised work experience under departmental guidelines in approved psychological agency or setting.

PSY 792A-F Var. Seminar. F. S, SS.
C) Counseling psychology. D) Industrial/organizational psychology.
E) Perceptual and brain sciences. F) Special topics in psychology.

PSY 795A-F Var[1-3]. Independent Study. F. S, SS.
Individual investigation of a special topic in psychology under direction of faculty.
C) Counseling/Clinical Psychology. D) Industrial/Organizational Psychology.
E) Perceptual and Brain Sciences. F) Special Topics in Psychology.

C) Counseling/Clinical Psychology. D) Industrial/Organizational Psychology.
E) Perceptual and Brain Sciences.
BUSINESS MANAGEMENT SCIENCE COURSES
Department of Computer Information Systems
College of Business

QNT 270 03(2-2-0). Basic Business Statistics. F, S, SS. Prerequisite: STAT 204.
   Statistical tools applied to business conditions and functions.

QNT 375 03(2-2-0). Models and Applications in Management Science. F, S. Prerequisite: STAT 204.
   Introduction and application of operations research techniques to business decision problems.

QNT 570 03(3-0-0). Statistical Decision Making. F, SS. Prerequisite: QNT 270.
   Classical statistical techniques including hypothesis testing and multiple regression; model building, control charts, time series and forecasting.

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### REAL ESTATE COURSES

*Department of Finance and Real Estate*

*College of Business*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Offered</th>
<th>Prerequisites</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>REL 360</td>
<td>Real Estate Principles</td>
<td>F, S, SS</td>
<td>AREC 202 or ECON 202</td>
<td>Broad survey of real estate emphasizing land use, urban structure and growth, market analysis, real estate finance and valuation, and property rights. (NT-O)</td>
</tr>
<tr>
<td>REL 367</td>
<td>Real Estate Law</td>
<td>S</td>
<td>BUS 205 or BUS 260 or HDFS 403</td>
<td>Legal regulations applicable to real property ownership and transfer, to real estate agents, and to use of real property. (NT-O)</td>
</tr>
<tr>
<td>REL 430</td>
<td>Real Estate Analysis and Marketing</td>
<td>F</td>
<td>REL 360</td>
<td>How the brain impacts real estate analysis and marketing; real estate economics; major property types; and marketing research process.</td>
</tr>
<tr>
<td>REL 435</td>
<td>Real Estate Marketing and Brokerage</td>
<td>S</td>
<td>REL 360</td>
<td>This is a partial semester course. Practitioner focus including legal forms, valuation, sales techniques, escrow, fiduciary requirements, start-to-finish real estate project. (NT-O)</td>
</tr>
<tr>
<td>REL 440</td>
<td>Real Estate Development</td>
<td>S</td>
<td>FIN 300; REL 360; REL 460</td>
<td>Development process including urban dynamics, architecture, construction, law, public approvals, financing, marketing, and property management.</td>
</tr>
<tr>
<td>REL 442</td>
<td>Real Estate Professional Development</td>
<td>S</td>
<td>REL 430</td>
<td>Career and skills development; learn negotiation and conflict resolution, performance skills; sales skills; networking skills.</td>
</tr>
<tr>
<td>REL 452/AREC452</td>
<td>Real Estate Appraisal Principles</td>
<td>S</td>
<td>AREC 202 or ECON 202; AREC 305 or REL 360</td>
<td>Theoretical principles that underlie real estate appraisal methods. (NT-O)</td>
</tr>
<tr>
<td>REL 453/AREC453</td>
<td>Real Estate Appraisal Practices</td>
<td>S</td>
<td>AREC or REL 452</td>
<td>Procedures and Practices used in real estate appraisal. (NT-O)</td>
</tr>
<tr>
<td>REL 455</td>
<td>Residential Real Estate Finance</td>
<td>F</td>
<td>REL 360</td>
<td>Residential mortgage origination, mortgage loan amortization; secondary markets, residential investment. (NT-O)</td>
</tr>
<tr>
<td>REL 460</td>
<td>Real Estate Finance and Investment</td>
<td>F</td>
<td>FIN 300 or FIN 305; REL 360</td>
<td>Financing of real estate resources: real estate financial markets, policies; use of leverage and real estate investment analysis in real estate investment programs.</td>
</tr>
<tr>
<td>REL 487</td>
<td>Real Estate Internship</td>
<td>Var[1-3]</td>
<td></td>
<td>Maximum of 3 credits allowed in course.</td>
</tr>
<tr>
<td>REL 495</td>
<td>Real Estate Independent Study</td>
<td>Var[1-3]</td>
<td></td>
<td>Maximum of 3 credits allowed in course.</td>
</tr>
<tr>
<td>REL 496</td>
<td>Real Estate Group Study</td>
<td>Var[1-3]</td>
<td></td>
<td>Maximum of 3 credits allowed in course.</td>
</tr>
</tbody>
</table>

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RESTAURANT/RESORT MANAGEMENT COURSES
Department of Food Science and Human Nutrition
College of Health and Human Sciences

RRM 101 03(3-0-0). Hospitality Industry. F, S.
Food service, lodging, and tourism industries; exploration of various industry segments and career opportunities.

RRM 200 03(3-0-0). Hotel Operations. F, S. Prerequisite: RRM 101.
Front office and room management as related to resorts and hotels. Computer application, financial controls, employee and guest relations.

RRM 310 03(3-0-0). Food Service Systems-Operations. F, S, SS.
Technical operations: menu planning, evaluation; recipe standardization; forecasting, food cost, sanitation, hospital food distribution systems. (NT-O)

RRM 311 03(3-0-0). Food Service Systems-Production and Purchasing. F, S, SS. Prerequisite: RRM 310.
Quantity food production principles, purchasing specifications, market channels. (NT-O)

Principles and practices of employee management in the hospitality industry including employment process, training, legal aspects, performance.

RRM 330 02(2-0-0). Alcohol Beverage Control and Management. F. Prerequisite: CHEM 103 or CHEM 107.
Classification, production, and service of controlled beverages; management of facilities and people; safe service training; financial controls.

RRM 350 03(3-0-0). Restaurant and Resort Marketing. F. Prerequisite: RRM 101.
Restaurant and resort operations marketing, including planning, promotion, and special industry considerations.

RRM 386 03(0-0-9). Practicum. F, S, SS. Prerequisite: RRM 101.
Practicum in Hospitality Management.

RRM 400 03(2-0-1). Food and Society. S. Prerequisite: PSY 100 or SOC 100; must have completed category 3D and 3E AUCC requirements.
Exploration of the influence of food, dining, and nutrition on cultural aspects of the human experience.

RRM 415 03(0-6-0). Catering Techniques and Culinary Arts. S. Prerequisite: RRM 311.
Management of advanced techniques in culinary technique; catering of food and beverages for special functions. ($)

RRM 340 04(0-8-0). Restaurant Operations. F, S. Prerequisite: RRM 101 or concurrent registration.
Principles, practices, philosophies, systems for daily operations of casual or fine dining restaurant; focus on developing solutions to problems.

RRM 460/NRRT 460 03(3-0-0). Event and Conference Planning. F, S. Prerequisite: NRRT 270 or RRM 101. Credit not allowed for both RRM 460 and NRRT 460.
Foundation in planning, organizing, and producing special events and conferences. Functions and strategies for effective event management.

RRM 487 03(0-0-9). Internship: Hospitality Management. F, S, SS.
Prerequisite: RRM 200; RRM 311 or concurrent registration; junior standing.

RRM 492 03(0-0-3). Seminar on Hospitality Management. F, S. Prerequisite: MKT 305.
Applying and synthesizing service knowledge and management functions; project discussions, benchmark presentations, execution of a capstone project. ($)

RRM 500 03(3-0-0). Understanding Food. F. Prerequisite: RRM 400.
Role of food in the creation of identity, as driver of technology, prominent role food plays in the media.

RRM 604 03(3-0-0). Research Methods in Food and Nutrition. S. Prerequisite: ERDM 606 or STAT 301 or STAT 311.
Research techniques used in food and nutrition disciplines. Emphasis on design, preparation, and evaluation of research.

RRM 686 01(0-4-0). Practicum-Food Service Management.
Food production, menu planning, nutritional analysis, and food costing.

° Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT subcode = State Guarantee Transfer course and AUCC subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
RS 300 03(3-0-0). Rangeland Conservation and Stewardship. F. Prerequisite: BZ 120 or LIFE 102.
Conservation and management of rangeland-ecosystem values using sustainable practices. (NT-O)

RS 310/F 310 03(2-2-0). Forest and Rangeland Ecogeography. F, S. Prerequisite: BZ 101 or BZ 104 or BZ 110 or BZ 120 or LIFE 102.
Distribution of wildland plant communities and identification of important grasses, forbs, shrubs and trees common in North America.

RS 312 01(0-2-0). Rangeland Plant Identification Lab. F. Prerequisite: Concurrent registration in RS 310.
Identification of characteristic grasses, forbs, and shrubs common to North American rangelands.

RS 329 01(0-3-0). Rangeland Assessment. SS. Prerequisite: SOCR 240; RS 300; RS 331.
Five-day intensive field-based course on principles of rangeland ecosystem assessment.

+RS 331 03(2-2-0). Wildland Plants and Plant Communities. F. Prerequisite: BZ 223 or NR 220. Required field trips.
Distribution of non-forested wildland plant communities and important plant species in the western United States. (NT-O)

+RS 351 03(2-2-0). Wildland Ecosystems in a Changing World. F. Prerequisite: LAND 220/LIFE 220 or LIFE 320, SOCR 240. Required field trips.
Understanding and conserving non-forested wildland ecosystems, processes, and services under changing environmental conditions.

RS 400 02(2-0-0). Rangeland Improvements. F. Prerequisite: RS 300 or SOCR 320.
Improvement of rangelands through biological and cultural methods; management of improved rangelands.

RS 420 03(1-4-0). Grass Taxonomy. S. Prerequisite: BZ 223.
Anatomy, morphology, and identification of grasses.

+RS 432 02(1-3-0). Rangeland Measurements and Monitoring. F. Prerequisite: NR 220; RS 300 or concurrent registration; STAT 201 or STAT 301 or STAT 307. Required field trips.
Vegetation sampling and field measurements emphasizing applications for monitoring and adaptive management. (S)

+RS 452 03(3-0-0). Rangeland Herbivore Ecology and Management. F, S, SS. Prerequisite: RS 300; LAND 220/LIFE 220 or LIFE 320. Voluntary field trips.
Ecology and management of large ungulate herbivores including consumer functions at organismal and ecosystem levels. (NT-O)

RS 470 02(2-0-0). Rangeland Economics and Analysis. F. Prerequisite: AREC 202 or ECON 202; RS 300.
Economics of rangeland resource use; analytical techniques for allocation of rangeland resources.

RS 471 02(2-0-0). Rangeland Planning and Grazing Management. F. Prerequisite: RS 300 or SOCR 320.
Definition of grazing management, grazing systems. Synthesis of animal, plant responses to grazing management. Structure, function of rangeland planning.

+RS 472 04(1-6-0). Rangeland Ecosystem Planning. S. Prerequisite: RS 471. Required field trips.
Range allotment, ranch and restoration planning. (S)

RS 478 03(3-0-0). Ecological Restoration. S. Prerequisite: BZ 450 or LAND 220/LIFE 220 or LIFE 320; SOCR 240. Credit not allowed for both RS 478 and NR 678.
Analysis of environmental factors influencing restoration of disturbed lands and practices for successful restoration of disturbed ecosystems.

RS 495 Var. Independent Study-Rangeland Ecosystem.
RS 496 Var. Group Study-Rangeland Ecosystem.
RS 500 03(3-0-0). Advanced Rangeland Management. F, S, SS. Prerequisite: One course in basic ecology. Rangeland management concepts. (NT-O)

RS 501 03(3-0-0). Range Habitat Manipulation. F. Prerequisite: RS 300 or SOCR 320. Improvement of range habitats and effects on ecosystem components.

+RS 520 02(2-0-0). Range Issues and Policy. F. Prerequisite: RS 300; SOCR 320.
Explores and evaluates current issues and policies concerning range use.

RS 531 03(2-3-0). World Grassland Ecogeography. F. Prerequisite: BZ 223
Distribution, climate, and structure of the world's major grasslands with emphasis on North America. (NT-O)

+RS 532 03(1-3-1). Rangeland Ecosystem Sampling. F. Prerequisite: STAT 301; one ecology course. Credit not allowed for both RS 532 and RS 432. Required field trips.
Measurement, analysis techniques for rangeland vegetation. Applications to management emphasized. (S)

RS 552 04(3-0-1). Range Animal Production and Management. F, S, SS. Prerequisite: One course in ecology; one course in animal or wildlife management.
Biological and ecological basis for production of meat from rangelands. Biological and ecological basis for production of meat from rangelands. (NT-O)

+RS 565 03(2-2-0). Riparian Ecology and Management. S. Prerequisite: LAND 220 or LIFE 220 or LIFE 320. Required field trips.
Analysis of interactions among biotic and abiotic processes as relates to the ecology and management of riparian systems, emphasizing case studies.

RS 630 03(3-0-0). Ecology of Grasslands and Shrublands. F. Prerequisite: RS 300. (S)
Selection of case studies emphasizing the ecological and management considerations of grassland and shrubland plant communities.

+RS 640 03(3-0-0). Vegetation-Environment Analysis. F. Prerequisite: STAT 301. Multivariate analyses and ecological interpretations of vegetation communities.

RS 651 04(3-2-0). Primary Production and Decomposition. F. Prerequisite: One course in plant physiology; one course in soils.
Energy transformations within primary producer compartment; dissipation of ecosystem biomass by decomposers, mineralization. (NT-O).

RS 693 01(1-0-0). Seminar.
RS 695 Var. Independent Study-Rangeland Ecosystem.
RS 696 Var. Group Study-Rangeland Ecosystem.
RS 698 Var. Research.
RS 793 01(0-0-1). Seminar.
RS 795 Var. Independent Study-Rangeland Ecosystem.
RS 798 Var. Research.
STUDY ABROAD
Nondepartmental
Office of International Programs
Office of Provost and Executive Vice President

SA 482 [Var] Study Abroad. (AUCC 3E).
Students participating in a semester study abroad program register for SA 482. This is not a course for credit.

SA 682 [Var] Graduate Study Abroad. Prerequisite: Approval of graduate committee, Graduate School, and International Programs.
Vehicle to allow graduate students to enroll in a study program abroad as part of their approved program. This is not a course for credit.

° Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
SOCIOLOGY COURSES
Department of Sociology
College of Liberal Arts

SOC 100 03(3-0-0). General Sociology. (GT-SS3, AUCC 3C). F, S, SS.
Analysis of human societies in the U.S. and abroad; major institutions, groups, and interaction patterns from the sociological perspective. (NT-O)

SOC 105 03(3-0-0). Social Problems. (GT-SS3, AUCC 3C). F, S.
Analysis of global and domestic social problems. (NT-O)

SOC 192 03(0-0-3). Civic Culture and Social Responsibility. S.
Erosion of civility in society with particular emphasis on civic culture on the university campus.

SOC 205 03(3-0-0). Contemporary Race-Ethnic Relations. (GT-SS3, AUCC 3E). F, S.
People of color and white ethnic groups in the U.S. and internationally. (NT-O)

SOC 210 03(3-0-0). Quantitative Sociological Analysis. F, S.
Prerequisite: Mathematics placement exam or one credit of 100-level mathematics.
Application of quantitative concepts and methodology to investigation of social problems.

SOC 220 03(3-0-0). Global Environmental Issues. F, S.
Relationship between human societies around the world and the larger natural environment.

SOC 253 03(3-0-0). Introduction to Criminal Justice. F, S, SS.
Criminal justice as a system. History, philosophy, components and administration of criminal justice.

SOC 301 03(3-0-0). Development of Sociological Thought. F, S.
Prerequisite: SOC 100 or SOC 105.
Central themes in sociological thought from Enlightenment to present. (NT-O)

SOC 302 03(3-0-0). Contemporary Sociological Theory. F, S, SS.
Prerequisite: SOC 100 or SOC 105.
Theoretical approaches and models in sociology.

SOC 311 03(3-0-0). Methods of Sociological Inquiry. F, S, SS.
Prerequisite: SOC 100 or SOC 105; MATH 118.
Application of sociological concepts to sociological problems including problem formulation, data gathering, and research design. (NT-O)

SOC 313 01(1-0-0). Computer Methods in Sociology. F.
Prerequisite: SOC 210.
Experimental introduction to typical uses of computers in sociology with emphasis on data analysis. (NT-O)

SOC 320 03(3-0-0). Population-Natural Resources and Environment. F.
Prerequisite: SOC 100 or SOC 105.
Population studies; world growth patterns and their relationship to natural resources and environment. (NT-O)

SOC 321 03(3-0-0). Soil, Environment, and Society. F, S.
Prerequisite: SOC 100 or SOC 105.
Role of soil in our environment and its value as it relates to the social and economic well-being of society.

SOC 322 03(3-0-0). Introduction to Environmental Justice. F, S.
Prerequisite: SOC 100 or SOC 105.
Unequal distribution of environmental risks, benefits, policies and regulatory practices across different populations.

SOC 323 03(3-0-0). Sociology of Environmental Governance. S.
Prerequisite: SOC 100 or SOC 105; minimum of 30 credits.
Roles of government and civil society in creating environmental problems and in developing effective responses to those problems.

SOC 330 03(3-0-0). Social Stratification. F.
Prerequisite: SOC 100 or SOC 105.
Theories of social inequality and mobility and their ramifications in American society. (NT-O)

SOC 332 03(3-0-0). Comparative Majority-Minority Relations. S.
Prerequisite: SOC 100 or SOC 105.
Discrimination, ideology, power, policy issues in the U.S. and selected societies; application of basic concepts in student’s self appraisal. (NT-O)

SOC 333 03(3-0-0). Gender and Society. F.
Prerequisite: SOC 100 or SOC 105.
Analysis of social organization of gender in contemporary society, emphasizing gendered experiences and institutional linkages.

SOC 340 03(3-0-0). Bureaucracy and Modern Organizations. S.
Prerequisite: SOC 100 or SOC 105.
Structure and function of large-scale organization: coordination of activities between organizations and society.

SOC 341 03(3-0-0). Sociology of Rural Life. S.
Prerequisite: SOC 100 or SOC 105.
Rural life in U.S. and Third World societies: analysis of sociocultural systems, social differentiation, social institutions, and problems of social change. (NT-T)

SOC 342 03(3-0-0). Leisure and Society. F, S, SS.
Prerequisite: SOC 100 or SOC 105.
Nature and purpose of leisure and work in society; influences of culture and social structure on leisure values and behavior.

SOC 343 03(3-0-0). Sport and Society. F.
Prerequisite: None.
Sport as a microcosm of American society focusing on sport and values, socialization, institutions, stratification, race, and gender.

SOC 352 03(3-0-0). Criminology. F, S, SS.
Prerequisite: SOC 100 or SOC 105.
Crime in contemporary society; behavioral, causation, prevention, and justice issues. (NT-O)

SOC 353 03(3-0-0). Criminal Investigations. F.
Prerequisite: SOC 100 or SOC 105.
Examination of the social, organization, and applied facets of the criminal investigation process.

SOC 354 03(3-0-0). Law Enforcement and Society. F, S.
Prerequisite: SOC 100 or SOC 105; SOC 253.
Rise and development of law enforcement as a societal reaction to crime.

SOC 358 03(3-0-0). Correctional Organizations. S.
Prerequisite: SOC 100 or SOC 105; SOC 253.
Social and organizational issues in the administration of punishment and correction.

SOC 360 03(3-0-0). Political Sociology. F.
Prerequisite: SOC 100 or SOC 105.
Analysis of power as a sociological concept, emphasizing competing theories of the state and power.

SOC 362 03(3-0-0). Social Change. F.
Prerequisite: SOC 100 or SOC 105.
Sources of stability and stress in changing societies, consequences of planned and unplanned change; future trends.

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SOC 364 03(3-0-0). Agriculture and Global Society. S. Prerequisite: SOC 100 or SOC 105.
Analysis of relationships between global agriculture and social change.

SOC 366 03(3-0-0). Peoples and Institutions of Latin America. F. Prerequisite: SOC 100 or SOC 105.
Change in the cultures and institutions of contemporary Latin America.

SOC 371 03(3-0-0). Symbolic Interaction. F, S. Prerequisite: SOC 100 or SOC 105.
Basic concepts and issues in sociological perspective of social action and interactionism.

SOC 372 03(3-0-0). Sociology of Deviance. F, S. SS. Prerequisite: SOC 100 or SOC 105.
Description, comparison, and analysis of theories and research of deviance. (NT-O)

SOC 375 03(3-0-0). Sociology of Religion and Medicine. F. Prerequisite: SOC 100 or SOC 105.
Descriptions and analyses of the roles and relationships of religion and medicine as modern social institutions.

SOC 403 03(0-0-3). Capstone Seminar. F, S. Prerequisite: SOC 210 or SOC 2**; SOC 301 or SOC 302; SOC 311; SOC 313.
Student demonstration of central concepts and procedures currently employed in sociology discipline.

*SOC 422/*ANTH 422 03(3-0-0). Comparative Legal Systems. S. Prerequisite: ANTH 100 or SOC 100. Credit not allowed for both SOC 422 and ANTH 422.
Traditional approaches to law, competing concepts of law in the global system and experiences of minorities in state legal systems.

*SOC 429 03(3-0-0). Comparative Urban Studies. S. Prerequisite: SOC 100 or SOC 105.
World urbanization and metropolitan development, measurement of growth and change in cities, and sociological perspective in planning.

SOC 431 04(3-2-0). Community Dynamics and Development. F, S. Prerequisite: SOC 100 or SOC 105; SOC 311.
Nature of community; its institutions, problems and processes, including growth, disintegration, and development.

SOC 444/ETST 444 03(3-0-0). Federal Indian Law and Policy. S. Prerequisite: None. Credit not allowed for both SOC 444 and ETST 444.
Indian policy processes and their impact on Native lives and culture, particularly Native sovereignty.

SOC 450 03(3-0-0). Gender, Crime, and Criminal Justice. F. Prerequisite: SOC 100 or SOC 105.
Issues related to women as offenders, victims, and professionals in the criminal justice system.

SOC 455 03(3-0-0). Sociology of Law. F. Prerequisite: SOC 100 or SOC 105; SOC 253.
Social origins, functions, and procedures of law in society.

SOC 460 03(3-0-0). Society and Environment. S. Prerequisite: SOC 100 or SOC 105.
Technology as a social phenomenon interacting with social organization and the natural environment.

SOC 461 03(3-0-0). Water, Society, and Environment. F, S, SS. Prerequisite: SOC 100 or SOC 105.
Social aspects of water resource utilization; interface of social organization with physical environment. (NT-O)

SOC 462 03(3-0-0). Applied Social Change. S. Prerequisite: SOC 100 or SOC 105.
Applied sociology with a focus on research and practice designed to foster social change.

SOC 463 03(3-0-0). Sociology of Disaster. S. Prerequisite: SOC 100 or SOC 105.
Determinants and consequences of behavior and response to environmental extremes including floods, earthquakes, wind, severe storms, and technological emergencies. (NT-O)

*SOC 474 03(0-0-3). Social Movements and Collective Behavior. S. Prerequisite: SOC 100 or SOC 105.
Theory and research on causes, organizational structure, and outcomes of social movements and collective behavior.

SOC 482A-B 03(2-0-1). Travel Abroad. SS. Prerequisite None.

SOC 487 03(0-9-1). Internship. Prerequisite: SOC 210; SOC 301 or SOC 302; SOC 311; SOC 313.
Academic-based work experience with selected organizations or agencies. Supervised application of sociological principles and seminar participation.

SOC 492 01(0-0-1). Seminar. F, S, SS. Prerequisite: SOC 210 or 2**; SOC 301 or SOC 302; SOC 311; SOC 313; concurrent registration in SOC 487.
Examination of work-oriented instruction in seminar setting where sociological principles are analyzed using internship experience.

SOC 495 Var. Independent Study.

SOC 500 01(1-0-0). The Sociological Profession I. F. Prerequisite: Fifteen credits in sociology.
Examination of issues and values affecting sociology as a profession.

SOC 501 03(3-0-0). The Sociological Profession II. F. Prerequisite: Fifteen credits in sociology.
Examination of the activities and procedures critical to the socialization of professional sociologists.

SOC 502 03(3-0-0). Foundations of Theoretical Sociology. F. Prerequisite: SOC 500 or concurrent registration.
Contributions of major sociological theorists prior to mid-20th century.

*SOC 503 03(3-0-0). Contemporary Sociological Theory. S. Prerequisite: SOC 502.
Contributions of major sociological theorists since mid-20th century.

*SOC 510 03(3-0-0). Sociological Methods I. F. Prerequisite: SOC 210 or SOC 311.
Linkage of sociological theory and conceptual models; case studies; data-gathering techniques.

*SOC 511 03(3-0-0). Sociological Methods II. S. Prerequisite: SOC 510.
Linkage of sociological theory and conceptual models; case studies; data-gathering techniques.

SOC 540 03(3-0-0). Community Sociology. F. Prerequisite: SOC 500.
Intellectual roots of community sociology and contemporary community studies.

SOC 555 03(0-0-3). Society, Deviance, and Crime. F. Prerequisite: 12 credits of sociology at the 300 level or above.
Sociological perspectives and research in the areas of deviance and crime, including classical, positivist, and critical approaches.

° Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
SOC 562/AGRI 562 03(2-0-0-1). Sociology of Food Systems and Agriculture. F. S.
How agricultural choices generate intended and unintended consequences for human communities and the natural environment.

SOC 564 03(3-0-0-0). Environmental Justice. S. Prerequisite: SOC 100 or SOC 105.
Unequal distribution of environmental risks, benefits, policies and regulatory practices across different populations.

SOC 566/AREC 566 03(3-0-0-0). Contemporary Issues of Developing Countries. S. Prerequisite: Two or more courses in AREC or ECON or SOC. Credit not allowed for both SOC 566 and AREC 566.
Social, economic, and technological factors in developing countries.

SOC 610 03(0-0-0-3). Seminar in Methods of Qualitative Analysis. S. Prerequisite: POLS 620 or concurrent registration or SOC 311. Credit not allowed for both SOC 610 and POLS 621.
Examination and application of qualitative techniques of analysis.

SOC 612 03(0-0-0-3). Seminar in Methods of Evaluational Research. S. Prerequisite: SOC 511.
Quantitative and qualitative techniques of evaluating social action programs.

SOC 613 03(0-0-0-3). Seminar in Multiple Regression and Path Analysis. F. Prerequisite: SOC 511.
Analysis and application of techniques for multiple regression and path analysis.

SOC 614 03(3-0-0). Comparative Sociology. S. Prerequisite: SOC 500.
Examination of problems and prospects in extending and carrying out sociological research across social systems.

SOC 630 03(3-0-0-0). Social Stratification. S. Prerequisite: SOC 500.
Theory and research on class structure, status attainment, ideology, and social change.

SOC 631 03(3-0-0-0). Sociology of Rural Development. F. Prerequisite: SOC 500.
Rural social organization and development, modernization, and social change as it relates to rural social systems, underdeveloped regions of the world.

SOC 633 03(3-0-0-0). Theories of Modern Organizations. S. Prerequisite: SOC 340.
Comparison of various theoretical perspectives on functioning of modern large-scale organizations.

SOC 63903(3-0-0-0). Technology Assessment and Social Forecasting. F. Prerequisite: SOC 500.
Interrelationships between technology and society emphasizing procedures for evaluating impacts and forecasting alternatives.

SOC 660 03(3-0-0-0). Theories of Development and Social Change. F. Prerequisite: SOC 500.
Central concepts, issues, and approaches in sociology of development.

SOC 661 03(0-0-0-3). Gender and Global Society. S. Prerequisite: SOC 500.
Gender relations and social change in global society.

SOC 662 03(0-0-0-3). Seminar in Sociological Policy Analysis. S. Prerequisite: SOC 500.
Examination of sociological perspectives on formulation and impact of policies to deal with social problems.

SOC 663 03(3-0-0-0). Sociology of Sustainable Development. S. Prerequisite: SOC 500.
Social dimensions of sustainable Third World development and implications for policy.

SOC 664 03(3-0-0-0). Sociology of Water Resources. F. Prerequisite: SOC 500.
Social organization, conflict, and power in arid environments.

SOC 665 03(3-0-0-0). Sociology of Science and Technology. F. Prerequisite: Ten credits of undergraduate natural sciences; SOC 100.
Examination of connections among science, technology, and social development in national and global context.

SOC 666 03(0-0-0-3). Globalization and Socioeconomic Restructuring. S. Prerequisite: SOC 500.
Sociological theories and issues in globalization; socioeconomic restructuring of the world economy.

SOC 667 03(3-0-0-0). Theories of State, Economy, and Society. S. Prerequisite: SOC 500.
Major classical and contemporary sociological theories of state-economy-society relations emphasizing development.

SOC 668 03(3-0-0-0). Environmental Sociology. S. Prerequisite: SOC 500.
Connections between social organizations, the environment, and science and technology.

SOC 669 03(0-0-0-3). Global Inequality and Change. F. Prerequisite: SOC 500.
Major issues in global inequality and change from a historical and contemporary perspective.

SOC 671 03(0-0-0-3). Metatheoretical Issues in Sociology. F. Prerequisite: SOC 502.
Analysis of metatheoretical concepts and issues in sociological theory.

SOC 693A-D 03(0-0-0-3). Seminar. S. Prerequisite: SOC 602.

SOC 695 Var. Independent Study.

SOC 696 Var[1-3]. Group Study. Maximum of 8 credits allowed in course.


SOC 752 03(0-0-0-3). Seminar in Utopian Thought. F. Prerequisite: SOC 602.
Sociological analysis of major utopian writings.

SOC 784 Var. Supervised College Teaching.

SOC 787 Var. Internship.

SOC 793-A-D 03(0-0-0-3). Seminar. S. Prerequisite: SOC 511.

SOC 795 Var. Independent Study.

SOC 799 Var. Dissertation.

Alternate year offering (odd); * Alternate year offering (even); § Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT = State Guarantee Transfer course and AUCC subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
SOIL AND CROP SCIENCES COURSES  
Department of Soil and Crop Sciences  
College of Agricultural Sciences

SOCR 100 04(3-2-0). General Crops. F. Prerequisite: None.  
Production and adaptation of cultivated crops; principles affecting growth, development, management, and utilization.

SOCR 171/HORT 171 03(2-0-1). Environmental Issues in Agriculture. (GT-SS3, AUCC 3E). F. Prerequisite: None. Credit not allowed for both SOCR 171 and HORT 171.  
Historical development of agriculture; environmental consequences of modern food production and other cultural approaches to agriculture.

SOCR 177 01(3-0-0). Applied Information Technology in Agriculture. S. Prerequisite: None.  
Introduction to database and project management, GIS/GPS, and remote sensing as they apply to agriculture, the environment, and business management.

SOCR 192 03(0-0-3). Water in the West. F. Prerequisite: None.  
History and current status of water resources management and policy in the western United States.

SOCR 200 01(0-2-0). Seed Anatomy and Identification. F, S, SS. Prerequisite: BZ 104 or BZ 110 or BZ 120 or HORT 100 or LIFE 102 or SOCR 100.  
Principles of seed anatomy including reproduction, identification, and seed characteristics of plant families. (NT-C/O)

SOCR 201 01(0-2-0). Seed Development and Metabolism. F, S, SS. Prerequisite: BZ 104 or BZ 110 or BZ 120 or HORT 100 or LIFE 102 or SOCR 100.  
Basic processes controlling seed development, maturation, dormancy, storage, germination, and how these factors relate to seedling growth. (NT-C/O)

SOCR 240 04(3-2-0). Introductory Soil Science. F, S. Prerequisite: CHEM 107 or CHEM 111.  
Formation, properties, and management of soils emphasizing soil conditions that affect plant growth.

SOCR 300 02(0-4-0). Seed Purity Analysis. F, S, SS. Prerequisite: SOCR 201 or written consent of instructor.  
Fundamentals for determining physical purity of a seed lot using established rules and procedures. (NT-C/O)

SOCR 301 02(0-4-0). Seed Germination and Viability. F, S, SS. Prerequisite: SOCR 201 or written consent of instructor.  
Seed viability tests including standard germination and tetrazolium, seed viability, dormancy, parameters of viability and evaluation. (NT-C/O)

SOCR 310 02(0-4-0). Agronomic Plant and Seed Identification. S. Prerequisite: BZ 104 or BZ 110 or BZ 120 or HORT 100 or LIFE 102 or SOCR 100.  
Evaluate characteristics needed to identify agronomic plant and seed species.

SOCR 320 03(3-0-0). Forage and Pasture Management. S. Prerequisite: None. Credit not allowed for both SOCR 320 and RS 320.  
Fundamentals of establishment, management, and utilization of cultivated forages including hay, silage, and pasture production. (S)

SOCR 322 03(3-0-0). Principles of Microclimatology. S. Prerequisite: Three credits in PH.  
Principles of microclimatology including energy balance concepts for soil and vegetation surfaces, and their application.

SOCR 330 03(3-0-0). Principles of Genetics. F, S, SS. Prerequisite: BZ 110 or BZ 120 or LIFE 102.  
Transmission, population, and molecular genetics; practical applications.

SOCR 331 01(0-2-0). Genetics Laboratory. F, S. Prerequisite: SOCR 330 or concurrent registration.  
Experimental techniques in transmission and molecular genetics.

*SOCR 341 01(1-0-0). Microbiology for Sustainable Agriculture. S. Prerequisite: SOCR 240.  
Functional roles and management of soil organisms in organic agriculture, emphasis on ecological interactions with plants and plant pathogens.

*SOCR 342 01(1-0-0). Organic Soil Fertility. F. Prerequisite: SOCR 240; SOCR 341; SOCR 350.  
Organic soil fertility management in framework of holistic organic farming system. ($)

*SOCR 343 01(1-0-0). Composting Principles and Practices. F. Prerequisite: SOCR 240; SOCR 350.  
Fundamentals of compost production, use, and regulation. ($)

*SOCR 344 01(1-0-0). Crop Development Techniques. S. Prerequisite: BZ 120 or LIFE 102 or LIFE 103.  
Conventional and transgenic approaches to crop variety development.

*SOCR 345/HORT 345 02(0-4-0). Diagnosis and Treatment in Organic Fields. SS. Prerequisite: BSPM 302 or BSPM 308 or BSPM 361; HORT 100 or SOCR 100; SOCR 240. Credit not allowed for both SOCR 345 and HORT 345.  
Field experience in diagnosis of pest and nutrient problems on organic farms and development of treatment recommendations. ($)

SOCR 350 03(3-0-0). Soil Fertility Management. F. Prerequisite: SOCR 240.  
Managing soil fertility and fertilizers to meet plant nutrient requirements in an environmentally sound manner with emphasis on nutrient cycling.

SOCR 351 01(0-2-0). Soil Fertility Laboratory. F. Prerequisite: SOCR 350 or concurrent registration.  
Soil chemical analyses and development of fertilizer recommendations for crops. ($)

SOCR 370 02(2-0-0). Irrigation Principles. S. Prerequisite: HORT 100 or SOCR 100 or BZ 120; SOCR 240.  
Determination of irrigation water requirements based on the estimation of storage and movement of water in the soil-plant-atmospheric system.

+SOCR 371 01(1-0-0). Irrigation of Field Crops. F. Prerequisite: SOCR 370.  
Management of irrigation systems for field crops with emphasis on irrigation methods, irrigation scheduling and strategies for water conservation. Required field trips.

+SOCR 377 03(2-2-0). Geographic Information Systems in Agriculture. F. Prerequisite: Three credits in SOCR or CS. Credit allowed for only one of the following: SOCR 377 or CIVE 377 or SOCR 577.  
Introduction to geographic information systems and global positioning systems with applications to agriculture. ($)

SOCR 384 Var[1-5]. Supervised College Teaching. F, S, SS. Prerequisite: None. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

+SOCR 400 03(2-2-0). Soils and Global Change: Science and Impacts. F. Prerequisite: LIFE 220 or LIFE 320; SOCR 240. Required field trips.  
Foundations on the science of global change and its impact on soil processes and biota.

° Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCsubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
SOCR 410 01(1-0-0). Seed Processes: Storage and Deterioration. F, S, SS. Prerequisite: BZ 104 or BZ 105 or BZ 120.

Environmental conditions and management factors influencing storage and deterioration of seeds, including physiological and biochemical changes. (NT-C/O)

SOCR 411 01(1-0-0). Large Seeded Legume Seed Production. F, S, SS. Prerequisite: BZ 104 or BZ 105 or BZ 120.

Principles for seed production of large-seeded legume crops with emphasis on common bean, peanut and soybean. (NT-C/O)

SOCR 412 01(1-0-0). Seed Processes: Separation and Conditioning. F, S, SS. Prerequisite: SOCR 100.

Understanding the physical process required to separate pure seed from contaminants and maintain viability. (NT-C/O)

SOCR 420 03(3-0-0). Crop and Soil Management Systems I. S. Prerequisite: HORT 100 or SOCR 100; SOCR 240.

Principles of crop, soil management emphasizing crop growth and development, interactions with soil organic matter.

SOCR 421 04(3-2-0). Crop and Soil Management Systems II. F. Prerequisite: HORT 100 or SOCR 100; SOCR 240.

Principles of crop and soil management with emphasis on soil erosion control, water conservation, and plant-water relationships. ($)

*SOCR 424/HORT 424 03(3-0-0). Topics in Organic Agriculture. S. Prerequisite: AREC 202 or ECON 202; AREC 328; HORT 100 or SOCR 100; SOCR 171/HORT 171; SOCR 240. Credit not allowed for both SOCR 424 and HORT 424.

Examination of issues specific to organic food production systems and marketing.

*SOCR 430 03(3-0-0). Applications of Plant Biotechnology. S. Prerequisite: SOCR 330.

Current and potential applications of DNA-based biotechnology in crop agriculture and other plant disciplines.

SOCR 440 04(2-3-1). Pedology. F. Prerequisite: None.

Process of soil formation, characterization, classification of soils; soil survey methods. ($)

SOCR 441 03(2-3-0). Soil Ecology. S. Prerequisite: SOCR 455.

An integrative, hands-on experience in the theory and application of ecology principles to the soil environment.

SOCR 442 03(3-0-0). Forest and Range Soils. S. Prerequisite: None.

Soil and water relationships in forest and rangeland ecosystems; significant properties in their management.

SOCR 455 03(3-0-0). Soil Microbiology. F. Prerequisite: MIP 300 or SOCR 240.

Microbial activities in agricultural, forest, and grassland soils; in soil-plant relationships; and in maintenance of environmental quality.

SOCR 456 01(0-3-0). Soil Microbiology Laboratory. F. Prerequisite: SOCR 455 or concurrent registration.

Techniques used in study of ecology and activities of soil microorganisms.

*SOCR 460/HORT 460 03(2-0-1). Plant Breeding. F. Prerequisite: BZ 350 or concurrent registration or LIFE 201A or concurrent registration or SOCR 330 or concurrent registration. Credit not allowed for both SOCR 460 and HORT 460.

Theory and practice of plant breeding using principles of genetics and related sciences.

*SOCR 461/HORT 461 01(0-2-0). Plant Breeding Laboratory. F. Prerequisite: SOCR 460/HORT 460 or concurrent registration. Credit not allowed for both SOCR 461 and HORT 461.

Techniques and procedures used in public and commercial plant breeding programs.

SOCR 467 03(3-0-0). Soil and Environmental Chemistry. S. Prerequisite: CHEM 335.

Fundamental principles of soil chemistry with respect to environmental reactions between soils and other natural materials and priority pollutants.

SOCR 470 03(3-0-0). Soil Physics. F. Prerequisite: SOCR 240 or GEOL 232.

Physical properties of soils emphasizing mechanical composition, moisture, aeration, temperature, and structure related to management, plant growth.

SOCR 471 01(0-3-0). Soil Physics Laboratory. F. Prerequisite: SOCR 470 or concurrent registration.

Familiarization of techniques and equipment used in evaluation of soil physical properties.

*SOCR 475 03(3-0-0). Global Challenges in Plant and Soil Science. S. Prerequisite: SOCR 240 or GEOL 122; LIFE 102 or BZ 120.

Evaluation of case studies to define problems and develop solutions to address global challenges in plant and soil science.

SOCR 478 03(3-0-0). Environmental Soil Sciences. S. Prerequisite: SOCR 467 or concurrent registration; SOCR 470.

Chemical, biological, and physical aspects of prevention and remediation of soil and water pollution; environmental impact assessment.

SOCR 479 01(0-3-0). Environmental Soil Science Laboratory. S. Prerequisite: SOCR 478 or concurrent registration.

Laboratory and field studies of soil and groundwater contamination, including monitoring and remediation.

SOCR 486 Var[1-4]. Practicum. Prerequisite: Written consent of instructor.

Directed experiences in the application of soil and crop science principles.

SOCR 487 Var[1-12]. Internship.

SOCR 490 01(0-0-1). Hydrus-1D Workshop. S. Prerequisite: SOCR 470.

Using Hydrus-1D software for flow and transport of water, heat, and chemicals in soil.

SOCR 492 01(0-0-1). Seminar.

SOCR 495 Var. Independent Study.

SOCR 496 Var. Group Study.

SOCR 498 Var[1-6]. Undergraduate Research. Prerequisite: Written consent of instructor.

Research in soil and crop sciences.

SOCR 514/STAT 514 04(3-3-0). Agricultural Experimental Design and Analysis. S. Prerequisite: STAT 201 or STAT 301 or STAT 307.

Credit allowed for only one of the following: SOCR 414, SOCR 514, STAT 350, or STAT 514.

Design and implementation of agricultural experiments and statistical analysis of resulting data.

SOCR 522 03(3-0-0). Micrometeorology. S. Prerequisite: Three credits in PH.

Microenvironments; physics of environmental variables; plant canopy microclimate; evapotranspiration; surface-atmosphere exchange; instrumentation.
SOCR 530/BSPM 530 01(1-0-0). Scientific Writing. S. Prerequisite: None. Credit not allowed for both SOCR 530 and BSPM 530.

Skills necessary to prepare complete scientific journal articles including writing, editing, and literature searching and assessment.

*SOCR 535 03(3-0-0). Origin and Evolution of Cultivated Plants. F. Prerequisite: SOCR 330.

Origin of crops from viewpoints of archaeology, history, botany, and taxonomy, and continued evolution of plants under cultivation.

*SOCR 540 03(3-0-0). Soil-Plant-Nutrient Relationships. S. Prerequisite: SOCR 350.

Soil and plant factors affecting nutrient uptake, mechanistic models of uptake, availability and functions of essential elements, diagnostic techniques.

*SOCR 550 03(3-0-0). Advanced Soil Genesis. S. Prerequisite: SOCR 440.

Modern concepts of specific mechanisms involved in formation of genetic soil groups and their relationship to environmental factors.

SOCR 567 04(3-0-1). Environmental Soil Chemistry. S. Prerequisite: CHEM 335. Credit not allowed for SOCR 467 and SOCR 567.

The chemistry of terrestrial environments and the interactions of soil constituents with bacteria, nutrients, and pollutants.

*SOCR 570 01(1-0-0). Plant Breeding for Drought Tolerance. F. Prerequisite: SOCR 330; SOCR 460. Offered as a nontraditional online course only through the Division of Continuing Education.

Principles and practices of evaluation, selection and cultivar development for crops in drought-stress environments with emphasis on agronomic crops. (NT-O)

SOCR 571 02(2-0-0). Foundations of Soil Science. S. Prerequisite: SOCR 240.

Importance of soils in ecology and earth system science with regard to the study and management of the soil resource.

+SOCR 577 03(2-2-0). Principles/Components: Precision Agriculture. F. Prerequisite: Three credits in SOCR or CS. Credit allowed for only one of the following: CIVE 377 or SOCR 377 or SOCR 577.

Principles and components of precision agriculture, including GPS, GIS, remote sensing, and their applications in soil and crop management. (S)

*SOCR 620 03(2-3-0). Modeling Ecosystem Biogeochemistry. F. Prerequisite: MATH 155 or MATH 160; LAND 220/LIFE 220 or SOCR 240 or ECOL 505.

Model design and build biogeochemical process and ecosystem models with GUI-based software. Analyze and test models and interpret experimental data.

*SOCR 640 01(1-0-0). Crop Physiology. F. Prerequisite: BZ 440.

Developmental, physiological, and biochemical determinants of crop yields as controlled by genetic and environmental effects.

SOCR 650 01(1-0-0). Research Proposal Development. F. Prerequisite: Graduate standing.

Skills to develop and write an effective scientific research proposal.

*+SOCR 670 03(2-2-0). Terrestrial Ecosystems Isotope Ecology. S. Prerequisite: None.

Isotopes distribution in biogeochemical cycles; research topics in biosphere-atmosphere interactions; lab experience with isotope techniques. Field trips required.

SOCR 675 01(1-0-0). Presentations for Scientific Audiences. F. Prerequisite: None.

Organization and presentation of scientific information to audiences in oral and poster format.


SOCR 720A-B 02(2-0-0). Advanced Plant Breeding. Prerequisite: HORT 460/SOCR 460; 3 credits in STAT.


*SOCR 725 03(2-2-0). Quantitative Inheritance in Plant Breeding. S. Prerequisite: None.

Quantitative genetic structure of populations, recognition of genetic, environmental variance. Methods of dealing with quantitatively inherited traits.

SOCR 730 01(1-0-0). Topics in Plant Breeding and Genetics. F. Prerequisite: None.

Current literature regarding mechanisms used for plant improvement.

*SOCR 731 01(1-0-0). Plant Breeding Data Management. F. Prerequisite: Three credits in computer science.

Principles and best practices for optimal data management for plant breeding and other data-intensive research programs.

*SOCR 740/BSPM 740 03(3-0-0). Plant Molecular Genetics. F. Prerequisite: BC 351; SOCR 330. Credit not allowed for both SOCR 740 and BSPM 740.

Advances in study of organization and function of nuclear and organelar genomes, gene expression in higher plants, and plant-microbe interactions.

*SOCR 755 03(3-0-0). Advanced Soil Microbiology. S. Prerequisite: MIP 624 or SOCR 455.

Ecology of soil microorganisms emphasizing population and activity relationships, nitrogen fixation, and microbe-pesticide interactions.

*SOCR 760 03(3-0-0). Advanced Soil Chemistry. F. Prerequisite: Four semesters of chemistry; one course in computer science; one semester of calculus.

Surface chemistry of soils, electrical double layer models of surface charge and potential, colloid stability, computer modeling of adsorption.

*SOCR 770 04(3-2-0). Advanced Soil Physics. S. Prerequisite: MATH 261 or SOCR 470.

Description and analysis of principles of storage and movement of water, solutes, heat, and gases in soils.

SOCR 784 Var. Supervised College Teaching.

SOCR 792 01(0-0-1). Seminar.

SOCR 795 Var. Independent Study.

SOCR 796 Var. Group Study.

SOCIAL WORK COURSES  
School of Social Work  
College of Health and Human Sciences

SOWK 110 03(2-0-1). Contemporary Social Welfare. (GT-SS3, AUCC 3C)  F, S, SS. Prerequisite: None.  
Principles, values and institutions of U.S. social welfare in context of human need within family, groups, and society.

SOWK 150 03(3-0-0). Introduction to Social Work.  F. S. Prerequisite: PSY 100 or concurrent registration; SOC 100 or concurrent registration or SOC 105 or concurrent registration.  
Introduction to social work; history of social welfare in the U.S.; overview of knowledge, values, skills, practice settings, and populations served. (NT-T)

SOWK 233 03(3-0-0). Human Behavior in the Social Environment.  F, S. Prerequisite: HDFS 101 or concurrent registration; SOWK 150 or concurrent registration.  
Understanding human behavior theory relevant to social work practice.

SOWK 286A-B 03(0-3-2). Practicum. Prerequisite: SOWK 233 or concurrent registration.  
Introductory social work practice skills in communication, relationship development, and professional behavior.  A) Practicum I.  B) Practicum II.

SOWK 300 03(3-0-0). Research in Applied Professions.  F, S, SS. Prerequisite: Completion of AUCC 1B mathematics requirement.  
Application of social science research methodology to applied professions including problem formulation, research design, and data collection.

SOWK 330 03(3-0-0). Human Diversity Practice Issues.  F, S. Prerequisite: SOWK 233 or concurrent registration.  
Knowledge about human differences and similarities essential for social work practice.

SOWK 340 03(0-0-3). Generalist Practice-Individuals and Families.  F, S. Prerequisite: SOWK 286B or concurrent registration; progression into the major.  
Knowledge and techniques used in applying the generalist planned change process to individual and family system assessments and interventions.

SOWK 341 03(0-0-3). Generalist Practice-Small Groups.  F, S. Prerequisite: SOWK 340 or concurrent registration.  
Within a generalist framework, focuses on the knowledge, skills, and competencies needed for the planned change process in groups.

SOWK 342 03(1-0-2). Generalist Practice-Organizations/Communities.  F, S. Prerequisite: SOWK 340 or concurrent registration.  
Knowledge regarding the planned change process with organizations and communities.

SOWK 350 03(0-0-3). Legal Issues in Human Services.  SS. Prerequisite: None.  
Legal principles, procedures, and issues relevant to social work including policy research and courtroom testimony. (NT-O)

SOWK 352/ETST 352 03(3-0-0). Indigenous Women, Children and Tribes.  F. Prerequisite: None. Credit not allowed for both SOWK 352 and ETST 352.  
Historical and contemporary lives of women, children, and tribal communities.

Application of practice processes with selected populations.  A) Children and families. F, S. B) Juvenile offenders. F.

SOWK 384 Var[1-5]. Supervised College Teaching. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.  
Assist instructor in teaching selected classes, group training, or discussion group leadership.

SOWK 410 03(2-0-1). Social Welfare Policy.  F, S. Prerequisite: SOWK 342 or concurrent registration.  
Issues and processes shaping social welfare institutions; definitions of social welfare policy; analytical framework for policy analysis.

SOWK 450/IE 450 03(3-0-0). International Social Welfare and Development.  F. Prerequisite: None. Credit not allowed for both SOWK 450 and IE 450.  
Framework of social welfare and development in international area; social need with focus on cultures/countries in transition.

SOWK 488 Var[5-10]. Field Placement.  F, S, SS. Prerequisite: AHS 300 or concurrent registration; SOWK 330; SOWK 341; SOWK 342; SOWK 410 or concurrent registration. Maximum of 10 credits allowed in course.  
Engagement, assessment, interventions, and evaluation at multiple levels of service as well as mastery of foundation practice roles(S).

SOWK 492 03(2-0-1). Seminar. Prerequisite: SOWK 488 or concurrent registration.  
Integrates theory with social work core competencies and practice behaviors while in field placement.

SOWK 495 Var[1-12]. Independent Study.

SOWK 496 Var[1-12]. Group Study.

SOWK 500 03(3-0-0). Principles and Philosophy of Social Work.  F, S, SS. Prerequisite: Admission to the MSW program. Blended format is a partial-semester course.  
Knowledge, values, history, and philosophy of social work. (NT-B)

SOWK 511 03(0-0-3). Generalist Practice-Small Client Systems.  F. Prerequisite: SOWK 500 or concurrent registration; concurrent registration in SOWK 515.  
Generalist practice perspective. Practice knowledge and skills related to intervention with individuals and families within a systems framework.

SOWK 512 01(0-2-0). Small Client Systems Skills Laboratory.  F. Prerequisite: SOWK 511; concurrent registration in SOWK 588.  
Application of communication and relationship skills for professional practice.

SOWK 515 04(3-0-1). Theoretical Foundations for Social Work.  F, S. Prerequisite: SOWK 500 or concurrent registration. Blended format is a partial-semester course.  
Socio-behavioral principles relevant to generalist social work practice. (NT-B)

SOWK 520 03(2-0-1). Social Welfare Policy Analysis.  F. Prerequisite: Admission to the MSW program.  
Historical analysis and impact of social welfare policy.

SOWK 550 03(3-0-0). Fundamentals of Mediation.  F, S, SS. Prerequisite: Admission to the MSW program. Blended format is a partial-semester course.  
Principles, values and policy of mediation and human rights. (NT-O)

F, S, SS. (NT-O)

SOWK 551 03(1-0-2). Fundamentals of Mediation.  F, S. SS. Prerequisite: Bachelor’s degree.  
Knowledge and skills essential to the successful application of mediation for a wide variety of interpersonal conflicts. (NT-D)

*Alternate year offering (odd);  * Alternate year offering (even);  + Field trips;  $ Special course fee;  NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD);  GT-subcode = State Guarantee Transfer course and AUCCsubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
SOWK 552 03(1-0-2). Conflict Management: Health and Elder Care. F, S, SS. Prerequisite: SOWK 551.
Knowledge, values, and skills necessary for the practice of conflict resolution in health care and elder care settings. (NT-O)

SOWK 553 03(2-0-1). Multi-Party Conflict Resolution. F, S, SS. Prerequisite: SOWK 551.
Theories, models, and skills required for design and guidance of multi-party conflict resolution in group, community and organizational settings. (NT-O)

SOWK 554 03(1-0-2). Conflict Resolution in the Workplace. F, S, SS. Prerequisite: SOWK 551.
Knowledge, values, and skills necessary for the practice of conflict resolution in the workplace. (NT-O)

SOWK 555 03(1-0-2). Divorce and Family Mediation. F, S, SS. Prerequisite: SOWK 551.
Knowledge and skills essential to the practice of family mediation including divorce and child custody. (NT-O)

SOWK 560 03(2-0-1). Social Work Practice in Schools. S, SS. Prerequisite: M.S.W. or enrollment in M.S.W. program.
Knowledge and skills essential to practice of social work in educational settings. (NT-O)

SOWK 561 03(0-3). School/Community: People with Disabilities. S, SS. Prerequisite: None.
Teamwork approach to serving persons with special needs values, issues, and best practices related to creating desirable futures for them. (NT-O)

SOWK 571 03(2-0-1). Small Client Systems: Theory and Practice. SS. Prerequisite: admission to MSW program.
Theories and practice principles relevant to social work practice with small client systems.

SOWK 572 03(2-0-1). Large Client Systems: Theory and Practice. SS. Prerequisite: Admission to MSW Program.
Theories and practice principles relevant to social work practice with large client systems.

SOWK 588 Var[1-6]. Field Placement. S. Prerequisite: SOWK 512 or concurrent registration; SOWK 601 or concurrent registration; SOWK 611 or concurrent registration. Maximum of 6 credits allowed in course.
Supervised professional practice. ($)

SOWK 590 Var[1-6]. Workshop.

SOWK 600 03(3-0-0). Methods of Research I. F. Prerequisite: Concurrent registration in SOWK 520; STAT 201.
Social work research: role of practitioners as consumers and initiators of research.

SOWK 601 03(3-0-0). Methods of Research II. S. Prerequisite: SOWK 600.
Data analysis, computer processing in social work research, and methods for evaluating one's own practice.

SOWK 602A-B 02(0-0-2). Macro-Level Social Work Practice Research. A) Prerequisite: SOWK 601; concurrent registration in SOWK 688. B) Prerequisite: SOWK 602A; concurrent registration in SOWK 688.
Design and implementation of needs assessment, program implementation, and community research.

SOWK 603A-B 02(0-0-2). Direct Practice Assessment and Evaluation.
Selection and application of techniques for monitoring and evaluating interventions with individuals, families, and groups. A) F. Prerequisite: SOWK 601; concurrent registration in SOWK 688. B) Prerequisite: SOWK 603A; concurrent registration in SOWK 688.

SOWK 611 03(1-0-2). Generalist Practice-Large Client Systems. S. Prerequisite: SOWK 511.
Practice knowledge and skills related to intervention with task groups, coalitions, organizations, and communities.

SOWK 630 02(1-0-1). Advanced Generalist Practice with Individuals. F. S. Prerequisite: SOWK 601; (SOWK 571; SOWK 572) or (SOWK 588; SOWK 611).
Knowledge and skills appropriate for clinical assessments and interventions with individuals focusing on contemporary theoretical constructs.

SOWK 631 02(1-0-1). Advanced Practice with Communities. F. S. Prerequisite: SOWK 601; (SOWK 571; SOWK 572) or SOWK 588.
Knowledge, skills, and values regarding the planned change process with communities.

SOWK 632 02(0-0-2). Advanced Practice: Manager/Administrator. F, S. Prerequisite: SOWK 601; (SOWK 571; SOWK 572) or SOWK 588.
Knowledge, values, skills of organizational practice for a social work manager/administrator.

SOWK 633 02(0-0-2). Advanced Practice: Social Welfare Policy. F, S. SS. Prerequisite: SOWK 601; (SOWK 571; SOWK 572) or (SOWK 520; SOWK 588; SOWK 611).
Application of social welfare policy analysis models; normative aspects of policy analysis and assessment skills.

SOWK 634 03(1-0-2). Advanced Practice with Families and Groups. F, S, SS. Prerequisite: SOWK 630.
Apply engagement, assessment, and intervention skills, theoretical models, and evidence-bases practice approaches in work with families and groups.

SOWK 675 03(2-0-1). Psychopathology and Social Work. S, SS. Prerequisite: M.S.W. degree or current enrollment in an M.S.W. program.
Major forms of mental and emotional disorders and methods of diagnosis relevant to social work practice with individuals and families. (NT-O)

SOWK 684 Var[1-5]. Supervised College Teaching. Maximum of 10 credits allowed in course.

SOWK 688 Var[1-8]. Field Placement. F. S. Prerequisite: SOWK 511, SOWK 571; SOWK 572; SOWK 601. Maximum of 15 credits.
Integrates and applies competencies and measurable practice behaviors comprising knowledge, values, and skills in social work practice. ($) 

SOWK 695 Var. Independent Study. F, S, SS. (NT)

SOWK 696 Var. Group Study. F, SS. (NT)

SOWK 698 Var. Research. Prerequisite: SOWK 601. Maximum of 6 credits allowed in course.


*SOWK 701 03(1-0-2). Contemporary Issues-Social Work Education. S. Prerequisite: Master’s degree in social work.
Issues and trends currently impacting professional education for social work practice.

*SOWK 702 03(1-0-2). Social Welfare Policies in Selected Countries. S. Prerequisite: SOWK 701.
Social welfare policy analysis and impact on professional social work practice.

°Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
SOWK 703 03(1-0-2). Theoretical Analysis of Social Work Practice. SS. Prerequisite: SOWK 701.
   Social work practice theories; building, evaluating, and teaching for social work educators.

SOWK 704 03(1-0-2). Theoretical Foundations of Social Work. F.
   Prerequisite: SOWK 701.

SOWK 784 Var[1-3]. Supervised College Teaching.

SOWK 786 03(0-0-3). Research Practicum. F, S, SS. Prerequisite: EDRM 700; EDRM 704; SOWK 701.

SOWK 792 03(0-0-3). Seminar. F, S, SS. Prerequisite: SOWK 701.

SOWK 795 Var. Independent Study.


*Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
SPCM 100 03(3-0-0). Communication and Popular Culture. (GT-AH1, AUCC 3B). F, S, SS. Prerequisite: None.
Classical tradition of speech communication, its extension to broadcasting, and integration of both in contemporary culture. (NT-O)

SPCM 130 03(2-0-1). Relational and Organizational Communication. (AUCC 3C). F, S, SS. Prerequisite: None.
Basic communication processes and skills central to relating and organizing in interpersonal, small group, and organizational contexts.

SPCM 200 03(3-0-0). Public Speaking. F, S, SS. Prerequisite: None.
Fundamentals of public speaking emphasizing content, organization, delivery, audience response. (NT-O)

SPCM 201 03(3-0-0). Rhetoric in Western Thought. (GT-AH3, AUCC 3B). F, S. Prerequisite: None.
Major concepts of Western rhetoric from Greece to modern times and their relationship to present-day approaches to communication.

SPCM 207 03(3-0-0). Public Argumentation. F, S, SS. Prerequisite: SPCM 200.
Key communication principles for democracy, including issue analysis, evidence, reasoning, decision-making, debate, dialogue, and deliberation.

SPCM 232 03(3-0-0). Group Communication. F, S. Prerequisite: SPCM 200. Prerequisite: None.
Principles and methods of group communication emphasizing face-to-face and electronically mediated problem-solving and decision making.

SPCM 278A-I 01(1-0-0). Communication Skills. F, S, SS. Prerequisite: None. A maxi-mum of 3 credits are allowed for SPCM 278A-I.

SPCM 300 03(0-0-3). Advanced Public Speaking. F, S, SS. Prerequisite: SPCM 200.
Advanced technique in public speaking; emphasis on argument construction and refutation, style, and manuscript delivery.

SPCM 311 03(3-0-0). Historical Speeches on American Issues. F. Prerequisite: CO 150; minimum of 30 credits.
Significant speeches and speakers as they reflected and affected American issues from colonial period through early 20th century.

SPCM 331 03(3-0-0). Nonverbal Communication. S. Prerequisite: None.
Non-language symbols in communication; systems and functions of nonverbal communication behaviors.

SPCM 332 03(3-0-0). Interpersonal Communication Skills. F, S, SS. Prerequisite: None.
Analysis, exploration, and skill enhancement strategies for interpersonal communication in friendship, couple, family, and business relationships.

SPCM 333 03(3-0-0). Professional Communication. F, S. Prerequisite: SPCM 200.
Technological, interpersonal, and ethical dimensions of professional communication, emphasizing interviews, teams, and presentations at work.

SPCM 334 03(3-0-0). Co-Cultural Communication. F, SS. Prerequisite: None.
Cultural concerns of communication among co-cultures of United States; diversity; self-awareness as cultural imperative for enhanced communication.

SPCM 335 03(3-0-0). Gender and Communication. F. Prerequisite: None.
Analysis and exploration of communication as it relates to gender and women’s and men’s roles and identities. (NT-O)

SPCM 341 03(3-0-0). Evaluating Contemporary Television. F. Prerequisite: None.
Rhetorical standards applied to content, ethical, and artistic aspects of American televised discourse; emphasizing nonentertainment programming. (NT-O)

SPCM 342 03(3-0-0). Critical Media Studies. F, S. Prerequisite: SPCM 100.
Analysis of communication media; history; structure, regulation, policy, and impact upon society. (NT-O)

SPCM 346 03(2-2-0). Virtual Culture and Communication. F, S. Prerequisite: SPCM 100 or SPCM 342.
Rhetorical theory applied to planning, producing, and evaluating computer-mediated messages.

SPCM 347 03(3-0-0). Visual Communication. S. Prerequisite: SPCM 100 or SPCM 342.
Media/visual aesthetics and literacy and the symbolic and affective dimensions of the codes, conventions, and formulas of media.

SPCM 349 03(3-0-0). Freedom of Speech. F, S. Prerequisite: None.
Historical and philosophical precedents to freedom of speech; development of free speech principles in the U.S.; ethical obligations of speakers. (NT-O)

SPCM 350 03(2-3-0). Evaluating Contemporary Film. S. Prerequisite: None.
Theory and development of film criticism; application of critical approaches to modern fiction and nonfiction film. (NT-O)

SPCM 354 03(2-3-0). History and Appreciation of Film. F. Prerequisite: SPCM 350 or concurrent registration.
Screening and evaluation of landmark fiction and nonfiction films; assessment of cinema as an art form and a social force.

SPCM 356 03(2-3-0). Asians in the U.S. Media. S. Prerequisite: SPCM 342 or SPCM 350 or concurrent registration.
Asian representations in the U.S. media from the 19th century to the present.

SPCM 357 03(2-3-0). Film and Social Change. F, S, SS. Prerequisite: SPCM 350 or concurrent registration.
Ways in which the medium of motion pictures has sparked significant social changes at home and abroad. (NT-O)

SPCM 358 03(2-3-0). Gender and Genre in Film. S. Prerequisite: SPCM 350 or concurrent registration.
Gender relations in film genres.

SPCM 378 03(0-0-3). Virtual Workplace Communication. F, S, SS. Prerequisite: None.
Interpersonal/organizational dimensions and communicative processes underpinning virtual/remote/distributed workers and workplaces. (NT-O)

SPCM 384 Var[1-3]. Supervised College Teaching. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements. Open only to undergraduate students who are invited to assist in teaching selected courses.

Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCsubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
SPCM 387 01(1-0-0). Communication Internship. Prerequisite: SPCM 100 or SPCM 342; SPCM 200; SPCM 201; SPCM 207; 2.000 GPA.

SPCM 401 03(3-0-0). Rhetoric in Social Movements. F. Prerequisite: None.
Case studies of campaigns and social movements; genesis, leadership, and use of traditional and electronically mediated rhetoric to achieve objectives.

SPCM 407 03(3-0-0). Public Deliberation. F, S. Prerequisite: SPCM 200; SPCM 207.
Communication in collaborative decision-making and community problem-solving, examined through the lens of deliberative democracy.

SPCM 408 03(3-0-0). Applied Deliberative Techniques. F, S. Prerequisite: Written consent of instructor.
Skills development and direct experience in convening, facilitating, and reporting public forums tied to Center for Public Deliberation activities.

SPCM 411 03(3-0-0). Contemporary Speeches on American Issues. S. Prerequisite: CO 150; minimum of 30 credits.
Significant speeches and speakers as they reflect and affect issues, 1930 to present.

SPCM 412 03(3-0-0). Evaluating Contemporary Rhetoric. S. Prerequisite: CO 150; minimum of 30 credits.
Exploration and evaluation of contemporary persuasive communication in order to understand and assess a variety of forms of messages and symbols.

SPCM 415 03(3-0-0). Rhetoric and Civility. F. Prerequisite: CO 150; minimum of 30 credits.
Relationship between rhetoric and civility historically and in contemporary times.

SPCM 420 03(3-0-0). Political Communication. F. Prerequisite: None.
Rhetoric of political campaigns. (NT-O)

SPCM 429 03(3-0-0). Environmental Discourse. F, S. Prerequisite: None.
Environmental communication in advocacy campaigns, media representations of science, encounters with nature, and public policy.

SPCM 431 03(3-0-0). Communication, Language, and Thought. S. Prerequisite: None.
Influence of rhetoric, ranging from spoken language to electronically mediated communication, on human understanding and Western thought.

SPCM 433 03(3-0-0). Communication in Organizations. F. Prerequisite: Completion of AUCC category 2, Advanced Writing; minimum of 30 credits.
Communication theory and strategy for empowerment of non-supervisory and supervisory personnel.

SPCM 434 03(3-0-0). Intercultural Communication. F, S, SS. Prerequisite: CO 150; minimum of 30 credits.
Cultural influences on communication between people of different nations; communication rules/norms in specific cultures; cultural adaptation.

SPCM 436 03(3-0-0). Conflict Management and Communication. S. Prerequisite: None.
Theories and principles of communication in conflict management; application to conflict resolution situations.

SPCM 437 03(3-0-0). Studies in Persuasion. S. Prerequisite: None.
Rhetorical and behavioral theories of persuasion applied to persuasive practice in public and interpersonal arenas of social influence.

SPCM 454/ETST 454 03(2-2-0). Chicano/a Film and Video. F. Prerequisite: None. Credit not allowed for both SPCM 454 and ETST 454.
Emergence of Chicano/a cinema from a place of displacement, resistance, and affirmation found in contemporary Chicano/a film, video.

SPCM 455/LB 455 03(2-3-0). Narrative Fiction Film as a Liberal Art. S. Prerequisite: Senior standing. Credit not allowed for both SPCM 455 and LB 455.
Narrative fiction film and its role in human history, culture, and social interaction.

SPCM 479 03(3-0-0). Communication Studies Capstone. F, S. Prerequisite: SPCM 100; SPCM 200; SPCM 201; SPCM 207; seniors in Communication Studies majors only.
Synthesis of central issues in Communication Studies; examination of their relevance to students’ professional, personal, and civic endeavors.

SPCM 486 Var. Practicum.
Directed experience of communication techniques and procedures in the community with periodic faculty consultation.

SPCM 495 Var. Independent Study.

SPCM 496 Var. Group Study.

SPCM 508 03(0-0-3). Deliberative Theory and Practice. S. Prerequisite: Graduate standing or SPCM 408.
Survey of current theory and practice connected to deliberative democracy.

SPCM 538 03(3-0-0). Communicating in the Health Clinic. S. Prerequisite: None. Organizational, interpersonal, and intercultural dimensions of communicating in public health clinical settings.

SPCM 540 03(3-0-0). Rhetoric, Race and Identity. F. Prerequisite: Graduate standing or SPCM 412 and 12 additional 300-400 SPCM credits. Credit not allowed for both SPCM 540 and ETST 540.
Critical race theory and its relevance to rhetorical studies.

SPCM 570 03(3-0-0). Instructional Communication Theory, Practice. F, S, SS. Prerequisite: None.
Communication theory and research in instructional contexts. Designed for current or prospective teachers. (NT-O)

*SPCM 592 03(0-0-3). Seminar-Topics in Speech Communication. S. Prerequisite: Graduate standing or fifteen 300-400 level credits in communication studies or English.

SPCM 601 03(3-0-0). History of Rhetorical Theory. F. Prerequisite: Fifteen 300- and 400-level credits in communication studies and/or English.
Rhetorical theories and theorists from the classical period to the present.

SPCM 604 03(3-0-0). Rhetoric of Everyday Life. S. Prerequisite: Graduate standing or SPCM 412 and 12 additional 300-400 SPCM credits.
Contemporary theories of rhetoric and of everyday life.

*SPCM 611 03(3-0-0). Topics in Public Address. F. Prerequisite: Graduate standing or either SPCM 311 or SPCM 411 with additional 300- and 400-level credits in communication studies, history, or English.
Theoretical and methodological issues in public address research; analysis of public discourse of selected movements or periods in U.S. history.

SPCM 612 03(3-0-0). Rhetorical Criticism. F. Prerequisite: Fifteen 300-400 level credits in communication studies and/or journalism.
Traditional and contemporary methods for analyzing persuasive discourse.

* Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guaranteed Transfer course and AUCCsubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
SPCM 620 03(0-0-3). Rhetoric and Public Affairs. F. Prerequisite: Admission to graduate school. Rhetoric’s role in contemporary policies and civil society.

SPCM 623 03(3-0-0). Feminist Theories of Discourse. F. Prerequisite: Admission to graduate school. Exploration and evaluation of contemporary feminist theories of rhetoric and discourse.

SPCM 632 03(0-0-3). Theories of Interpersonal Communication. F. Prerequisite: Admission to graduate school. Theories of communication in development, maintenance, and deterioration of friendship, couple, family, group, and business relationships.

SPCM 633 03(0-0-3). Discourse, Work, and Organization. S. Prerequisite: Admission to graduate school. How organizing processes and discursive practices create, maintain, and destroy diverse forms of work in society.

SPCM 634 03(0-0-3). Communication and Cultural Diversity. S. Prerequisite: Admission to graduate school. Ethnographic approach to communication issues and concerns in a global context.

SPCM 638 03(3-0-0). Communication Research Methods. S. Prerequisite: None. Historical and philosophical context of communication research; relationship between theory and method; dominant forms of communication research.

SPCM 639 03(3-0-0). Communication Theory. F. Prerequisite: Graduate standing or fifteen 300- and 400-level credits in communication studies and/or English. Examination of communication philosophies and perspectives; analysis of modern theories of face-to-face communication.

SPCM 646 03(3-0-0). Media Theory. F. Prerequisite: Fifteen 300-400 level credits in communication studies, English, or journalism. Survey of the broad range of rhetorical/qualitative theories that inform media studies.

*SPCM 647 03(0-0-3). Media Industries. F. Prerequisite: Graduate standing or 15 300-400 level credits in communication studies or English. Political economy of the media both in the U.S. and globally, including how the media system operates and with what effects.

*SPCM 648 03(3-0-0). Media Texts. S. Prerequisite: Graduate standing or fifteen 300- and 400-level credits in communication studies or English. Practical and theoretical implications for criticism in treating media products as texts; various approaches to textual or discourse analysis.

*SPCM 649 03(3-0-0). Media Audiences. F. Prerequisite: Graduate standing or fifteen 300- and 400-level credits in communication studies or English. Theoretical and methodological issues concerning how audiences use and interpret media.

*SPCM 650 03(0-0-3). Contemporary Issues in Media. S. Prerequisite: Admission to graduate school. Ever-changing media culture and landscape and how it affects personal, professional, and public lives.

SPCM 675 03(3-0-0). Speech Communication Pedagogy. F. Prerequisite: Admission to communication studies master’s program. Instructional practices and theories in speech.

SPCM 684 Var[1-3]. Supervised College Teaching.

SPCM 686 Var. Practicum. F, S, SS. Prerequisite: Graduate standing; SPCM 408; SPCM 508 or concurrent registration. Direction of communication studies fieldwork connected to the CSU Center for Public Deliberation under professional supervision.
STAA 551 02(2-0-0). Regression Models and Applications. F. Prerequisite: Admission to the M.A.S. program or written consent of instructor. This is a partial-semester course.

Estimation/hypothesis testing methods: t-test, ANOVA, regression, residual analyses, transformations, goodness of fit, interactions, confounding. (NT-V)

STAA 552 02(2-0-0). Generalized Regression Models. F. Prerequisite: STAA 551 or concurrent registration or STAT 540. This is a partial-semester course.

Nonlinear regression, iteratively reweighted least squares, dose-response models, count data, multi-way tables, survival analysis. (NT-V)

STAA 553 02(2-0-0). Experimental Design. S. Prerequisite: STAA 551 or STAT 540; STAA 562 or STAT 530. This is a partial-semester course.

Design and analysis of experiments. Emphasis on balanced design; use of computing packages SAS and R. Example based presentation, rather than theoretical. (NT-V)

STAA 554 02(2-0-0). Mixed Models. S. Prerequisite: STAA 551 or concurrent registration. This is a partial-semester course.

Topics in linear, generalized linear, and nonlinear models with fixed and random predictors, balanced and unbalanced cases. (NT-V)

STAA 556 03(3-0-0). Statistical Consulting. SS. Prerequisite: 28 credits of STAA coursework or written consent of instructor.

Effective consulting to meet with clients, analyze real data, and prepare reports. (NT-V)

STAA 561 02(2-0-0). Probability with Applications. F. Prerequisite: Admission to the M.A.S. program or written consent of instructor. This is a partial-semester course.

Random variables, continuous and discrete distributions, expectations, joint and conditional distributions, transformations. (NT-V)

STAA 562 02(2-0-0). Mathematical Statistics with Applications. F. Prerequisite: STAA 561 or concurrent registration or STAT 520 or written consent of instructor. This is a partial-semester course.

Theory and applications of estimations, testing, and confidence intervals. Computer simulations, sampling from the normal distribution. (NT-V)

STAA 565 01(1-0-0). Quantitative Reasoning. F. Prerequisite: Concurrent registration in STAA 551 or written consent of instructor. This is a partial-semester course.

Confounding, types of bias such as selection bias and regression effect bias, Simpson’s paradox, experiments versus observational studies. (NT-V)

STAA 566 01(1-0-0). Computational and Graphical Methods. F. Prerequisite: Admission to the M.A.S. program or written consent of instructor. This is a partial-semester course.

Exploratory data analysis using graphics, effective communication with graphs, data reduction methods. (NT-V)

STAA 567 01(1-0-0). Computational and Simulation Methods. F. Prerequisite: STAA 551 or concurrent registration or STAT 540; STAA 561 or concurrent registration or STAT 520 or written consent of instructor. This is a partial-semester course.

Methods to estimate probability distribution of nonstandard test statistics, find estimators, test hypotheses, and compute confidence intervals. (NT-V)

STAA 568 01(1-0-0). Topics Industrial/Organizational Statistics. S. Prerequisite: STAA 553 or concurrent registration; STAA 561 or STAT 520 or written consent of instructor. This is a partial-semester course.

Quality management, process control, reliability, decision making. (NT-V)

STAA 571 02(2-0-0). Survey Statistics. S. Prerequisite: STAA 551 or STAT 540; STAA 562 or concurrent registration or STAT 530; or written consent of instructor. This is a partial-semester course.

Survey design, simple random, stratified, and cluster samples. Estimation and variance estimation. (NT-V)

STAA 572 02(2-0-0). Nonparametric Methods. F. Prerequisite: STAA 551 or concurrent registration or STAT 540; STAA 562 or concurrent registration or STAT 530; or written consent of instructor. This is a partial-semester course.

Rank-based methods, nonparametric inferential techniques, scatterplot smoothing, nonparametric function estimation, environmental applications. (NT-V)

STAA 573 02(2-0-0). Analysis of Time Series. S. Prerequisite: STAA 551 or concurrent registration or STAT 540; STAA 561 or concurrent registration or STAT 520 or written consent of instructor. This is a partial-semester course.

Moving average and auto-regression correlation structures, estimation and forecasting, modeling seasonality. Financial and environmental applications. (NT-V)

STAA 574 02(2-0-0). Methods in Multivariate Analysis. S. Prerequisite: STAA 551 or STAT 540; STAA 561 or concurrent registration or STAT 520 or written consent of instructor. This is a partial-semester course.

Multivariate ANOVA, principal components, factor analysis, cluster analysis, discrimination analysis. (NT-V)

STAA 575 02(2-0-0). Applied Bayesian Statistics. S. Prerequisite: STAA 551 or STAT 540; STAA 561 or concurrent registration or STAT 520 or written consent of instructor. This is a partial-semester course.

Bayesian analysis of statistical models, prior and posterior distributions, computing methods, interpretation. (NT-V)

STAA 576 02(2-0-0). Methods in Environmental Statistics. S. Prerequisite: STAA 552; STAA 562 or STAT 530; STAA 567 or written consent of instructor. This is a partial-semester course.

Statistical methodologies used in environmental/ecological studies. Topics in spatial statistics, abundance estimation for biological populations. (NT-V)
<table>
<thead>
<tr>
<th>COURSE</th>
<th>Title</th>
<th>Prerequisites</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 101</td>
<td>Activity Based Statistics</td>
<td>F, SS</td>
<td>None. Credit not allowed for students who have already taken any 200-level or higher statistics course. Population, sample, variation, data, relationships, probability and risk, polls, prediction, margin of error, critical assessment of studies.</td>
</tr>
<tr>
<td>STAT 110</td>
<td>Statistical Thinking: Concepts and Applications</td>
<td>S</td>
<td>None. Credit not allowed for students who have already taken any 200-level or higher statistics course. Use of statistical tools in real-life problems using computer packages; integration of critical thinking skills using case studies.</td>
</tr>
<tr>
<td>STAT 192</td>
<td>First-Year Seminar in Statistics</td>
<td>S</td>
<td>None. Explore careers in statistics and the variety of problems encountered by statisticians.</td>
</tr>
<tr>
<td>STAT 201</td>
<td>General Statistics</td>
<td>F, SS</td>
<td>Mathematics placement exam or one credit of 100-level mathematics. Credit not allowed for both STAT 201 and STAT 204. Intended as a one semester terminal course. Graphs, descriptive statistics, confidence intervals, hypothesis tests, correlation and simple regression, tests of association.</td>
</tr>
<tr>
<td>STAT 204</td>
<td>Statistics for Business Students</td>
<td>F, SS</td>
<td>Mathematics placement exam or one credit of 100-level mathematics. Credit not allowed for both STAT 204 and STAT 201. Surveys, sampling, descriptive statistics, confidence intervals, contingency tables, control charts, regression, exponential smoothing, forecasting.</td>
</tr>
<tr>
<td>STAT 301</td>
<td>Introduction to Statistical Methods</td>
<td>F, S, SS</td>
<td>Mathematics placement exam or one credit of 100-level mathematics. Credit not allowed for both STAT 301 and STAT 304. Credit allowed for only one of the following: ERHS 307, STAT 301, STAT 307, STAT 311, or STAT 315. Techniques in statistical inference; confidence intervals, hypothesis tests, correlation and regression, analysis of variance, chi-square tests.</td>
</tr>
<tr>
<td>STAT 303/ECE 303</td>
<td>Introduction to Communications Principles</td>
<td>F</td>
<td>Required: ECE 311 or concurrent registration; MATH 261. Credit not allowed for both STAT 303 and ECE 303. Basic concepts in design and analysis of communication systems.</td>
</tr>
<tr>
<td>STAT 305</td>
<td>Sampling Techniques</td>
<td>F</td>
<td>Required: STAT 301 or STAT 304 or STAT 311 or STAT 315. Sample designs: simple random, stratified, systematic, cluster, unequal probability, two phase; methods of estimation and sample size determination.</td>
</tr>
<tr>
<td>STAT 307</td>
<td>Introduction to Biostatistics</td>
<td>F, SS</td>
<td>Mathematics placement exam or one credit of 100-level mathematics. Credit not allowed for both STAT 307 and STAT 304. Credit allowed for only one of the following: ERHS 307, STAT 301, STAT 307, STAT 311, or STAT 315. Biostatistical methods; confidence intervals, hypothesis tests, simple correlation and regression, one-way analysis of variance.</td>
</tr>
<tr>
<td>STAT 311</td>
<td>Statistics for Behavioral Sciences I</td>
<td>F, SS</td>
<td>Mathematics placement exam or one credit of 100-level mathematics. Credit not allowed for both STAT 311 and STAT 314. Credit allowed for only one of the following: ERHS 307, STAT 301, STAT 307, STAT 311, or STAT 315. Classification, descriptive statistics; inference, testing, estimation; categorical data analysis; odds ratio.</td>
</tr>
</tbody>
</table>

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STAT 511 04(3-0-1). Design and Data Analysis for Researchers I. F.
Prerequisite: STAT 301 or STAT 307 or STAT 311 or STAT 315.
Statistical methods for experimenters and researchers emphasizing
design and analysis of experiments. (NT-V)

STAT 512 04(3-0-1). Design and Data Analysis for Researchers II. S.
Prerequisite: STAT 511.
Statistical methods for experimenters and researchers emphasizing
design and analysis of experiments.

STAT 514/SOCR 514 04(3-3-0). Agricultural Experiment Design
and Analysis. S. Prerequisite: STAT 201 or STAT 301 or STAT 307.
Credit allowed for only one of the following: SOCR 414, SOCR 514,
STAT 350, or STAT 514.
Design and implementation of agricultural experiments and statistical
analysis of resulting data.

S. Prerequisite: QNT 570 or STAT 511 or STAT 540.
Statistical methods in process design; statistical methods;
measurement processes; customer evaluation.

STAT 520 04(4-0-0). Introduction to Probability Theory. F.
Prerequisite: MATH 369; MATH 261; MATH 317.
Probability, random variables, distributions, expectations, generating
functions, limit theorems, convergence, random processes.

STAT 521 03(3-0-0). Stochastic Processes I. S. Prerequisite: STAT 520.
Characterization of stochastic processes, Markov chains in discrete
and continuous time, branching processes, renewal theory, Brownian
motion.

STAT 522 03(3-0-0). Stochastic Processes II. F, SS. Prerequisite: STAT 521.
Martingales and applications, random walks, fluctuation theory,
diffusion processes, point processes, queuing theory.

STAT 523/NR 523 03(3-0-0). Quantitative Spatial Analysis. S.
Prerequisite: STAT 301 or STAT 307. Credit not allowed for both
STAT 523 and NR 523.
Techniques in spatial analysis: point pattern analysis, spatial autocorrelation, trend surface and spectral analysis.

STAT 524/FIN 524 03(3-0-0). Financial Statistics. F. Prerequisite:
(MATH 345; STAT 420) or admission to MSBA program with
Financial Risk Management specialization. Credit not allowed for both
STAT 524 and FIN 524.
Probability and statistical concepts and quantitative tools used in
financial modeling and decision-making. (NT-O)

STAT 525 03(3-0-0). Analysis of Time Series I. F. Prerequisite: STAT
430.
Trend and seasonality, stationary processes, Hilbert space techniques,
spectral distribution function, fitting ARIMA models, linear prediction.

STAT 526 03(3-0-0). Analysis of Time Series II. S, SS. Prerequisite:
STAT 525.
Spectral analysis; the periodogram; spectral estimation techniques;
multivariate time series; linear systems, optimal control; Kalman
filtering, prediction.

STAT 530 03(3-0-0). Mathematical Statistics. S. Prerequisite: STAT
520.
Sampling distributions, estimation, testing, confidence intervals; exact
and asymptotic theories of maximum likelihood and distribution-free
methods.

STAT 540 03(3-0-0). Data Analysis and Regression. F. Prerequisite:
Six credits of upper-division statistics courses.
Introduction to multiple regression and data analysis with emphasis
on graphics and computing.

STAT 544/ERHS 544 03(3-0-0). Biostatistical Methods for
Quantitative Data. S. Prerequisite: STAT 301 or STAT 307. Credit not
allowed for both STAT 544 and ERHS 544.
Regression and analysis of variance methods applied to both
observational studies and designed experiments in the biological
sciences.

STAT 547/CIVE 547 03(3-0-0). Statistics for Environmental
Monitoring. S. Prerequisite: STAT 301. Credit not allowed for both
STAT 547 and CIVE 547.
Applications of statistics in environmental pollution studies involving
air, water, or soil monitoring; sampling designs; trend analysis; censored
data.

STAT 548/CS 548 04(3-2-0). Bioinformatics Algorithms. F.
Prerequisite: STAT 301 or STAT 307 or STAT 315; knowledge of a
contemporary programming language.
Computational methods for analysis of DNA/protein sequences and
other biological data.

STAT 560 03(3-0-0). Applied Multivariate Analysis. F, S. Prerequisite:
STAT 520; STAT 540.
Multivariate analysis of variance; principal components; factor
analysis; discriminant analysis; cluster analysis. (NT-O/V)

STAT 570 03(3-0-0). Nonparametric Statistics. S, SS. Prerequisite:
STAT 430.
Distribution and uses of order statistics; nonparametric inferential
techniques, their uses and mathematical properties. (NT-V)

STAT 586 01(0-2-0). Practicum in Consulting Techniques. F, S, SS
Prerequisite: STAT 540.
Instruction on planning studies, writing reports, and interacting with
clients. Attend and critique consulting sessions.

STAT 592 01(0-0-1). Seminar.

STAT 600 03(3-0-0). Statistical Computing. F, S. Prerequisite: STAT
520; STAT 540.
Optimization and integration in statistics; Monte Carlo methods;
simulation; bootstrapping; density estimation; smoothing.

STAT 604/BUS 604 02(2-0-0). Managerial Statistics. F. Prerequisite:
Admission to the MBA Program. Credit not allowed for both
STAT 604 and BUS 604.
Introduction to statistical thinking and methods used to support
managerial-decision making. (NT-V)

STAT 605 03(3-0-0). Theory of Sampling Techniques. S. Prerequisite:
STAT 301 or STAT 307 or STAT 311 or STAT 315; STAT 430.
Survey designs; simple random, stratified, cluster samples; theory of
estimation; optimization techniques for minimum variance or costs.

STAT 640 04(4-0-0). Design and Linear Modeling I. S. Prerequisite:
STAT 301 or STAT 307 or STAT 311 or STAT 315 or STAT 316.
Introduction to linear models; experimental design; fixed, random,
and mixed models.

STAT 645 03(3-0-0). Categorical Data Analysis and GLIM. S.
Prerequisite: Concurrent registration in STAT 640.
Generalized linear models, binary and polytomous data, log linear
models, quasilikelihood models, survival data models.

STAT 650 03(3-0-0). Design and Linear Modeling II. F. Prerequisite:
STAT 640.
Mixed factorials; response surface methodology; Taguchi methods;
variance components.

*STAT 673/FW 673 03(3-0-0). Hierarchical Modeling in Ecology. F.
Prerequisite: ESS 575 or STAT 420. Credit not allowed for both STAT
673 and FW 673.
Hierarchical ecological modeling using common forms of data in fish
and wildlife studies and emphasizing spatial and temporal aspects of
analysis.

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blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUC=subjectcode = All
University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)

STAT 684 Var[1-3]. Supervised College Teaching. Prerequisite: Enrollment in M.S./Ph.D. program in statistics.
Guidance and instruction in effective teaching of college courses in statistics.

STAT 695 Var. Independent Study.


STAT 720 04(4-0-0). Probability Theory. S. Prerequisite: MATH 517; STAT 520. 
Measure theoretic probability, characteristic functions; convergence; laws of large numbers; central limit, extreme value, asymptotic theory.

General theory of processes; Markov processes in discrete, continuous time; review of martingales, random walks; renewal and regenerative processes.

Brownian motion, diffusion, stochastic differential equations; weak convergence, central limit theorems. Applications in engineering, natural sciences.

STAT 725 03(3-0-0). Time Series and Stationary Processes. F, S, SS. Prerequisite: STAT 720; STAT 730. 
Spectral theory of multivariate stationary processes; estimation, testing for spectral, linear, AR-MA representations; best linear predictors, filters.

STAT 730 04(4-0-0). Advanced Theory of Statistics I. F. Prerequisite: STAT 530; STAT 720. 
Minimal sufficiency, maximal invariance; Neyman-Pearson theory; Fisher, Kullback-Leibler information; asymptotic properties of maximum-likelihood methods.

STAT 731 03(3-0-0). Advanced Theory of Statistics II. S, SS. Prerequisite: STAT 730. 
Decision-theory model; Bayes, e-Bayes, complete, and admissible classes; applications to sequential analysis and design of experiments.

STAT 740 03(3-0-0). Advanced Statistical Methods. F, S. Prerequisite: STAT 640; concurrent registration in STAT 730. 
Generalized additive models; recursive partitioning regression and classification; graphical models and belief networks; spatial statistics.

STAT 750 03(3-0-0). Advanced Theory of Design. F, S. Prerequisite: STAT 650. 
Information theory; design evaluation, factorial designs and optimal designs, orthogonal and balanced arrays, designs with discrete/continuous factors.

STAT 760 03(3-0-0). Theory of Multivariate Statistics. F, SS. Prerequisite: STAT 640; concurrent registration in STAT 730. 
Theory of multivariate normal; maximum-likelihood inference, union-intersection testing for single sample; theory of a multivariate linear model.

STAT 770 03(3-0-0). Approximation Theory and Methods. F, S. Prerequisite: STAT 730. 
Edgeworth expansions, saddlepoint methods; applications of weak convergence and other approximation methods in mathematical statistics.

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STAT 792 01(0-0-1). Seminar.

STAT 793 03(3-0-0). Seminar on Advanced Statistical Methods. F, S. Prerequisite: STAT 640; concurrent registration in STAT 730. May be taken up to two times for credit.

STAT 795 Var. Independent Study.

STAT 796 Var. Group Study. 
Methodology, stochastic processes, experimental design, multidi-dimensional statistics.

THEATRE COURSES
Department of Music, Theatre, and Dance
College of Liberal Arts

+TH 141 03(3-0-0). Introduction to Theatre. (GT-AH1, AUCC 3B). F, S, SS. Prerequisite: None. Required field trips. Theatre as an art and one of the humanities, its impact upon society, and its relationship to other art forms. ($) TH 251 03(2-2-0). Intermediate Acting. S. Prerequisite: TH 151. Study in the application of the given circumstances to a text and development of characterization. Selection and preparation of audition material.

*TH 255 03(2-2-0). Directing Workshop. S. Prerequisite: TH 241 or concurrent registration; TH 251 or concurrent registration. Practical directing workshop, short directing exercises, short scenes, techniques, theories, readings, staging prompts.


TH 261 03(1-4-0). Drawing and Drafting for the Theatre. F. Prerequisite: TH 160. Fundamental drawing, drafting, and rendering techniques needed by theatrical designers to effectively communicate their visual ideas. ($) TH 262 03(3-0-0). Stage Management I. F. Prerequisite: TH 151; TH 161. Duties and responsibilities of stage managers. Communication, rehearsal, performance techniques. Conceptual approaches to theatre.

TH 263 03(2-2-0). Costume Design I. F. Prerequisite: TH 160. Basic theory and technique for visualization of theatrical characters through costume.

TH 264 03(2-2-0). Lighting Design: Fundamentals. S. Prerequisite: TH 160; TH 161. Essential principles and theory for stage lighting including design process, control, equipment, and lighting aesthetics. ($) TH 265 03(3-0-0). Scenic Design: Fundamentals. F. Prerequisite: TH 160; TH 161. Theory and techniques for designing scenery for the stage. ($) TH 266 03(2-2-0). Sound Design for the Theatre. S. Prerequisite: TH 160; TH 161. Equipment, process, and recording techniques used in sound design for live performance. ($) TH 267 03(1-6-0). Scenic Painting. F. Prerequisite: TH 265. Basic techniques and practical applications in scenic painting for the theatre. ($) TH 269 03(2-3-0). Theatrical Makeup. S. Prerequisite: TH 251 or TH 261. Stage makeup. Individual skill in character analysis, application in pigment, plastic, hair, makeup, and selection and use of theatrical makeup. ($) TH 275 03(1-0-2). Self-scripting and Performance Workshop. F. Prerequisite: TH 175. Study and practice of the processes of self-scripting (theatrical storytelling from personal experience) as a tool for performers and writers.

TH 286 01(0-2-0). Theatre Practicum II. F. S. Prerequisite: TH 186. This is a partial-semester course. Practical experience in mounting theatrical productions. ($) TH 301 03(3-0-0). Theatre Design and Production Special Topics. F. Prerequisite: TH 261; TH 262; two of: TH 263, TH 264, TH 265, TH 266. In-depth study of a topic of general interest in design and production. Possible topics include history of décor, storyboarding, etc.

+TH 324 03(1-6-0). Teaching Creative Drama for Children. F. Prerequisite: TH 251 or TH 275. Required field trips. Theoretical and practical experience in teaching creative drama.

TH 149 02(0-4-0). Movement for Actors I. S. Prerequisite: TH 141; TH 150 or concurrent registration. A broad survey of different movement theories from Asia, Africa, and Europe. ($) TH 150 03(1-0-2). Introduction to Performance. F, S. Prerequisite: None. Imagination as the actor’s primary resource: acting exercises, compositions, improvisations to acquire the basic approach to text through action.

TH 160 03(3-0-0). Introduction to Production Design. F, S. Prerequisite: None. Concepts and practices in the visual arts of the theatre; studio processes and technical production; elementary work in theatre design and production.

TH 161 03(2-2-0). Technical Theatre: Stagecraft. F, S. Prerequisite: TH 160. Skills and craft of technical theatre. Knowledge of tools, materials, and techniques essential to production realization. ($) TH 166 03(4-0-0). Costume Construction for the Theatre. S. Prerequisite: TH 160. Technical side of costuming for live stage performances with an emphasis on all aspects of construction. ($) TH 175 03(2-0-2). Storytelling. F. Prerequisite: TH 141; TH 150. Study and practice of storytelling. ($) TH 186 01(0-2-0). Theatre Practicum I. F, S. Prerequisite: None. This is a partial seminar course. Practical experience in mounting theatrical productions. ($) TH 192 Var. Freshman Seminar. F, S, SS. Prerequisite: Theatre majors only.

TH 241 03(3-0-0). Text Analysis for Performance. F, S. Prerequisite: None. Reading, researching and discussing representative play types to foster an understanding of concepts used in theatrical staging. ($) TH 242 03(3-0-0). Theatre History I. F. Prerequisite: TH 241 or concurrent registration. Theatre from its origins through the Renaissance.

TH 243 03(3-0-0). Theatre History II. S. Prerequisite: TH 242. Theatre history from the English Restoration of 1660 through the postwar developments in Europe and the Americas from 1945 to 1960.

TH 249 02(0-4-0). Movement for Actors II. F. Prerequisite: TH 149; TH 251 or concurrent registration. Intermediate actor movement. ($) TH 250 02(0-4-0). Voice and Speech for the Stage. S. Prerequisite: TH 251 or concurrent registration. Linklater and Skinner approaches to voice and speech for the theatre actor.

◊ Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT_subcode = State Guarantee Transfer course and AUCC_subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
TH 343 03(3-0-0). Contemporary Plays and Alternative Theatre. F. Prerequisite: TH 243.

The study of revolutionary movements and alternative staging practices in theatre prompted by plays written from 1960 to the present.

TH 344 03(0-0-3). Dramaturgy Protocol Seminar. S. Prerequisite: TH 343.

Training in the application of dramaturgical techniques to facilitate the collaborative creative process in contemporary performance practice.

TH 349 02(0-4-0). Movement for Actors III. S. Prerequisite: TH 249; TH 351 or concurrent registration.

Advanced assimilation techniques to challenge the actor physically and psychologically to conceptualize and fully realize theatrical characterization. (§)

TH 350 03(3-0-0). Classical Text. S. Prerequisite: TH 351 or concurrent registration or written consent of instructor.

The Cicely Berry approach to voice and speech for speaking classical text.

TH 351 03(1-2-1). Acting III. S. Prerequisite: TH 249; TH 250; TH 251.

Acting Methods for challenges presented in plays by Brecht, Moliere, Chekov, Ibsen, Pirandello, O’Neill, and contemporary re-workings of the Greeks.

TH 352 02(1-0-1). Acting for Singers. F. Prerequisite: MU 401 or concurrent registration.

Acting class specifically for singers: improv, beginning scene work, harnessing given circumstance and augmenting physical character life onstage.

TH 353 03(2-2-0). Experimental Performance. SS. Prerequisite: None.

Artistic exploration of experimental performance via radical innovations in dance, theatre, music, literature, film, art, and performance art.

TH 355 03(0-0-3). Directing Seminar. F. Prerequisite: TH 255; TH 265 or concurrent registration.

Theatrical, practical, and creative approaches to directing a play: research, analysis, semiotics, identifying visual metaphor, point of view.

*TH 361 03(1-4-0). Technical Theatre: Technical Direction. F. Prerequisite: TH 161.

Advanced training and techniques in construction management and technical production for the theatre.

*TH 362 03(3-0-0). Advanced Stage and Production Management. S. Prerequisite: TH 262.

Stage and production management practices and procedures of theatre in the U.S.

*TH 363 03(1-4-0). Advanced Costume Design S. Prerequisite: TH 263.

Theory and practice of advanced costume design techniques.

*TH 364 03(2-2-0). Advanced Lighting Design. S. Prerequisite: TH 264.

Principles and theory for stage lighting including advanced programming, tour preparation, and presentation techniques.

TH 365 03(2-2-0). Advanced Scenic Design. S. Prerequisite: TH 267.

The practice of scenic design from text to idea to realized work. Advanced scenic design techniques in divergent and increasingly complex situations.

*TH 366 03(2-2-0). Digital Media Design for the Stage. F. Prerequisite: TH 266.

Training, content creation and presentation techniques for sound and projection design for live performance.

TH 369 03(1-4-0). Advanced Makeup and Hair Design. S. Prerequisite: TH 269.

Advanced techniques in makeup, hair, and wig design for theatre.

TH 370a-B Var. Theatre Assistant. F, S.

Assist a guest professional or faculty designer. A) Design. Prerequisite: TH 365. B) Directing. Prerequisite: TH 355.

TH 375 03(1-0-2). Playwright’s Workshop. S. Prerequisite: TH 275.

Character, conflict, structure, setting, dialogue, and the process of rewriting, resulting in a finished 10-minute play.

TH 386 01(0-2-0). Theatre Practicum III. F, S. Prerequisite: TH 286.

This is a partial-semester course.

Practical experience in mounting theatrical productions.

TH 392 03(0-0-3). Theatre Seminar. F, S. Prerequisite: TH 243 or concurrent registration.

Various current theatre topics taught by visiting professionals, for example, “The League of Regional Theatres is our National Theatre.

TH 400 03(1-4-0). Theatre Production Workshop. F. S. Prerequisite: Written consent of instructor.

Explores both the practical and dramaturgical essences of the production of a play. (§)

TH 401 03(2-2-0). Theatrical Design and Prod Advanced Topics. F. Prerequisite: TH 362; three of the following or concurrent registration: TH 363, TH 364, TH 366, TH 369.

Intensive study for advanced TD&P students, e.g., property design, advanced costume technology, wigmaking, company management, rigging, pyro, etc.

TH 449 03(0-0-3). Commedia and Masks. F. Prerequisite: TH 351 or written consent of instructor.

Playing comedy, including commedia dell’arte techniques, clown work, masks, circus techniques, mime, and scene work from comic scripts.

TH 450 03(2-2-0). Professional Actor Preparation. S. Prerequisite: TH 351.

portfolios, casting, breakdowns, reels, agents, managers, interviews, cold reading techniques, on-camera work, marketing. ($)

TH 451 03(2-2-0). Advanced Topics in Acting. S. Prerequisite: TH 351. May be taken three times for credit.

Author-specific actor challenges (e.g., Brecht, Beckett, Shakespeare, Chekhov, Moliere, and contemporary writers).

TH 455 04(2-0-2). Advanced Directing. S. Prerequisite: TH 250; TH 262; TH 344; TH 350; TH 355; TH 365; (TH 449 or concurrent registration).

Intensive experience in stage direction focusing on specific directorial challenges posed by various types of texts and multiple collaborative projects.

*TH 460 03(2-2-0). Design Portfolio and Professional Preparation. F. Prerequisite: TH 363, TH 364, TH 365, TH 366.

Creating effective portfolio and design presentations, digital portfolios, storyboarding, articulating concepts, professional preparation for career.

TH 471 03(0-0-3). Capstone in Theatre Practice. F, S. Prerequisite: Written consent of instructor.

Major production assignment in acting, design, production, or dramatic literature.

TH 475 03(2-0-1). Advanced Playwriting. S. Prerequisite: TH 343; TH 375

Development of imaginative capabilities and insights, to articulate an individual voice as a writer of longer and more complex plays for theatre.

Alternate year offering (odd); *Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCC-subcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
TH 482 03(0-0-3). Theatre in London—Travel Abroad. SS.
Prerequisite: Good academic and disciplinary standing.
Study abroad in and around London to foster research into theatre as an evolving art form with rich historical and artistic traditions.

TH 484 Var. [1-3]. Supervised College Teaching. F, S.
Prerequisite: Written consent of instructor. Students must have taken the course they will be assisting. A maximum of 10 combined credits for all 384 and 484 courses are counted towards graduation requirements.

TH 486 01(0-2-0). Theatre Practicum IV. F, S.
Prerequisite: TH 386; only for students in the Theatrical Design and Production concentration.
This is a partial semester course.
Advanced topics in applied theatre production. Challenges in developing and mounting a theatrical performance.

TH 487 Var. [1-12]. Theatre Internship.
Adviser-approved position at a professional regional theatre, a professional training program, or professional summer theatre.

TH 491 Var. Repertory Theatre Workshop. Prerequisite: Audition only.
Principles and practice of repertory theatre operation; practical experience offered.

TH 492 03(0-0-3). Theatre Seminar. F, S.
Prerequisite: TH 344; senior standing.
Contemporary theatre practice, trends, in-depth study of genres, authors, current theatre research, e.g., “Theatre of Revolt,” “Beckett’s Theatre.”

TH 495 Var. Independent Study.

TH 498 Var[3-6]. Theatre Research. F, S, SS.
Prerequisite: Written consent of faculty advisor; theatre majors only.
Scholarly research paper in theatre. Topic approved by faculty advisor.

TH 499 Var[3-6]. Theatre Thesis. F, S, SS.
Prerequisite: Written consent of faculty advisor; theatre majors only.
Written thesis in theatre. Topic approved by faculty advisor.
### VETERINARY MEDICINE COURSES

**Nondepartmental College of Veterinary Medicine and Biomedical Sciences**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
<th>Description</th>
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<tbody>
<tr>
<td>VM 603 01(1-0-0)</td>
<td>Veterinary Science: Research and Methods. F. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Conduct of responsible research, contributions of research to the practice of veterinary medicine, and career opportunities.</td>
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<tr>
<td>VM 606 03(3-0-0)</td>
<td>Veterinary Immunology. F. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Infectious agents, immune-mediated diseases, immune deficiencies, and principles of vaccination.</td>
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<tr>
<td>VM 610 01(5-1.5-0)</td>
<td>Foundations of Veterinary Medicine I. F. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Development of professional skills (ethics, communication, physical exam, surgical skills) necessary for the practice of veterinary medicine.</td>
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</tr>
<tr>
<td>VM 611 01(5-1.5-0)</td>
<td>Foundations of Veterinary Medicine II. S. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Development of professional skills (ethics, communication, physical exam, surgical skills) necessary for the practice of veterinary medicine.</td>
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<tr>
<td>VM 612 01(0-0-1)</td>
<td>The Healer’s Art. S. Prequisite: Enrollment in the Professional Veterinary Medicine program.</td>
<td>Exploration of student experiences, beliefs, and values related to their work as veterinary medical professionals.</td>
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<tr>
<td>VM 616 08(4-9-1)</td>
<td>Functional Anatomy. F. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Embryonic development and organogenesis are incorporated to improve understanding of normal anatomy and common developmental pathologies.</td>
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<tr>
<td>VM 618 07(5-6-0)</td>
<td>Veterinary Physiology and Histology. F. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Gross microscopic anatomy and physiology of gastrointestinal, cardiovascular, respiratory, hemopoietic, urinary systems in selected domestic animals.</td>
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<tr>
<td>VM 619 04(3-3-0)</td>
<td>Veterinary Neurobiology. S. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Structural and functional foundations of nervous system activity; introduction to clinical neurology.</td>
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<tr>
<td>VM 621 02(1-2-0)</td>
<td>Exotic Animal Anatomy and Husbandry. S. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Applied veterinary anatomy and husbandry of birds, reptiles, amphibians, and fish.</td>
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<tr>
<td>VM 623 02(2-0-0)</td>
<td>Veterinary Nutrition and Metabolism. S. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Intermediary metabolism, nutrients, and animal nutrition.</td>
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<tr>
<td>VM 624 03(2-2-0)</td>
<td>Veterinary Feeds and Feeding. S. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Description, advantages, and limitations of feedstuffs fed to domestic livestock; nutrient requirements and formulation of rations for various needs.</td>
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<tr>
<td>VM 625 02(2-0-0)</td>
<td>Principles of Diagnostic Imaging. F. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Diagnostic film and digital radiography, computed tomography, ultrasound, magnetic resonance, nuclear medicine, and radiographic and sonographic anatomy.</td>
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<tr>
<td>VM 637 03(3-0-0)</td>
<td>Veterinary Bacteriology and Mycology. S. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Biology of bacterial and fungal pathogens of animals with emphasis on common infectious diseases encountered in veterinary practice.</td>
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<tr>
<td>VM 638 02(2-0-0)</td>
<td>Veterinary Parasitology. S. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Biology of helminths, arthropod, and protozoan pathogens of animals with emphasis on common infectious diseases encountered in veterinary practice.</td>
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<tr>
<td>VM 639 02(2-0-0)</td>
<td>Veterinary Virology. S. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Biology of viral pathogens of animals with emphasis on common infectious diseases encountered in veterinary practice.</td>
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<tr>
<td>VM 640 05(4-0-1)</td>
<td>Biology of Disease I. S. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Introduction to mechanisms of subcellular, cellular, tissue, and organ response to injury and associated pathological processes.</td>
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<tr>
<td>VM 648/VS 648 02(2-0-0)</td>
<td>Food Animal Production and Food Safety. S. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Credit not allowed for both VM 648 and VS 648. Basic orientation to food animal production units, herd health concepts, and issues of food safety from preharvest through processing and distribution.</td>
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<tr>
<td>VM 707 01(1-0-0)</td>
<td>Emerging Issues in Infectious Disease. F. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Influence of microbial, host, and environmental changes on the emergence, control, and prevention of infectious disease of veterinary importance.</td>
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<tr>
<td>VM 710 01(5-1.5-0)</td>
<td>Foundations of Veterinary Medicine III. F. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Development of professional skills (ethics, communication, physical exam, surgical skills) necessary for the practice of veterinary medicine.</td>
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<tr>
<td>VM 711 01(5-1.5-0)</td>
<td>Foundations of Veterinary Medicine II. S. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Development of professional skills (ethics, communication, physical exam, surgical skills) necessary for the practice of veterinary medicine.</td>
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<tr>
<td>VM 712 04(4-0-0)</td>
<td>Practice Management/Professional Development. S. Prequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.</td>
<td>Veterinary practice management including marketing, finance, information systems, personnel issues, and client relations.</td>
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</tbody>
</table>

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VM 714 04(4-0-0). Veterinary Preventive Medicine. F. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Principles of health promotion and disease prevention in populations.

VM 716 01(1-0-0). Principles of Shelter Veterinary Medicine. S. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Introduces the principles of veterinary shelter medicine. Emphasis on management of small animals with herd health concepts.

VM 720 01(1-0-0). Alternative and Complementary Therapeutics. F. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Mechanisms and efficacy of alternative and complementary therapeutics used in veterinary medicine.

VM 721 02(0-0-2). Non-Mammalian Vertebrate Medicine. F, S. Prerequisite: VM 621; admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Diagnosis and treatment of diseases of non-mammalian vertebrates.

VM 722 04(4-0-0). Veterinary Pharmacology. F. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Basic and clinical pharmacology, therapeutic practice, and pharmacy management.

VM 724 06(4-0-2). Bioanalytical Pathology. F. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Mechanisms, interpretation, and applications of laboratory analyses for solving diagnostic problems.

VM 726 02(1-0-1). Principles of Imaging Interpretation I. S. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Clinical indications and interpretation for imaging modalities in examination of body systems.

VM 728 02(2-0-0). Principles of Imaging Interpretation II. F. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Interpretation of clinical imaging techniques used in diagnosis of specific diseases of organ systems.

VM 730 02(2-0-0). Applied Animal Behavior. S. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Identification, characterization, and treatment of common disorders of animal behavior encountered by practicing veterinarians.

VM 731 02(2-0-0). Biology and Diseases of Small Mammals. F, S. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Diagnosis and treatment of diseases of small mammals.

VM 733 02(2-0-0). Principles of Surgery. S. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Principles and concepts of general and orthopedic surgery.

VM 737 03(2-0-1). Principles of Anesthesia. S. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Integration of physiological and pharmacological principles in clinical anesthesiology.

VM 741 04(3-0-1). Biology of Disease II. F. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Pathogenesis of organ system diseases and integrated systemic pathology.

VM 742 01(0-0-1). Biology of Disease III. S. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Pathogenesis of disease in organ systems, systemic pathology.

VM 744 03(2-2-0). Theriogenology. S. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Reproductive function and disease, including mammary gland and endocrine regulation of reproduction and lactation.

VM 745 05(5-0-0). Clinical Sciences I. S. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Diagnostic approaches to common medical problems of cardiovascular, urinary, and digestive-hepatic systems.

VM 747 05(5-0-0). Clinical Sciences II. S. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Diagnostic approaches to common medical problems of organ systems.

VM 749 05(5-0-0). Clinical Sciences III. F. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Diagnostic approaches to common medical problems of organ systems.

VM 751 02(2-0-0). Veterinary Clinical Toxicology. F. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Common toxicants and poisonous plants encountered by companion and farm animal species, their pathophysiological effects, and clinical treatments.

VM 753 05(5-0-0). Clinical Sciences IV. F. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Diagnostic approaches to common medical problems of organ systems.

VM 757 03(3-0-0). Bovine Herd Medicine. S. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Health management, and diagnosis and treatment of diseases of food animals.

VM 763 05(5-0-0). Equine Medicine and Surgery. S. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Health management, and diagnosis and treatment of diseases of horses.

VM 773 04(4-0-0). Small Animal Medicine and Surgery I. S. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Health management, and diagnosis and treatment of diseases of dogs and cats.

VM 774 04(4-0-0). Small Animal Medicine and Surgery II. S. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
Health management, and diagnosis and treatment of diseases of dogs and cats.

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VM 786A-B Var[1-22]. Practicum. Prerequisite: A-B) Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
A) Junior practicum Var[6-8]. B) Senior practicum.

VM 795 Var[1-18]. Independent Study. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.

VM 796J-R. Group Study. Prerequisite: Admission to professional curriculum in veterinary medicine. All courses must be taken in prescribed sequence in the PVM program.
J) Swine medicine 01(1-0-0). R) Food animal clinical problems 03(3-0-0).

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CLINICAL SCIENCES COURSES
Department of Clinical Sciences
College of Veterinary Medicine and Biomedical Sciences

VS 313/ANEQ 313 03(3-0-0). Prevention and Control of Livestock Diseases. F. Prerequisite: ANEQ 230 or ANEQ 305 or BMS 300; ANEQ 310 or concurrent registration; ANEQ 320 or concurrent registration; junior or senior standing. Credit not allowed for both VS 313 and ANEQ 313.

Common ailments of livestock; sanitation and disease prevention and control.

VS 331 04(3-2-0). Histology, F, S, SS. Prerequisite: BMS 300. Credit allowed for only one of the following: BMS 330, BMS 331, VS 331.

Analysis of animal cells, tissues and organs emphasizing light microscopy. (NT-O)

VS 333 04(3-3-0). Domestic Animal Anatomy, F, S, SS. Prerequisite: LIFE 102 or BZ 110. Credit not allowed for both VS 333 and BMS 305.

Comparative functional anatomy of the dog, horse, and cow. (NT-O)

VS 479/BZ 479 03(3-0-0). Biology and Behavior of Dogs, F, S. Prerequisite: BZ 110 or LIFE 103. Credit not allowed for both VS 479 and BZ 479.

Interactions of physiology, neurobiology, and genetics on behavior of domestic dogs, and how evolution and domestication influence behavioral traits. (NT-O)

VS 495 Var. Independent Study, F, S, SS.

VS 533/MIP 533 03(2-0-1). Epidemiology of Infectious Diseases/ Zoonoses. S. Prerequisite: MIP 300. Credit not allowed for both VS 533 and MIP 533.

Epidemiologic features of infectious and parasitic diseases that have a major impact on community medicine.

VS 562 03(3-0-0). Applied Data Analysis. S. Prerequisite: STAT 301 or STAT 307.

Data management, application and interpretation of statistical analysis, and reporting of results for students in health science fields.

VS 570/AGRI 570 02(2-0-0). Issues in Animal Agriculture. F. Prerequisite: None. Credit not allowed for both VS 570 and AGRI 570.

Issues that have a major impact on the direction of changes in animal agriculture.

VS 579/NSCI 579 03(3-0-0). Animal Behavior in Captive Populations. F, S. Prerequisite: Enrollment in the M.P.N.S., Zoo, Aquarium and Shelter Management specialization, or BZ 300. Credit not allowed for both VS 579 and NSCI 579.

How animals learn, perceive their world, and behave, and how all of those intersect to alter behavior in captive settings.

VS 602 02(1-0-1). Critical Evaluation of Scientific Literature. F. Prerequisite: None.

Method of evaluating scientific literature. Students present critiques of papers they have chosen.

1VS 605 02(2-0-0). Comparative Anesthesiology. S. Prerequisite: None.

Techniques in anesthesia for large and small animals.

1VS 606 01(0-3-0). Comparative Anesthesiology Laboratory. S. Prerequisite: Concurrent registration in VS 605.

Techniques in anesthesia for large and small animals.

1Offered every third year.

VS 612 02(2-0-0). Plastic and Reconstructive Surgery. F. Prerequisite: DVM or equivalent.

Advances in surgical patient care, surgical instrumentation, and reconstruction.

VS 613 01(0-3-0). Plastic and Reconstructive Surgery Laboratory. F. Prerequisite: VM 766B.

Advances in surgical patient care, surgical instrumentation, and reconstruction.

1VS 626 02(2-0-0). Infertility and Genital Disease. F.

Infectious and noninfectious causes of reproductive failure in food animals.

VS 628 03(3-0-0). Physiology and Pathophysiology. F. Prerequisite: DVM degree, or BMS 500 and BMS 501.

Overview of the normal physiology and pathophysiology of disease states of mammalian organ systems.

1VS 630 03(3-0-0). Orthopedic Surgery. F. Prerequisite: None.

Techniques, devices, and prosthetic materials in rehabilitating musculoskeletal problems.

1VS 631 01(0-3-0). Orthopedic Surgery Laboratory. F. Prerequisite: VS 630 or concurrent registration; VM 786A or VM 786B.

Procedures applied to skeletal preparations and living animals.

VS 642 05(4-2-0). Ophthalmology. F. Prerequisite: None.

Instrumentation, ocular therapeutics, and clinical ophthalmology.

1VS 645 03(2-3-0). Surgery of the Eye. S. Prerequisite: None.

Techniques, indications, and complications.

VS 648/VM 648 02(2-0-0). Food Animal Production and Food Safety. S. Prerequisite: Enrollment in Food Science/Safety Graduate Interdisciplinary Studies Program. Credit not allowed for both VS 648 and VM 648.

Basic orientation to food animal production units, herd health concepts, and issues of food safety from preharvest through processing and distribution.

1VS 650 03(3-0-0). Comparative Abdominal Surgery. F.

New techniques in surgery of abdominal viscera.

1VS 651 01(0-3-0). Comparative Abdominal Surgery Laboratory. F. Prerequisite: DVM or equivalent.

Reparative and reconstructive abdominal surgical procedures.

1VS 655 03(2-3-0). Echocardiography in Veterinary Medicine. F. Prerequisite: Earned DVM degree or equivalent professional medicine degree.

Technical proficiency in obtaining echocardiographic images; fundamental understanding of diagnostic criteria for common cardiac disease in dogs and cats.

1VS 660 03(3-0-0). Neurology and Neurosurgery. S. Prerequisite: None.

Diagnostic and surgical techniques for the nervous system.

1VS 661 01(0-3-0). Neurology and Neurosurgery Laboratory. S. Prerequisite: DVM or equivalent.

Production and correction of surgically amenable lesions in central and peripheral nervous system; electrodiaesthesia.

1VS 673 03(3-0-0). Thoracic and Cardiovascular Surgery. F. Prerequisite: DVM or equivalent.

Surgical approaches to the thorax and the central and peripheral cardiovascular system.

1VS 674 01(0-3-0). Thoracic and Cardiovascular Surgery Laboratory. F. Prerequisite: VS 673 or concurrent registration; VM 786A or VM 786B.

Surgical procedures applied to the chest, heart, and vessels.

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VS 701 Var[1-3]. Postgraduate Medicine I. F.
Comprehensive review, update of immunology, emergency medicine, dermatology, and endocrinology.

VS 702 Var[1-3]. Postgraduate Medicine II. S.
Comprehensive review, update of neurology, gastroenterology, and ophthalmology.

VS 703 Var[1-3]. Postgraduate Medicine III. F.
Comprehensive review, update of oncology, cardiology, reproduction, ophthalmology, and radiology.

VS 704 Var[1-3]. Postgraduate Medicine IV. S.
Comprehensive review, update of hematology, nephrology, urology, respiratory, hepatic, and pancreatic.

VS 716 02(2-0-0). Advanced Studies in Reproduction. S.
Biochemical and physiological basis for problems in reproduction.

VS 718 02(0-0-4). Cancer Biology Clinical Practicum. SS.
Prerequisite: ERHS 510.
Exposes graduate students engaged in laboratory cancer research to cancer from a clinical perspective, through VTH clinical rotations.

VS 733 04(4-0-0). Advanced Veterinary Epidemiology. S. Prerequisite: ERHS 532; ERHS 542 or ERHS 544 or STAT 511 or STAT 512 or VS 662.
Advanced epidemiological and statistical techniques for the design and analysis of research projects.

VS 750 02(2-0-0). Clinical and Applied Pharmacology. S. Prerequisite: BMS 450 or DVM or equivalent degree.
Factors involved in drug dosing and variability of drug response. Applications in veterinary and human medicine.

VS 784 Var. Supervised College Teaching.

VS 792 Var. Seminar.

VS 795A-T Var[1-5]. Independent Study. Maximum of 5 credits allowed per subtopic.


VS 798 Var. Research.

WATERSHED SCIENCE COURSES
Department of Ecosystem Science and Sustainability
Warner College of Natural Resources

WR 304/GR 304 03(3-0-0). Sustainable Watersheds. (AUCC 3A). F, S. Prerequisite: Completion of the AUCC 1B Mathematics requirement.
Credit not allowed for both WR 304 and GR 304.
Effects of climate, land use, and water use on the sustainability of water quantity and quality.

+WR 406 03(2-3-0). Seasonal Snow Environments. S. Prerequisite: Junior or senior standing. Required field trips.
Evaluation of the physical environment; characteristics of snow; methods of studying snow; snow safety. ($)

WR 416 03(3-0-0). Land Use Hydrology. F. Prerequisite: (GEOL 120 or GEOL 122 or GEOL 124 or GEOL 150 or SOCR 240); (CIVE 202 or STAT 201 or STAT 301 or STAT 307 or STAT 315); (PH 110 or PH 121 or PH 141).
Fundamental concepts in hydrology and effects of land use on hydrologic processes.

+WR 417 03(2-3-0). Watershed Measurements. F. Prerequisite: Concurrent registration in WR 416. Required field trips.
Instrument and field techniques in watershed science. Project design and data analysis. ($)

WR 418 03(3-0-0). Land Use and Water Quality. S. Prerequisite: (CHEM 103; CHEM 104) or (CHEM 107; CHEM 108) or (CHEM 111; CHEM 112).
Physical, chemical, biological water quality parameters affecting land use; land management to maintain water quality; water quality standards, legislation.

WR 419 02(0-4-0). Water Quality Laboratory for Wildland Managers. S. Prerequisite: Concurrent registration in WR 418.
Sampling and determination of water quality parameters. ($)

WR 440 03(2-2-0). Watershed Problem Analysis. S. Prerequisite: NR 322 or NR 319; WR 416; WR 418.
Capstone integration of spatial watershed issues, focused on problem solving in watershed science.

WR 465 04(3-3-0). Eolian and Fluvial Transport Processes. F. Prerequisite: PH 141.
Fundamental physical principles of eolian and fluvial transport processes.

WR 474 03(3-0-0). Snow Hydrology. F. Prerequisite: None.
Snowfall, accumulation, distribution, physical processes in the snowpack, energy balance, ablation and runoff, measurement methods, runoff forecasting.

+WR 486 02(0-6-0). Watershed Field Practicum. F. Prerequisite: Junior year standing. Required field trips.
Field visits to watershed management projects and sites of significant field studies. ($)

WR 487 Var[1-6]. Internship. F, S, SS. Prerequisite: Written consent of instructor.
Supervised work experience in professional settings related to Watershed Science.

WR 492 Var. Seminar.

WR 495 Var. Independent Study in Watershed Resources.

°WR 510 02(2-0-0). Watershed Management in Developing Countries. S. Prerequisite: CIVE 322/ENVE 322 or GR 304/WR 304.
Watershed management problems, approaches, and solutions in developing countries.

WR 511 03(3-0-0). Water Resource Development. S. Prerequisite: Graduate standing; written consent of instructor.
Basic principles of water resource management including surface and subsurface flows. (NT-O)

WR 512 03(0-0-3). Water Law for Non-Lawyers. S. Prerequisite: Written consent of instructor; graduate standing.
Basics of water law and policy for Colorado, western states, and the U.S. (NT-O)

°WR 516 03(2-0-1). Cumulative Effects and Watershed Analysis. S. Prerequisite: WR 416; WR 417.
Definition, causal processes, and modeling of cumulative watershed effects; comparison and evaluation of current watershed analysis procedures.

WR 520 02(2-0-0). Evapotranspiration. S. Prerequisite: PH 122.
Theory, estimation, measurement, simulation, and application of evapotranspiration processes in hydrology.

°WR 524/°CIVE 524 03(2-2-0). Modeling Watershed Hydrology. S. Prerequisite: CIVE 322/ENVE 322 or WR 416; CIVE 202 or STAT 301 or STAT 315. Credit not allowed for both WR 524 and CIVE 524.
Development and application of watershed models: structure, calibration, evaluation, sensitivity analysis, simulation.

°WR 574 04(3-0-1). Advanced Snow Hydrology. F. Prerequisite: CIVE 322/ENVE 322 or WR 416.
Snow processes in hydrologic cycle; physical and conceptual methods of modeling; techniques for measuring different states and change rates.

WR 575 01(0-2-0). Snow Hydrology Field Methods. S. Prerequisite: Enrollment in a graduate program.
Field course offering hands-on experience in snow hydrology. ($)

°WR 616 03(1-0-2). Hillslope Hydrology and Runoff Processes. S. Prerequisite: CIVE 322/ENVE 322 or WR 416.
Hillslope hydrology and runoff processes in different environments; implications for management and modeling.

°WR 674 03(3-0-0). Data Issues in Hydrology. S. Prerequisite: WR 574.
Types of data, data sources, data quality, missing data, spatial data, data usage, sensitivity in models, error, presentation of data and results.

WR 692 Var. Seminar.

WR 695 Var. Independent Study.

WR 696 Var. Group Study.

WR 698 Var. Research.


°WR 712 03(2-2-0). Watershed Systems. F. Prerequisite: CIVE 322/ENVE 322 or WR 416; STAT 340.
Dynamic simulation of watershed behavior; application and evaluation of current hydrologic models.

°WR 714 03(3-0-0). Water Quality for Wildland Managers. F. Prerequisite: WR 418.
Sampling, statistics of sampling, concepts of ionic equilibrium, water quality modeling, instream flow requirements.

WR 798 Var. Research.


° Alternate year offering (odd); * Alternate year offering (even); + Field trips; $ Special course fee; NT Approved for nontraditional course offering (B = blended, C = correspondence, O = online, T = telecourse, V = videotape/DVD); GT-subcode = State Guarantee Transfer course and AUCCsubcode = All University Core Curriculum, where the subcode refers to the specific category the course fulfills. (See Introduction for more information.)
WS 200 03(3-0-0), Introduction to Women’s Studies. F, S, SS. Prerequisite: None. Examination of gender roles in work, education, spirituality, relationships, health, institutions, and organizations. (NT-O)

WS 397 03(3-0-0), Group Study.

WS 472 03(3-0-0), Seminar in Women’s Studies-Social Sciences. F, S. Prerequisite: Enrolled in Women’s Interdisciplinary Studies Program.

WS 495 Var [1-3], Independent Study. Prerequisite: Approval of Women’s Studies Director and relevant department head(s).

WS 692 03(0-0-3), Seminar in Women’s Studies. Prerequisite: One semester of enrollment in Women’s Interdisciplinary Graduate Studies Program.

WS 695 Var [1-3], Independent Study. Prerequisite: Approval of Women’s Studies Director and relevant department head.

WS 699 Var [3-6], Thesis. Prerequisite: Approval of Women’s Studies Program Board.

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